

REFERENCE: I-5715

PROJECT: 50128

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
PROJECT DESCRIPTION I-77 AND NC 73 INTERCHANGE,
UPGRADE EXISTING INTERCHANGE TO
SPLIT DIAMOND CONFIGURATION

SITE DESCRIPTION WIDENING OF BRIDGE NO. 358
OVER I-77 NORTHBOUND (-L3NB-) ON NC 73 (-Y2-)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5715	1	21

CAUTION NOTICE

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

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

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

- NOTES:
- 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

GRAHL, D.

GRAINGER, P.

BEATY, A.

TOOTHMAN, R.

TURNAGE, T.

INVESTIGATED BY GRAINGER, P.

DRAWN BY WELLS, T. R.

CHECKED BY RIGGS, A.F., JR.

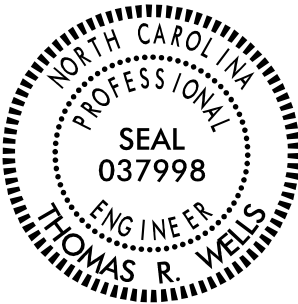
SUBMITTED BY WELLS, T. R.

DATE APRIL 2025

Prepared in the Office of:



7327-G W. FRIENDLY AVE.
GREENSBORO, NORTH CAROLINA 27410
NC REGISTERED ENGINEERING FIRM: E-0869
NC REGISTERED GEOLOGIC FIRM: C-367



DocuSigned by:

Thomas R. Wells 04/09/2025

F38C777458854E2 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

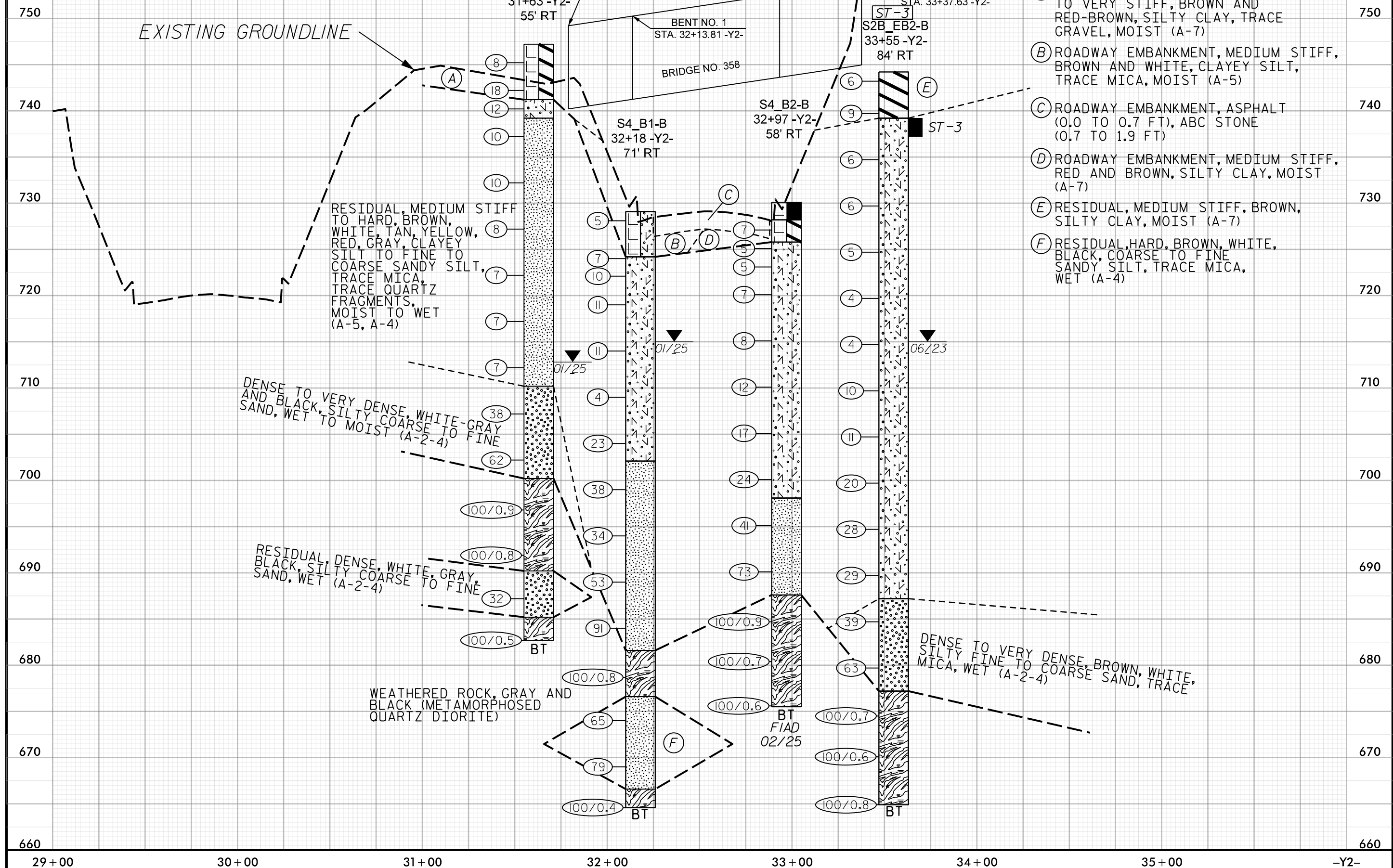
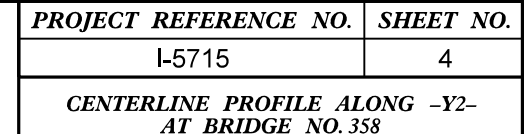
GEOTECHNICAL ENGINEERING UNIT

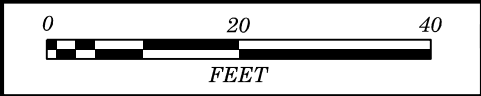
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (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 INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)									
GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.																				
GROUP CLASS.	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	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 SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.																					
SYMBOL																																							
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MX 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS		SILT-CLAY SOILS		MUCK, PEAT																							
MATERIAL PASSING #40 LL PI																SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS																					
GROUP INDEX																FAIR TO POOR		POOR		UNSATURABLE																			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND															SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS																			
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD															FAIR TO POOR		POOR		UNSATURABLE																			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																																							
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										ROCK HARDNESS										FRACTURE SPACING									
PRIMARY SOIL TYPE		COMPACTNESS OR CONSISTENCY		RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)				RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		DIP & DIP DIRECTION OF ROCK STRUCTURES		SLOPE INDICATOR INSTALLATION		CONE PENETROMETER TEST		SOUNDING ROD		TEST BORING WITH CORE		SPT N-VALUE															
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)		VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE		< 4 4 TO 10 10 TO 30 30 TO 50				N/A				SOIL SYMBOL		TEST BORING		SLOPE INDICATOR INSTALLATION		CONE PENETROMETER TEST		SOUNDING ROD		TEST BORING WITH CORE		SPT N-VALUE															
GENERALLY SILT-CLAY MATERIAL (COHESIVE)		VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD		< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30				< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4				INFERRED SOIL BOUNDARY		CORE BORING		SOUNDING ROD		CONE PENETROMETER TEST		SOUNDING ROD		TEST BORING WITH CORE		SPT N-VALUE															
GENERAL GRAIN SIZE		TEXTURE OR GRAIN SIZE		U.S. STD. SIEVE SIZE OPENING (MM)				4 4.76 10 2.00 40 0.42 60 0.25 200 0.075 270 0.053				BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE, SD.)		FINE SAND (F SD.)		SILT (SL.)		CLAY (CL.)															
GRAIN SIZE		305 12		75 3		2.0		0.25		0.05		0.005		AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HL - HIGHLY		MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY		VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO																					
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING									
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION				DRILL UNITS:		ADVANCING TOOLS:		HAMMER TYPE:		CORE SIZE:		HAND TOOLS:		FRIABLE		MODERATELY INDURATED		INDURATED		EXTREMELY INDURATED															
LL - LIQUID LIMIT		- SATURATED - (SAT.)		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE				CME-45C		CLAY BITS		AUTOMATIC		-B		POST HOLE DIGGER		RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.															
PL - PLASTIC LIMIT		- WET - (W)		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE				CME-55		6" CONTINUOUS FLIGHT AUGER		MANUAL		-H		HAND AUGER																							
OM - OPTIMUM MOISTURE		- MOIST - (M)		SOLID; AT OR NEAR OPTIMUM MOISTURE				CME-550		8" HOLLOW AUGERS				-N		SOUNDING ROD																							
SL - SHRINKAGE LIMIT		- DRY - (D)		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE				VANE SHEAR TEST		HARD FACED FINGER BITS						VANE SHEAR TEST																							
PLASTICITY		PLASTICITY INDEX (PI)		DRY STRENGTH				CME-55 (TRI0055)		TUNG-CARBIDE INSERTS						VANE SHEAR TEST																							
NON PLASTIC		0-5		VERY LOW				MOBILE B-57 (TER4013)		CASING						VANE SHEAR TEST																							
SLIGHTLY PLASTIC		6-15		SLIGHT						TRICONE						VANE SHEAR TEST																							
MODERATELY PLASTIC		16-25		MEDIUM						TRICONE						VANE SHEAR TEST																							
HIGHLY PLASTIC		26 OR MORE		HIGH						TRICONE						VANE SHEAR TEST																							
COLOR										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										DRILL UNITS:										ADVANCING TOOLS:		HAMMER TYPE:		CORE SIZE:		HAND TOOLS:		FRIABLE		MODERATELY INDURATED		INDURATED		EXTREMELY INDURATED					
										CME-45C		CLAY BITS		AUTOMATIC		-B		POST HOLE DIGGER		RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.													
										CME-55		6" CONTINUOUS FLIGHT AUGER		MANUAL		-H		HAND AUGER																					
										CME-550		8" HOLLOW AUGERS				-N		SOUNDING ROD																					
										VANE SHEAR TEST		HARD FACED FINGER BITS						VANE SHEAR TEST																					
										PORTABLE HOIST		TUNG-CARBIDE INSERTS						VANE SHEAR TEST																					
										CME-55 (TRI0055)		CASING						VANE SHEAR TEST																					
										MOBILE B-57 (TER4013)		TRICONE						VANE SHEAR TEST																					
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NOTE:	INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE EXISTING GROUND PROFILE ALONG THE CENTERLINE OF -Y2- TAKEN FROM THE PROVIDED PROJECT TIN FILE (15715_ls_tin.tin).	END PENT NO. 1
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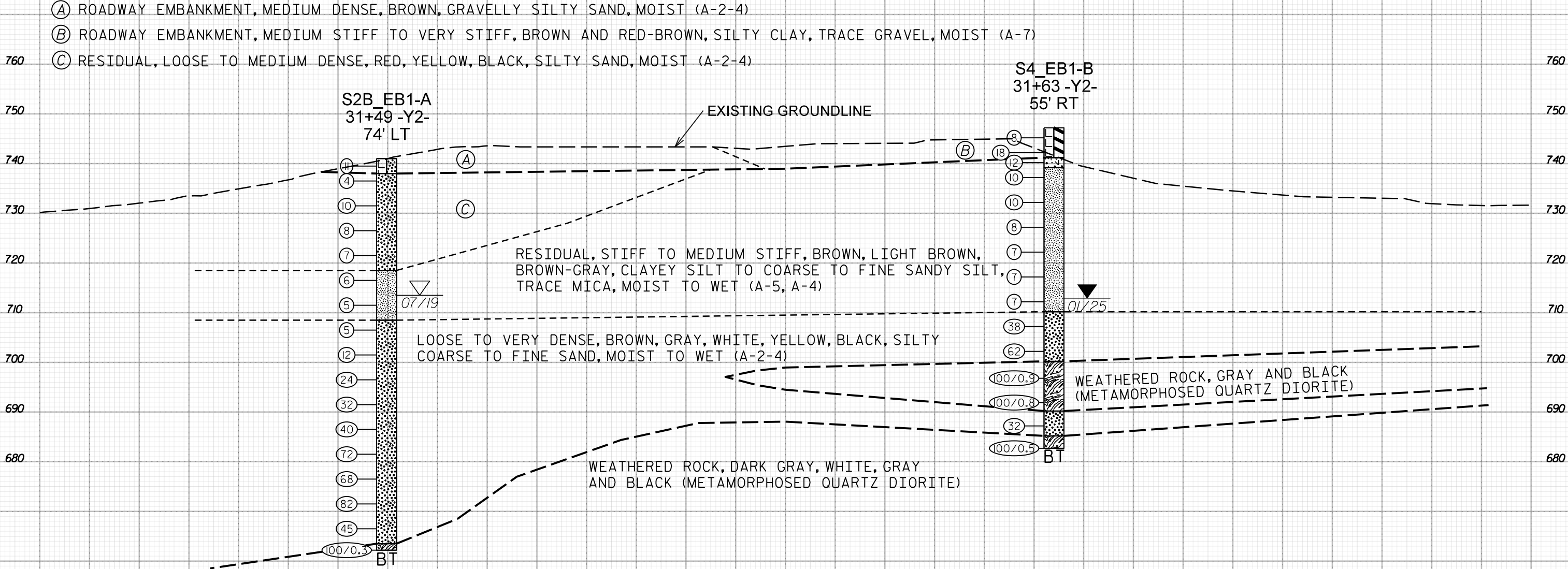
PROJ. REFERENCE NO.	SHEET NO.
I-5715	5

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

NOTE:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED
ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_Is_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 42' 58"

CROSS SECTION THROUGH END BENT NO. 1 AT STA. 31+79.06 -Y2-

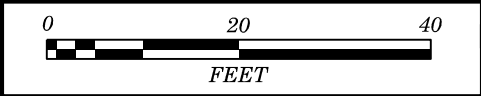
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31 + 79.06

-Y2-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



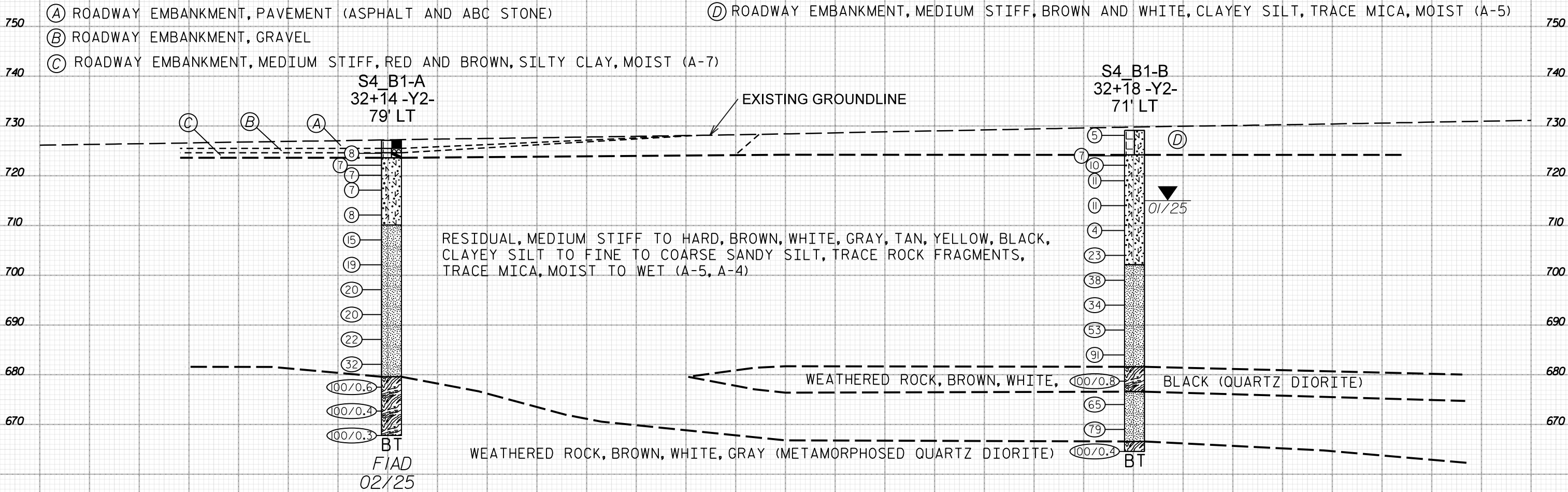
PROJ. REFERENCE NO.	SHEET NO.
I-5715	6

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

NOTE:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED
ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_ls_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 42' 58"

CROSS SECTION THROUGH BENT NO. 1 AT STA. 32+13.81 -Y2-

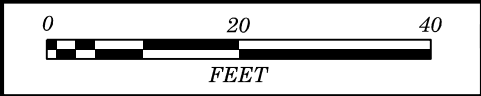
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32 + 13.81

-Y2-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

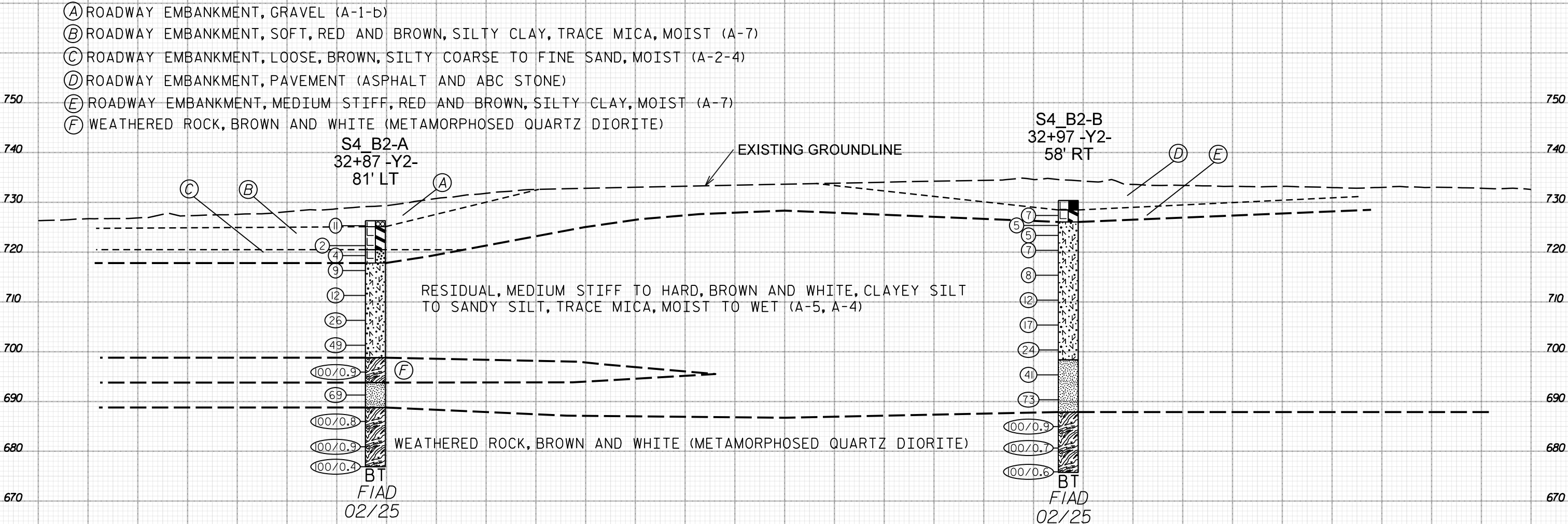


150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

NOTE:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED
ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_ls_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 42' 58"

CROSS SECTION THROUGH BENT NO. 2 AT STA. 33 + 93.30 -Y2-

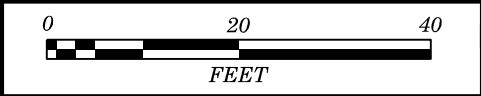
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33 + 93.30

-Y2-

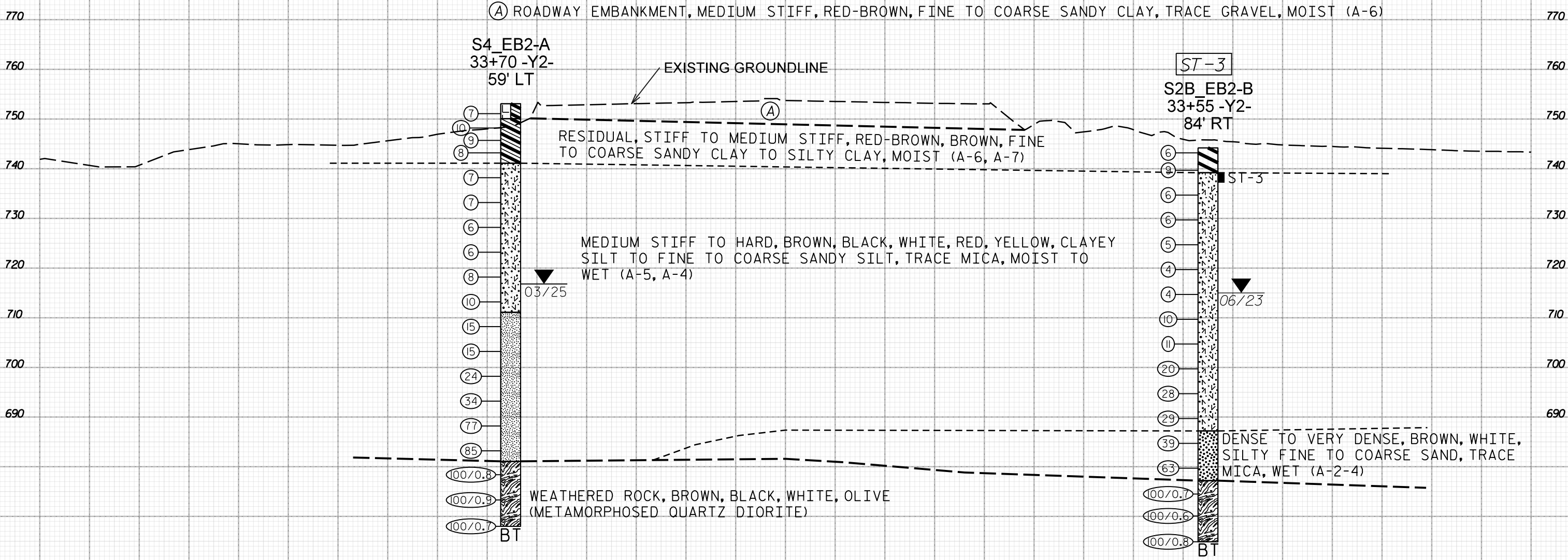
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



PROJ. REFERENCE NO.	SHEET NO.
I-5715	8

NOTE:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED
ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_ls_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 42' 58"

CROSS SECTION THROUGH END BENT NO. 2 AT STA. 33+37.63 -Y2-



33 + 37.63

-Y2-

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50128.1.FS1		TIP I-5715		COUNTY MECKLENBURG		GEOLOGIST WELLS, T.									
SITE DESCRIPTION Widening of Bridge No. 358 over I-77 Northbound (-L3NB-) on NC 73 (-Y2-)													GROUND WTR (ft)		
BORING NO. S4_EB1-B		STATION 31+63		OFFSET 55 ft RT		ALIGNMENT -Y2-		0 HR.		N/A					
COLLAR ELEV. 747.2 ft		TOTAL DEPTH 64.5 ft		NORTHING 621,144		EASTING 1,443,422		24 HR.		34.4					
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024				DRILL METHOD Mud Rotary				HAMMER TYPE Automatic							
DRILLER TURNAGE, J. R.		START DATE 01/20/25		COMP. DATE 01/20/25		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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
750															
745	746.2	1.0	3	4	4	3						M		747.2	0.0
	743.2	4.0	5	10	8	18						M			
740	741.2	6.0	3	5	7	12						M		741.2	6.0
	738.2	9.0	2	4	6	10						M		739.2	8.0
735												M			
	733.2	14.0	2	4	6	10						M			
730												M			
	728.2	19.0	2	3	5	8						M			
725												M			
	723.2	24.0	2	3	4	7						M			
720												M			
	718.2	29.0	2	3	4	7						W			
715															
	713.2	34.0	2	2	5	7									
710														710.2	37.0
	708.2	39.0	9	16	22	38						W		DENSE TO VERY DENSE, WHITE-GRAY AND BLACK, SILTY COARSE TO FINE SAND, WET TO MOIST (A-2-4)	
705												M			
	703.2	44.0	12	27	35	62								700.2	47.0
700															
	698.2	49.0	23	42	58/0.4						100/0.9			WEATHERED ROCK GRAY AND BLACK (METAMORPHOSED QUARTZ DIORITE)	
695															
	693.2	54.0	28	51	49/0.3						100/0.8			690.2	57.0
690															
	688.2	59.0	14	16	16	32						W		RESIDUAL DENSE, WHITE, GRAY, BLACK, SILTY COARSE TO FINE SAND, WET (A-2-4)	
685														685.2	62.0
	683.2	64.0	100/0.5								100/0.5			WEATHERED ROCK WHITE GRAY AND BLACK (METAMORPHOSED QUARTZ DIORITE)	64.5
														Boring Terminated at Elevation 682.7 ft IN WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE)	

WBS 50128.1.FS1		TIP I-5715		COUNTY MECKLENBURG		GEOLOGIST GRAINGER, P.							
SITE DESCRIPTION Widening of Bridge No. 358 over I-77 Northbound (-L3NB-) on NC 73 (-Y2-)							GROUND WTR (ft)						
BORING NO. S4_B1-A		STATION 32+14		OFFSET 79 ft LT		ALIGNMENT -Y2-		0 HR.	N/A				
COLLAR ELEV. 727.1 ft		TOTAL DEPTH 59.3 ft		NORTHING 621,272		EASTING 1,443,487		24 HR.	FIAD				
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024				DRILL METHOD Mud Rotary			HAMMER TYPE Automatic						
DRILLER TURNAGE, J. R.		START DATE 02/24/25		COMP. DATE 02/25/25		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	MOI		
730													
725	725.5	1.6	8	3	5	1							727.1 GROUND SURFACE 0.0
720	723.1	4.0	2	3	4	3						M	725.5 ROADWAY EMBANKMENT 1.6
	721.1	6.0	4	3	4	7						M	724.6 ASPHALT (0.0 TO 0.7 FT), ABC STONE 2.5
	718.1	9.0	2	3	4	7						M	723.8 GRAVEL (0.7 TO 1.6 FT) 3.5
715	713.1	14.0	2	3	5	8						M	MEDIUM STIFF, RED AND BROWN, SILTY CLAY, MOIST (A-7)
	708.1	19.0	3	6	9	15						M	RESIDUAL MEDIUM STIFF, BROWN, WHITE, GRAY, CLAYEY SILT, TRACE ROCK FRAGMENTS, TRACE MICA, MOIST (A-5)
710													710.1 VERY STIFF TO HARD, GRAY, BROWN, WHITE, SANDY SILT, MOIST (A-4) 17.0
705	703.1	24.0	4	8	11	19						M	
	698.1	29.0	5	9	11	20						M	
700	693.1	34.0	5	9	11	20						M	
	688.1	39.0	6	9	13	22						M	
695	683.1	44.0	10	16	16	32						M	
	678.1	49.0	55	45/0.1						100/0.6			679.6 WEATHERED ROCK 47.5
690	673.1	54.0	100/0.4							100/0.4			BROWN, WHITE, GRAY (METAMORPHOSED QUARTZ DIORITE)
	668.1	59.0	100/0.3							100/0.3			667.8 Boring Terminated at Elevation 667.8 ft IN WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE) 59.3

NCDOT BORE DOUBLE I5715_GEO_STRUC.GPJ NC_DOT.GDT 4/1/25

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50128.1.FS1				TIP I-5715				COUNTY MECKLENBURG				GEOLOGIST GRAINGER, P.					
SITE DESCRIPTION Widening of Bridge No. 358 over I-77 Northbound (-L3NB-) on NC 73 (-Y2-)												GROUND WTR (ft)					
BORING NO. S4_B1-B				STATION 32+18				OFFSET 71 ft RT				ALIGNMENT -Y2-				0 HR. N/A	
COLLAR ELEV. 729.1 ft				TOTAL DEPTH 64.5 ft				NORTHING 621,123				EASTING 1,443,475				24 HR. 14.1	
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024								DRILL METHOD Mud Rotary				HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.				START DATE 01/21/25				COMP. DATE 01/21/25				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			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
730																	
	729.1	0.0	2	2	3									729.1		GROUND SURFACE 0.0	
725	725.0	4.1															
			2	3	4												
	723.1	6.0	2	4	6												
720	720.0	9.1	4	4	7												
715	715.0	14.1	3	4	7												
710	710.0	19.1	2	1	3												
705	705.0	24.1	9	11	12												
700	700.0	29.1	10	15	23												
695	695.0	34.1	7	13	21												
690	690.0	39.1	15	22	31												
685	685.0	44.1	16	36	55												
680	680.0	49.1	26	46	54/0.3												
675	675.0	54.1	14	33	32												
670	670.0	59.1	21	40	39												
665	665.0	64.1	100/0.4														
	</																

WBS 50128.1.FS1				TIP I-5715				COUNTY MECKLENBURG				GEOLOGIST GRAINGER, P.					
SITE DESCRIPTION Widening of Bridge No. 358 over I-77 Northbound (-L3NB-) on NC 73 (-Y2-)												GROUND WTR (ft)					
BORING NO. S4_B2-A				STATION 32+87				OFFSET 81 ft LT				ALIGNMENT -Y2-				0 HR. N/A	
COLLAR ELEV. 726.3 ft				TOTAL DEPTH 49.4 ft				NORTHING 621,267				EASTING 1,443,560				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024								DRILL METHOD Mud Rotary				HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.				START DATE 02/26/25				COMP. DATE 02/26/25				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			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
730																	
725	726.3	0.0	10	7	4										726.3 GROUND SURFACE 0.0		
															725.1 ROADWAY EMBANKMENT 1.2		
720	722.3	4.0	2	1	1										GRAVEL (A-1-b)		
	720.3	6.0	2	2	2										SOFT, RED AND BROWN, SILTY CLAY, TRACE MICA, MOIST (A-7)		
715	717.3	9.0	2	4	5										720.5 LOOSE, BROWN, SILTY COARSE TO 5.8		
															FINE SAND, MOIST (A-2-4)		
710	712.3	14.0	3	5	7										717.8 RESIDUAL 8.5		
															STIFF TO HARD, BROWN AND WHITE, CLAYEY SILT, TRACE MICA, MOIST (A-5)		
705	707.3	19.0	5	9	17												
	702.3	24.0	24	26	23												
700																	
	697.3	29.0	32	52	48/0.4										698.8 WEATHERED ROCK 27.5		
695															BROWN AND WHITE (QUARTZ DIORITE)		
	692.3	34.0	17	28	41										693.8 RESIDUAL 32.5		
685	687.3	39.0	31	65	35/0.3										HARD, BROWN AND WHITE, SANDY SILT, TRACE MICA, WET (A-4)		
															688.8 WEATHERED ROCK 37.5		
680	682.3	44.0	25	53	47/0.4										BROWN AND WHITE (METAMORPHOSED QUARTZ DIORITE)		
	677.3	49.0	100/0.4												676.9 Boring Terminated at Elevation 676.9 ft IN 49.4		
															WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE)		

NCDOT BORE DOUBLE I5715_GEO_STRUC.GPJ NC_DOT.GDT 4/1/25

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50128.1.FS1			TIP I-5715			COUNTY MECKLENBURG			GEOLOGIST GRAINGER, P.					
SITE DESCRIPTION Widening of Bridge No. 358 over I-77 Northbound (-L3NB-) on NC 73 (-Y2-)									GROUND WTR (ft)					
BORING NO. S4_B2-B			STATION 32+97			OFFSET 58 ft RT			ALIGNMENT -Y2-			0 HR. N/A		
COLLAR ELEV. 730.1 ft			TOTAL DEPTH 54.6 ft			NORTHING 621,128			EASTING 1,443,556			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.			START DATE 02/25/25			COMP. DATE 02/25/25			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)
735														
730													730.1	0.0
	728.1	2.0	2	3	4	1						M	728.2	1.9
	726.1	4.0	1	2	3	7						M	ROADWAY EMBANKMENT ASPHALT (0.0 TO 0.7 FT), ABC STONE (0.7 TO 1.9 FT)	
725	724.1	6.0	2	2	3	5						M	725.8	4.3
	721.1	9.0	2	3	4	1						M	ROADWAY EMBANKMENT MEDIUM STIFF, RED AND BROWN, SILTY CLAY, MOIST (A-7)	
720						1						M	RESIDUAL MEDIUM STIFF TO VERY STIFF, BROWN AND WHITE, CLAYEY SILT, TRACE MICA, MOIST (A-5)	
	716.1	14.0	2	3	5	1						M		
715						8						M		
	711.1	19.0	3	5	7	12						M		
710												M		
	706.1	24.0	5	7	10	17						M		
705												M		
	701.1	29.0	7	11	13	24						M		
700												M		
	696.1	34.0	12	18	23	41						W	698.1	32.0
695												W	HARD, BROWN AND WHITE, SANDY SILT, TRACE MICA, WET (A-4)	
	691.1	39.0	17	33	40	73						W		
690												W		
	686.1	44.0	28	51	49/0.4								687.6	42.5
685													WEATHERED ROCK BROWN AND WHITE (METAMORPHOSED QUARTZ DIORITE)	
	681.1	49.0	52	48/0.2										
680														
	676.1	54.0	73	27/0.1									675.5	54.6
													Boring Terminated at Elevation 675.5 ft IN WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE)	

NCDOT BORE DOUBLE I5715_GEO_STRUC.GPJ NC_DOT.GDT 4/1/25

NCNDOT BORE DOUBLE I5715_GEO_STRUC.GPJ NC_DOT.GDT 4/1/25

WBS 50128.1.FS1			TIP I-5715			COUNTY MECKLENBURG			GEOLOGIST BEATY, A.				
SITE DESCRIPTION Widening of Bridge No. 358 over I-77 Northbound (-L3NB-) on NC 73 (-Y2-)									GROUND WTR (ft)				
BORING NO. S4_EB2-A			STATION 33+70			OFFSET 59 ft LT			ALIGNMENT -Y2-		0 HR. N/A		
COLLAR ELEV. 753.1 ft			TOTAL DEPTH 85.1 ft			NORTHING 621,236			EASTING 1,443,640		24 HR. 36.3		
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic				
DRILLER TURNAGE, J. R.			START DATE 02/17/25			COMP. DATE 02/18/25			SURFACE WATER DEPTH N/A				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
675	674.2	78.9				Match Line							
670	669.2	83.9	45	55/0.4		100/0.9							WEATHERED ROCK BLACK, WHITE, OLIVE (METAMORPHOSED QUARTZ DIORITE) (continued)
			35	60	30/0.2	100/0.7							
Boring Terminated at Elevation 668.0 ft IN WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE)													

NC DOT BORE DOUBLE I5715 GEO_STRUC.GPJ NC_DOT.GDT 4/1/25

[illegible]

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 50128.1.FS1

TIP: I-5715

COUNTY: Mecklenburg

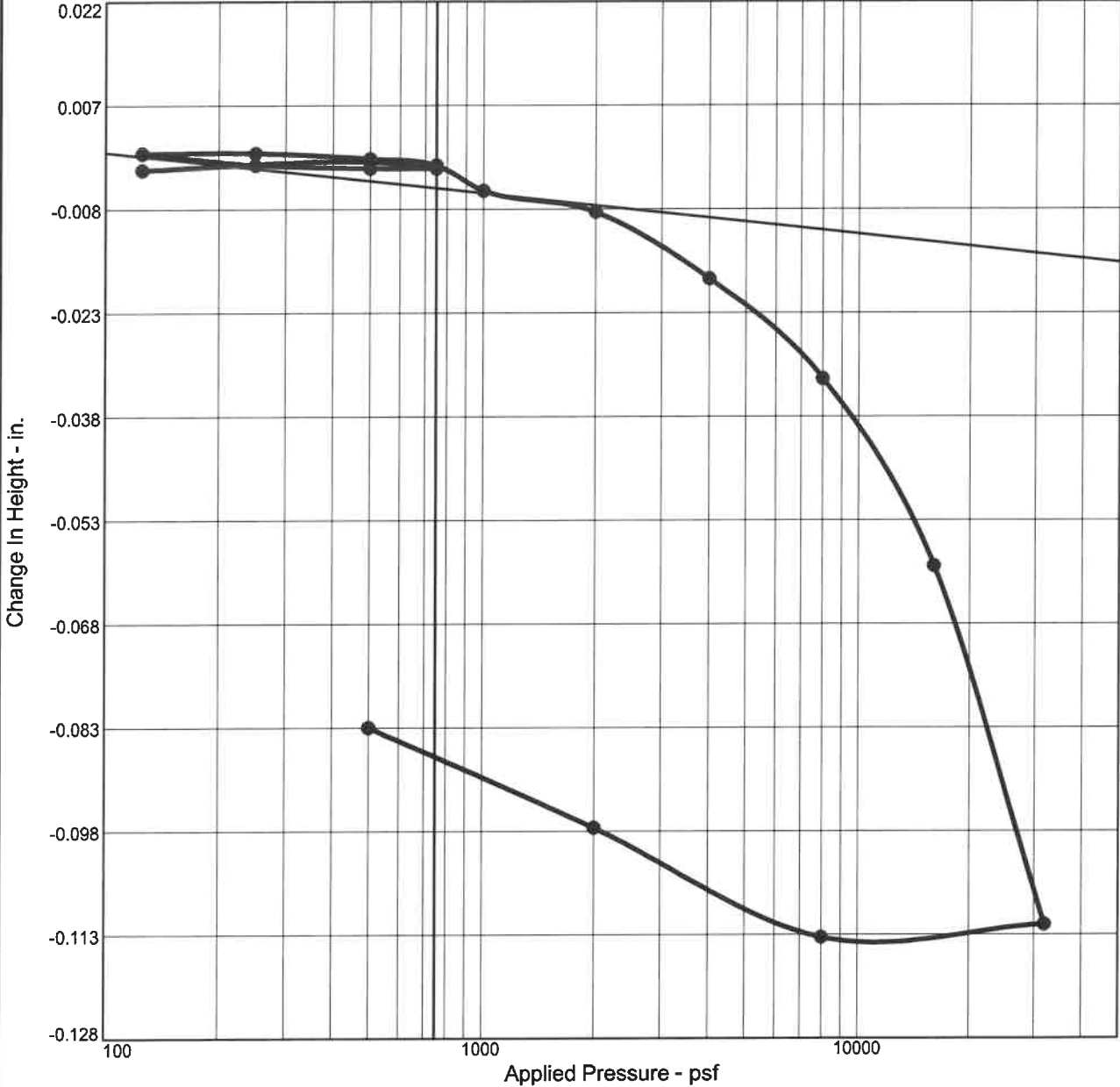
DESCRIPTION: I-77 and the NC 73 Interchange: Widening of Bridge No. 358 over I-77 Northbound (-L3NB-) on NC 73 (-Y2-)

[illegible]

Mitra Grabski
Certified Lab Technician Signature

114-01-1203
Certification Number

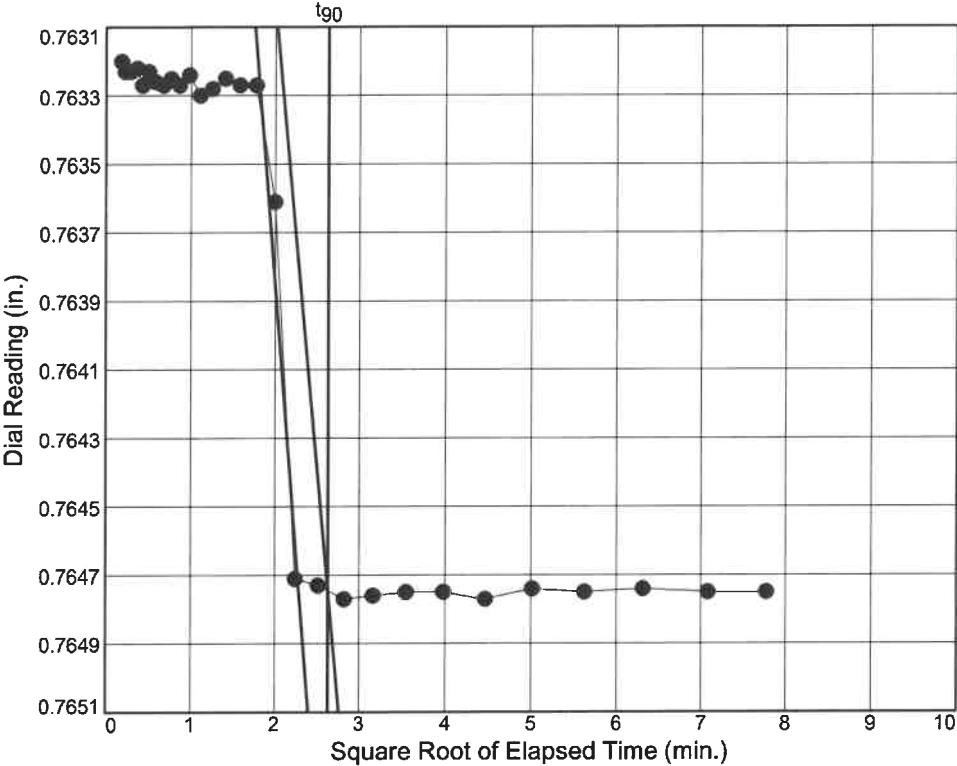
CONSOLIDATION TEST REPORT



MATERIAL DESCRIPTION											USCS		AASHTO	
Light Reddish Brown Sandy SILT with mica											MH		A-5(6)	
LL	PI	Sp. Gr.	Overburden (psf)	Dry Dens. (pcf)		Moisture		Saturation		Void Ratio		P _c (psf)	C _c	
				Init.	Final	Init.	Final	Init.	Final	Init.	Final			
57	9	2.736		83.1	83.7	30.9 %	32.7	80.1 %	100.0	1.057	0.886	4134	0.01	
Preparation Process: AASHTO T-216									D2435 Method	C _r	Swell Press. (psf)		Swell %	
Condition of Test: Un-disturbed									T-216	0.02				
Project No. 75235097 Client: NCDOT									Remarks: S2B-EB2-B @(5-7)'					
Project: I-77& NC 73 Interchange-I-5715														
Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3									Checked By: M. Grabski					
Terracon Consultants, Inc.									Title: lab Manager					
Charlotte, North Carolina									Figure 1					

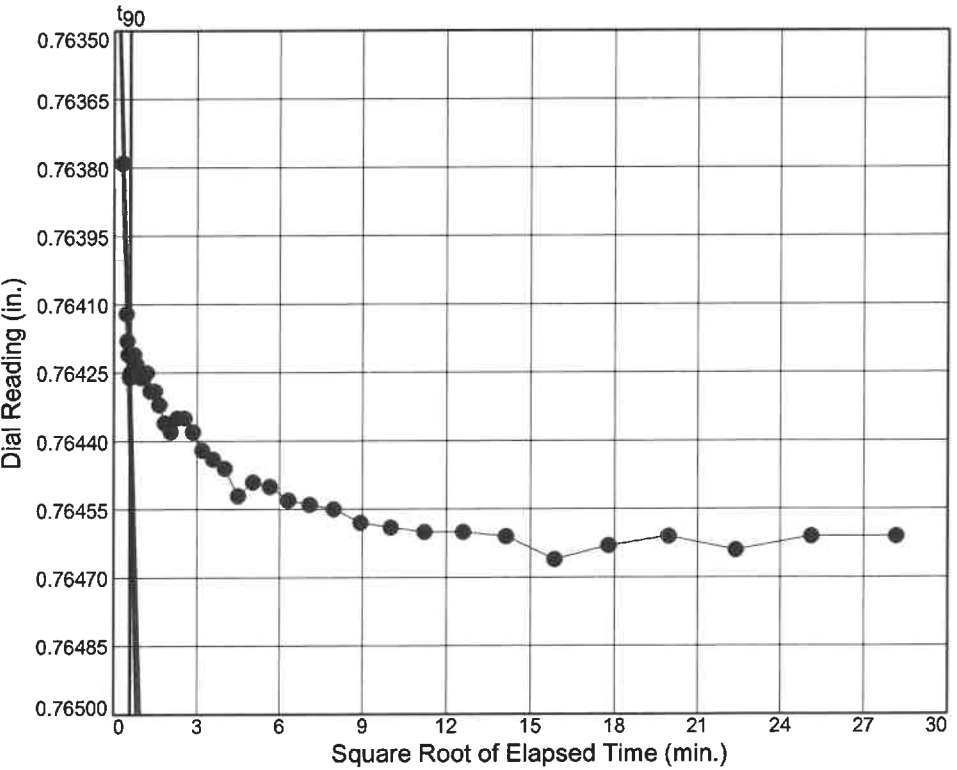
Dial Reading vs. Time

Project No.: 75235097
Project: I-77& NC 73 Interchange-I-5715
Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3



Load No.= 1
Load= 125 psf
D₀ = 0.7576
D₉₀ = 0.7647
D₁₀₀ = 0.7655
T₉₀ = 6.91 min.

C_v @ T₉₀
0.031 in.²/min.



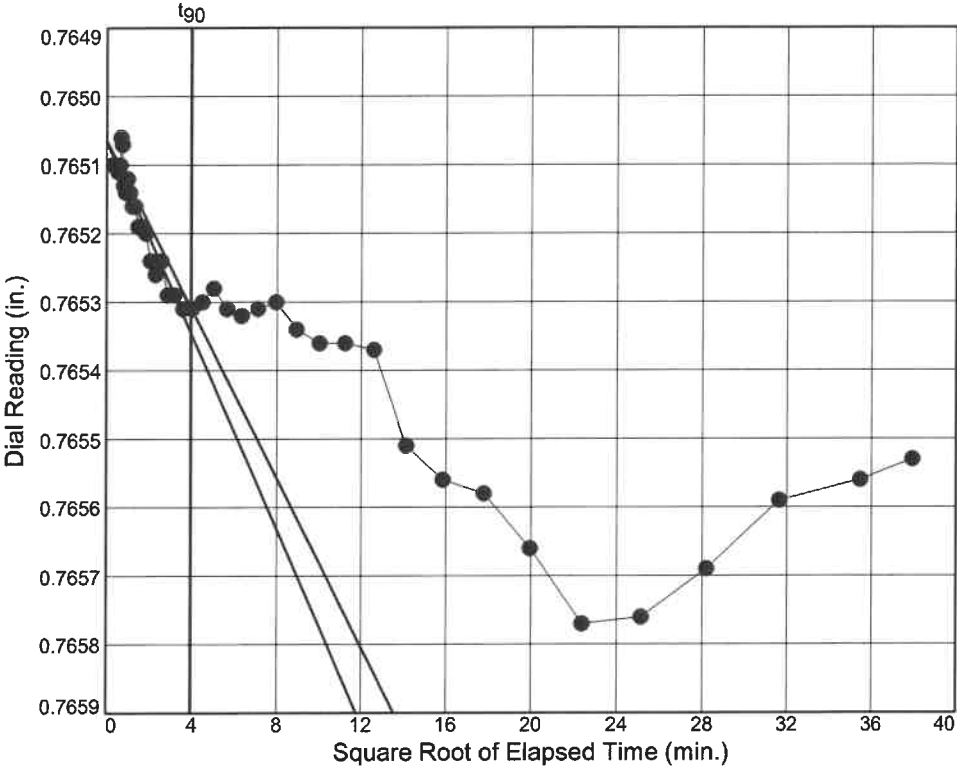
Load No.= 2
Load= 500 psf
D₀ = 0.7630
D₉₀ = 0.7643
D₁₀₀ = 0.7644
T₉₀ = 0.34 min.

C_v @ T₉₀
0.618 in.²/min.

Dial Reading vs. Time

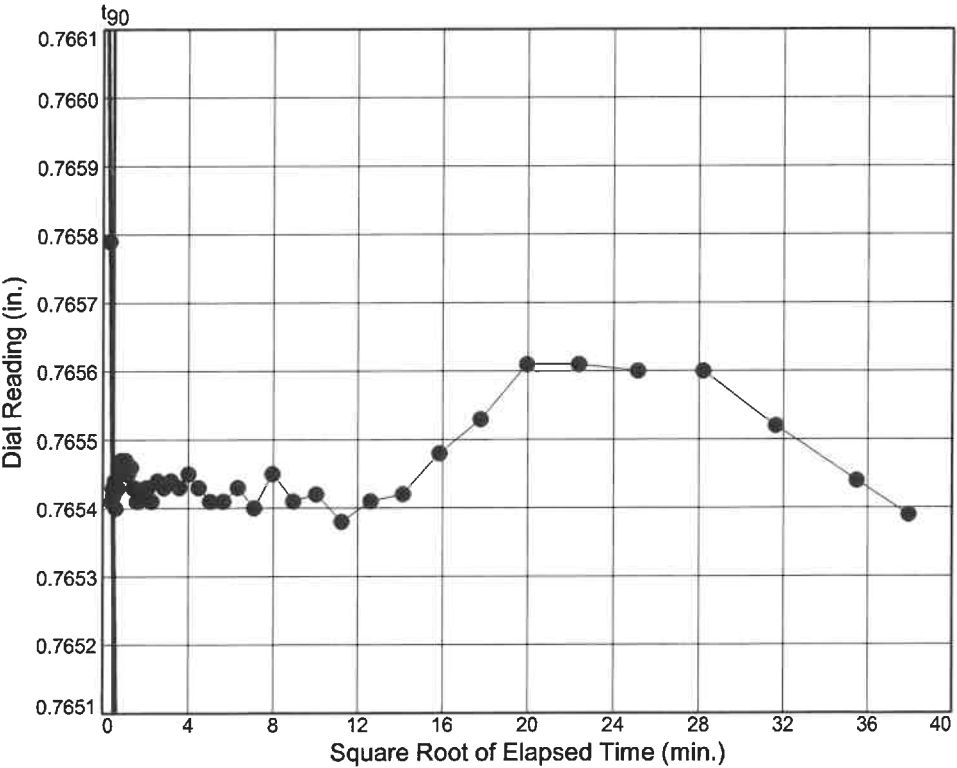
Project No.: 75235097
Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3



Load No.= 3
Load=750 psf
 $D_0 = 0.7651$
 $D_{90} = 0.7653$
 $D_{100} = 0.7653$
 $T_{90} = 15.64$ min.

$C_v @ T_{90}$
0.014 in.²/min.



Load No.= 4
Load=500 psf
 $D_0 = 0.7667$
 $D_{90} = 0.7654$
 $D_{100} = 0.7653$
 $T_{90} = 0.26$ min.

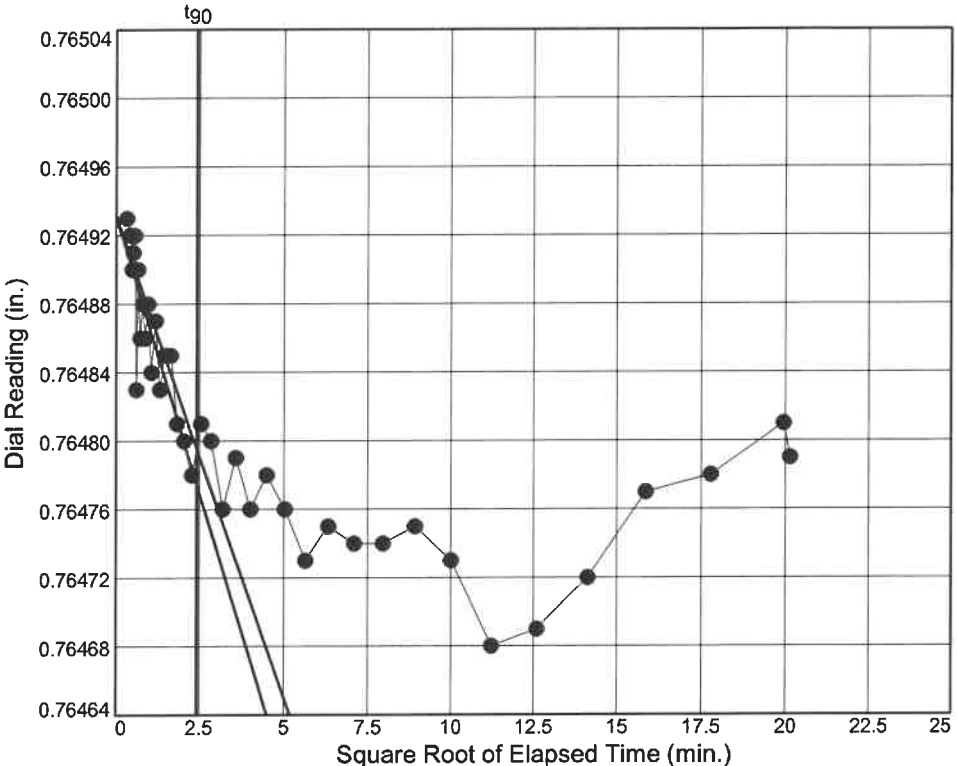
$C_v @ T_{90}$
0.813 in.²/min.

Figure 3

Dial Reading vs. Time

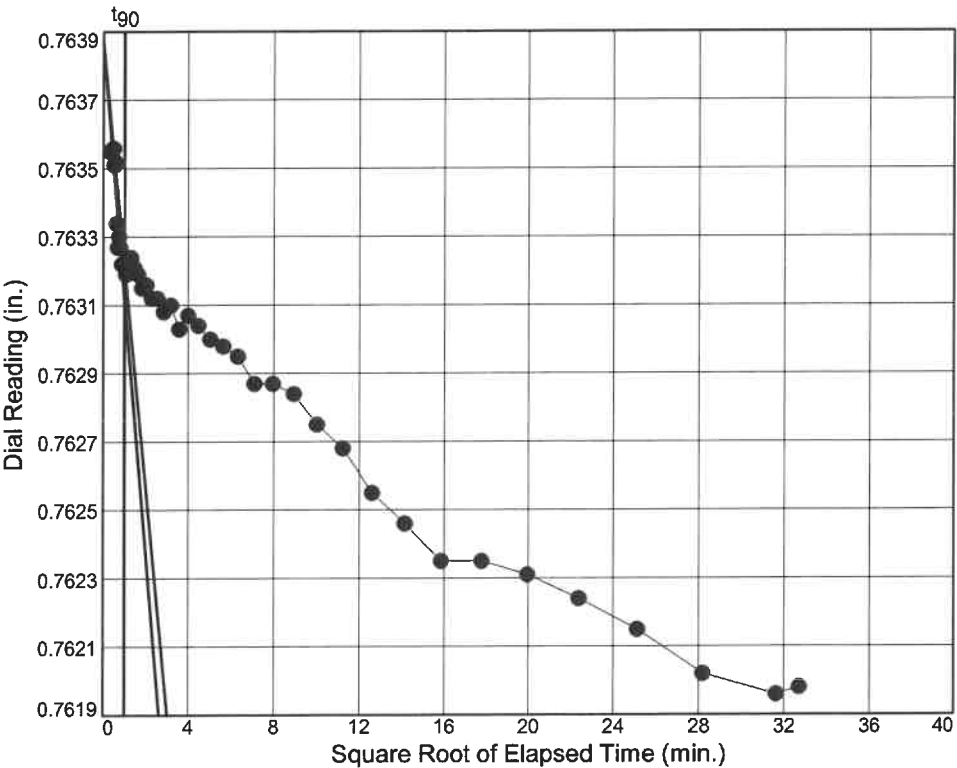
Project No.: 75235097
Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3



Load No.= 5
Load=250 psf
 $D_0 = 0.7649$
 $D_{90} = 0.7648$
 $D_{100} = 0.7648$
 $T_{90} = 5.87$ min.

$C_v @ T_{90}$
0.036 in.²/min.



Load No.= 6
Load=125 psf
 $D_0 = 0.7639$
 $D_{90} = 0.7632$
 $D_{100} = 0.7631$
 $T_{90} = 1.04$ min.

$C_v @ T_{90}$
0.204 in.²/min.

Figure 4

Dial Reading vs. Time

Project No.: 75235097

Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B

Depth: 5.0-7.0 ft

Sample Number: ST-3

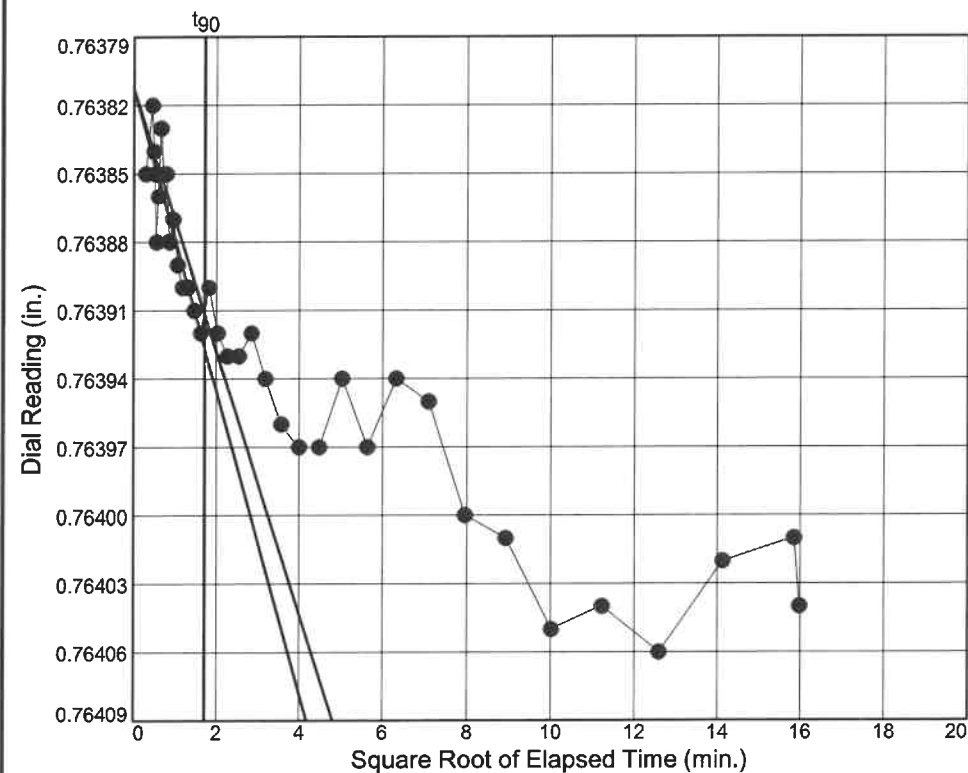
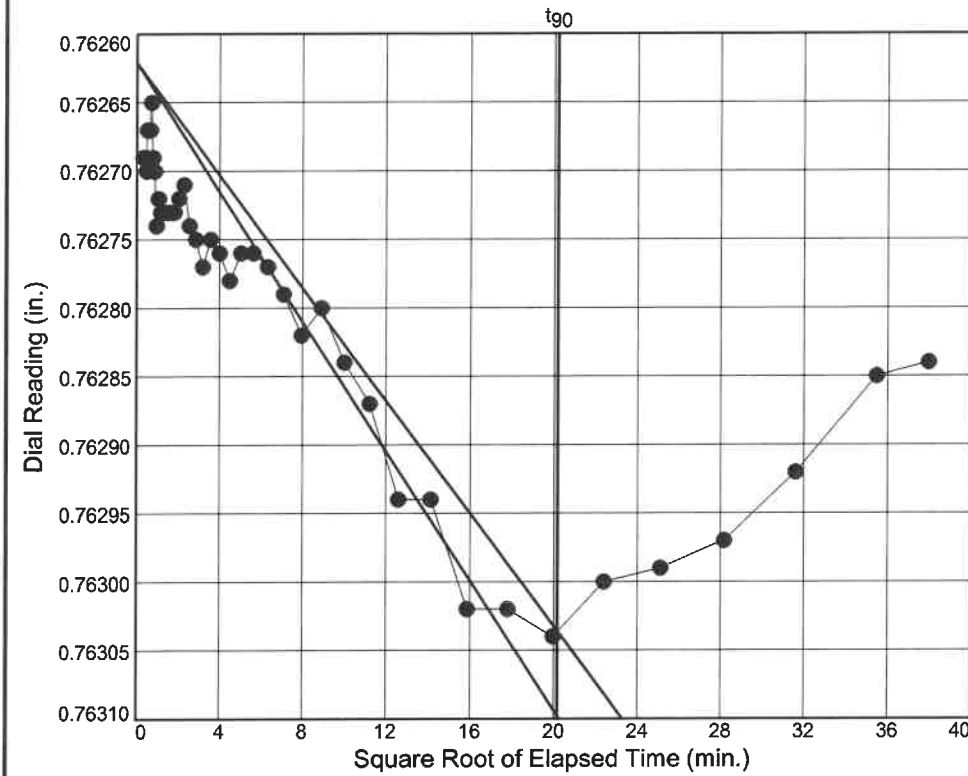


Figure 5

Terracon Consultants, Inc.

Dial Reading vs. Time

Project No.: 75235097

Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B

Depth: 5.0-7.0 ft

Sample Number: ST-3

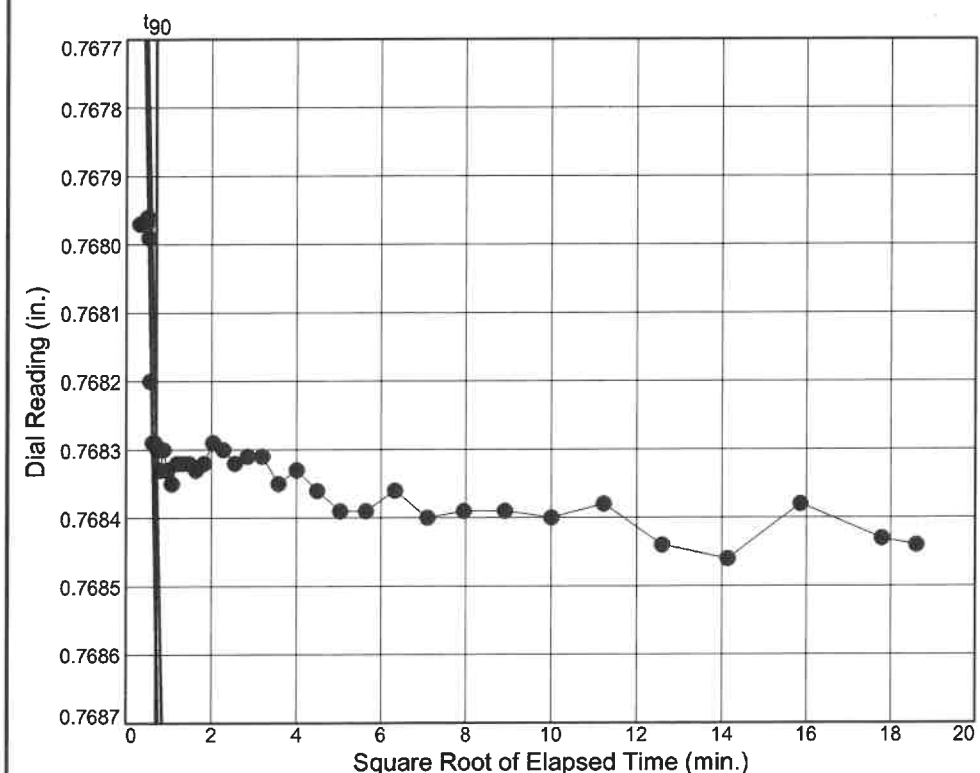
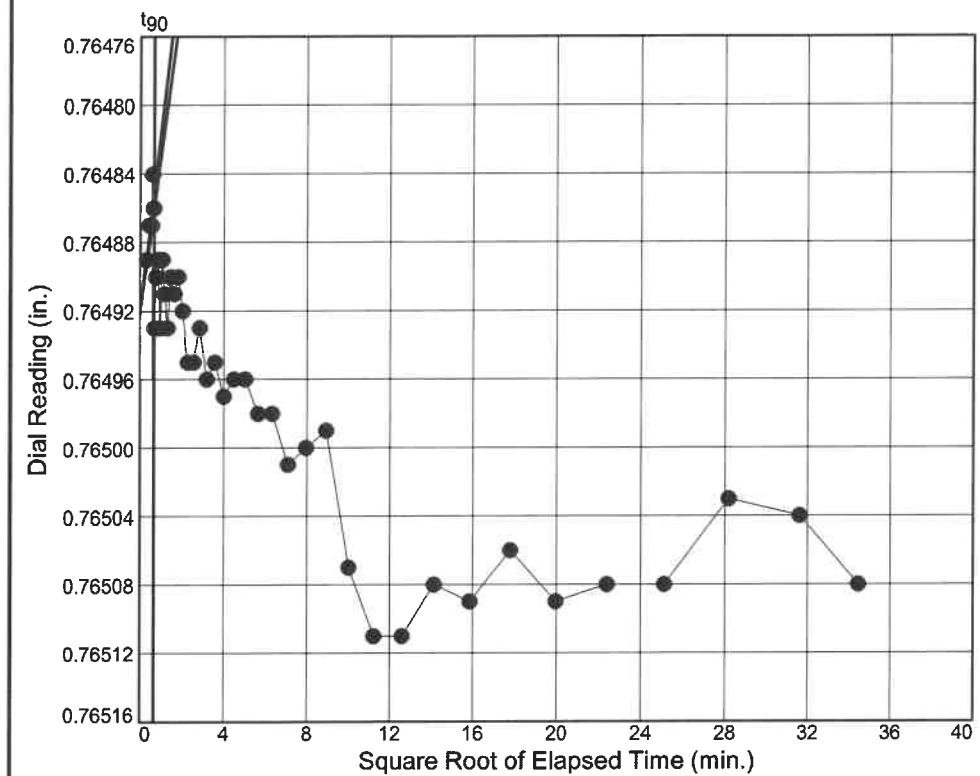


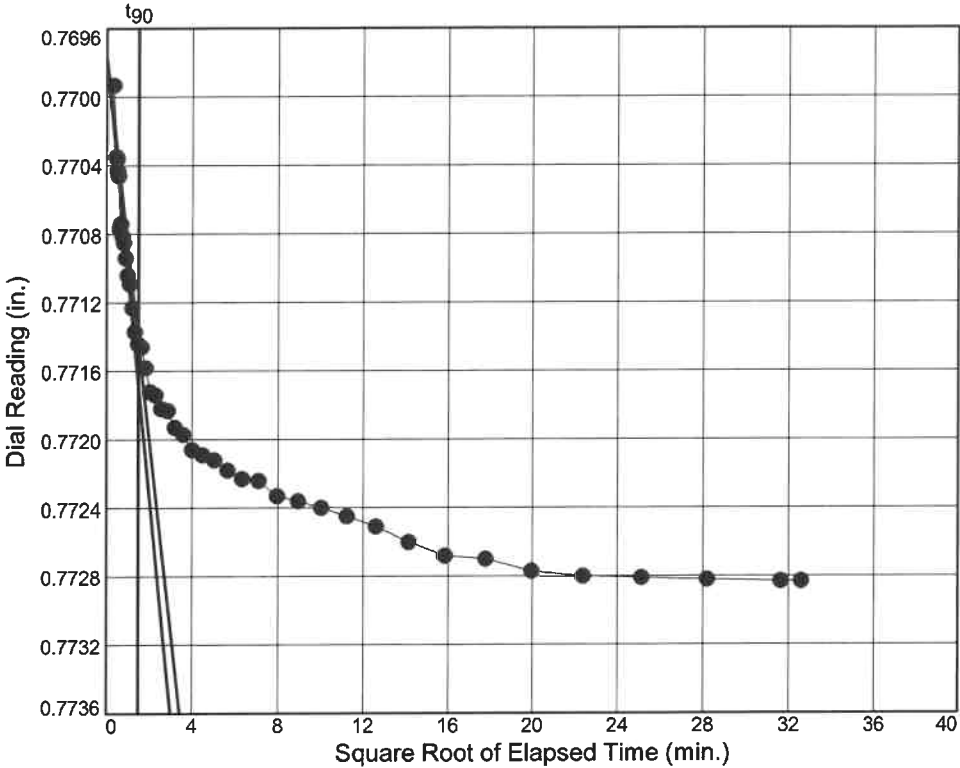
Figure 6

Terracon Consultants, Inc.

Dial Reading vs. Time

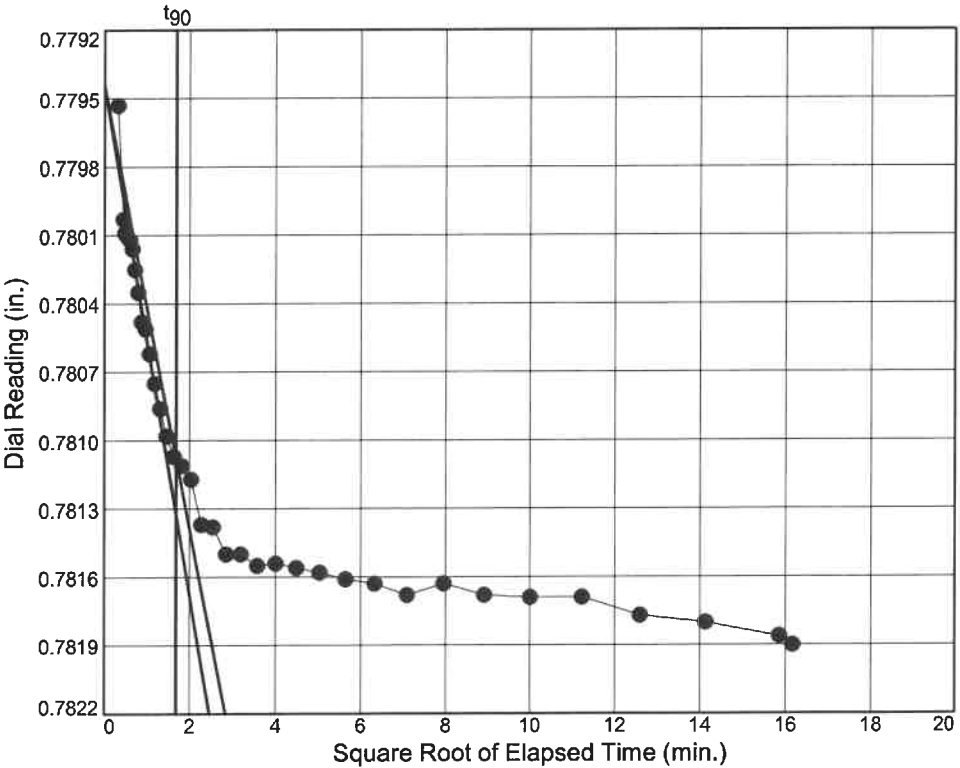
Project No.: 75235097
Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3



Load No.= 11
Load=2000 psf
 $D_0 = 0.7698$
 $D_{90} = 0.7714$
 $D_{100} = 0.7716$
 $T_{90} = 2.25$ min.

$C_v @ T_{90}$
0.093 in.²/min.



Load No.= 12
Load=4000 psf
 $D_0 = 0.7794$
 $D_{90} = 0.7811$
 $D_{100} = 0.7813$
 $T_{90} = 2.84$ min.

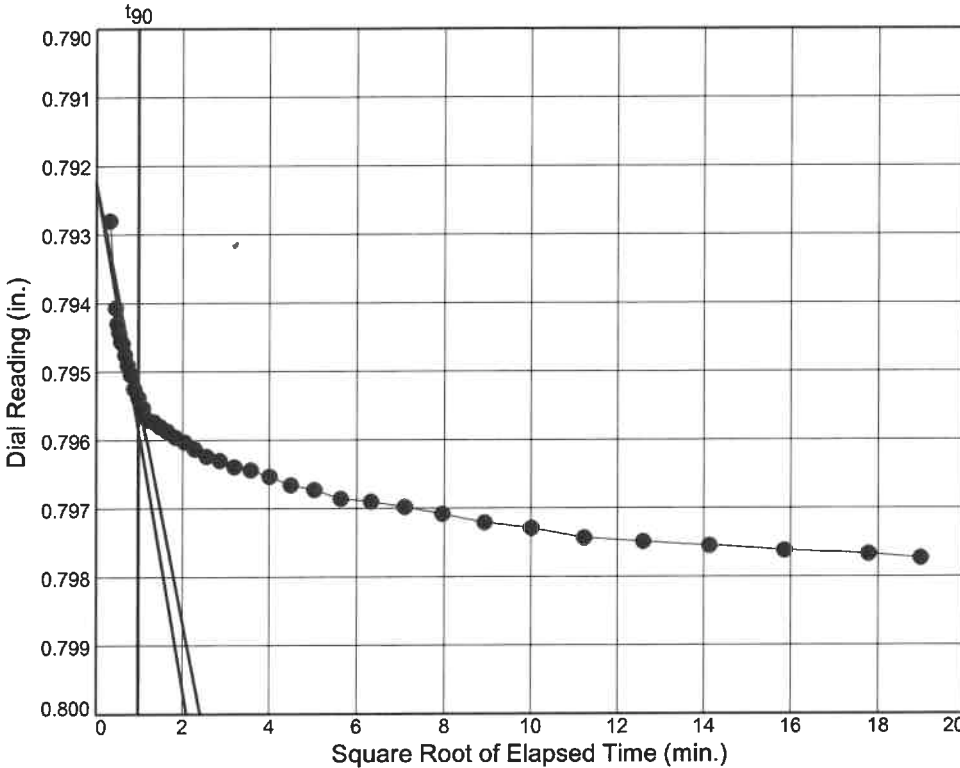
$C_v @ T_{90}$
0.072 in.²/min.

Figure 7

Dial Reading vs. Time

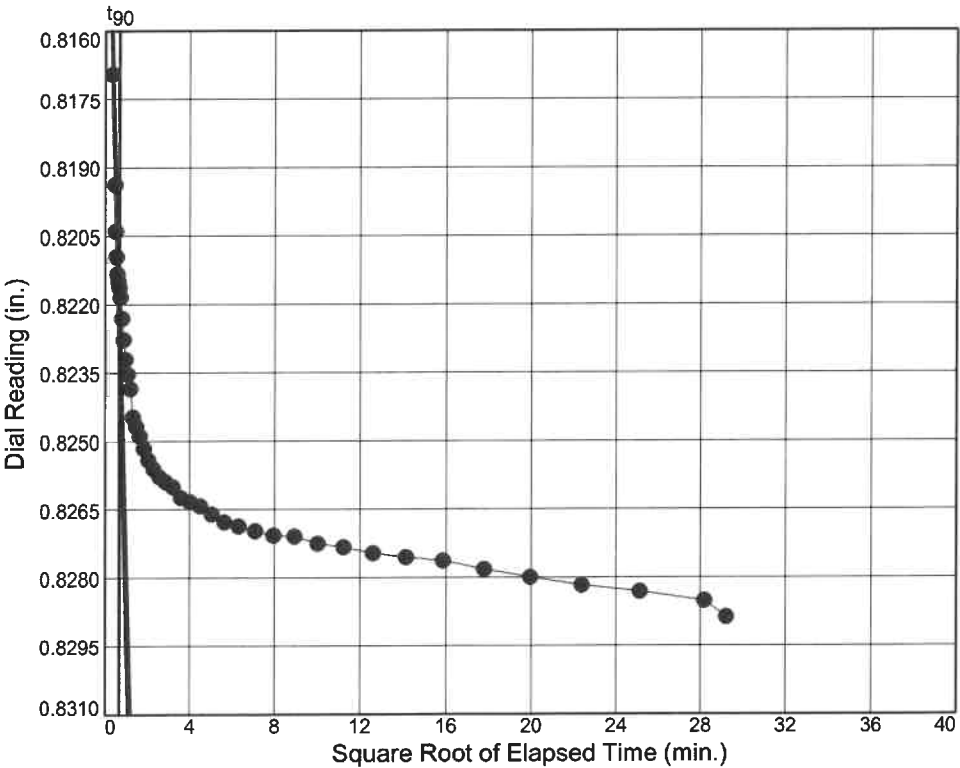
Project No.: 75235097
Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3



Load No.= 13
Load=8000 psf
 $D_0 = 0.7923$
 $D_{90} = 0.7954$
 $D_{100} = 0.7957$
 $T_{90} = 0.94$ min.

$C_v @ T_{90}$
0.212 in.²/min.



Load No.= 14
Load=16000 psf
 $D_0 = 0.8104$
 $D_{90} = 0.8216$
 $D_{100} = 0.8228$
 $T_{90} = 0.44$ min.

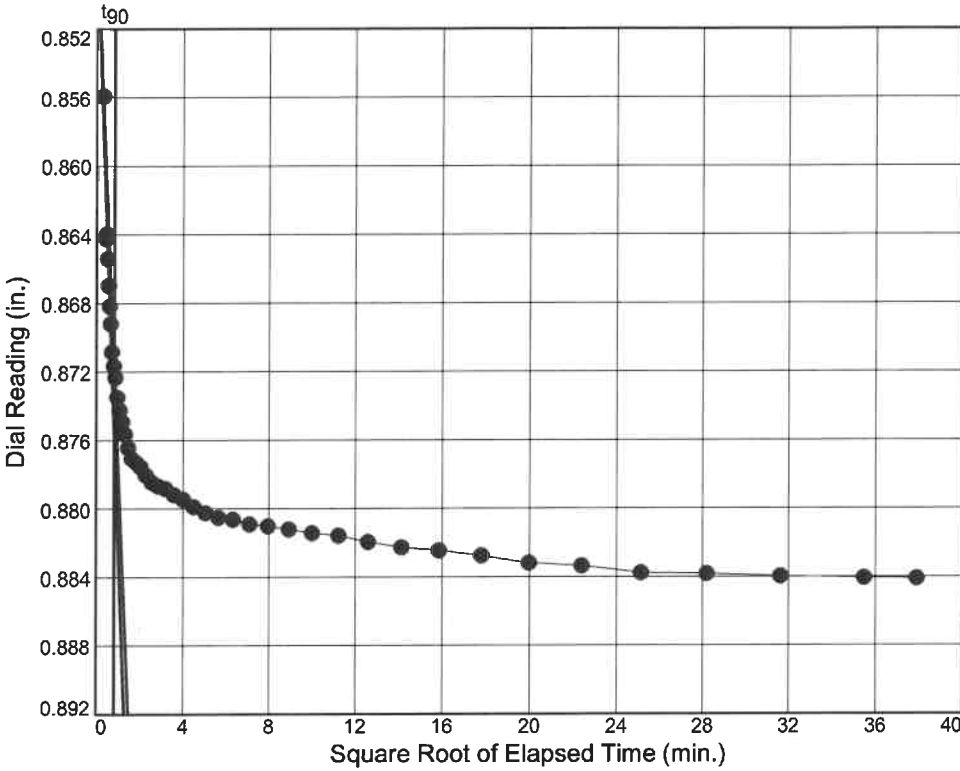
$C_v @ T_{90}$
0.433 in.²/min.

Figure 8

Dial Reading vs. Time

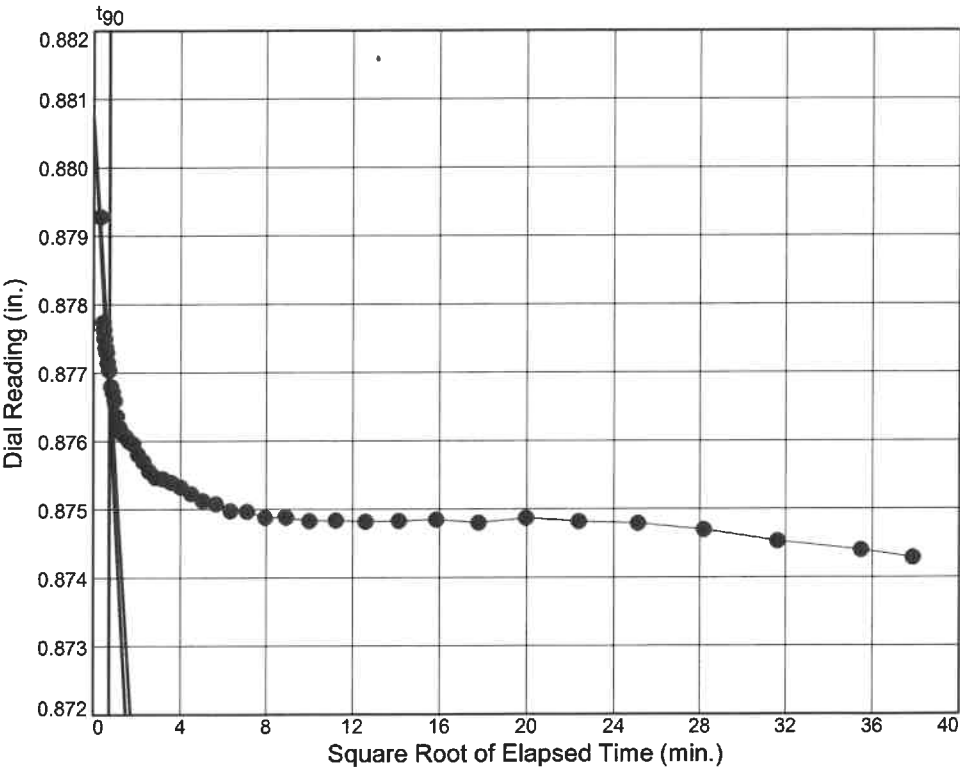
Project No.: 75235097
Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3



Load No.= 15
Load=32000 psf
D₀ = 0.8468
D₉₀ = 0.8719
D₁₀₀ = 0.8747
T₉₀ = 0.69 min.

C_v @ T₉₀
0.251 in.²/min.



Load No.= 16
Load=8000 psf
D₀ = 0.8807
D₉₀ = 0.8770
D₁₀₀ = 0.8766
T₉₀ = 0.53 min.

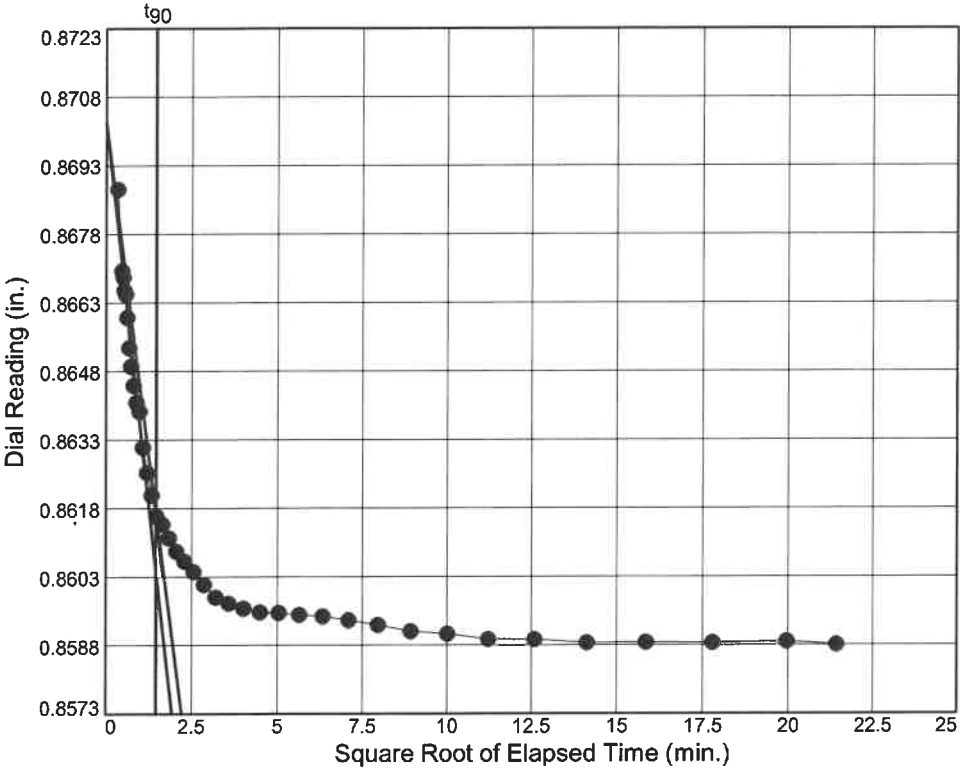
C_v @ T₉₀
0.315 in.²/min.

Figure 9

Dial Reading vs. Time

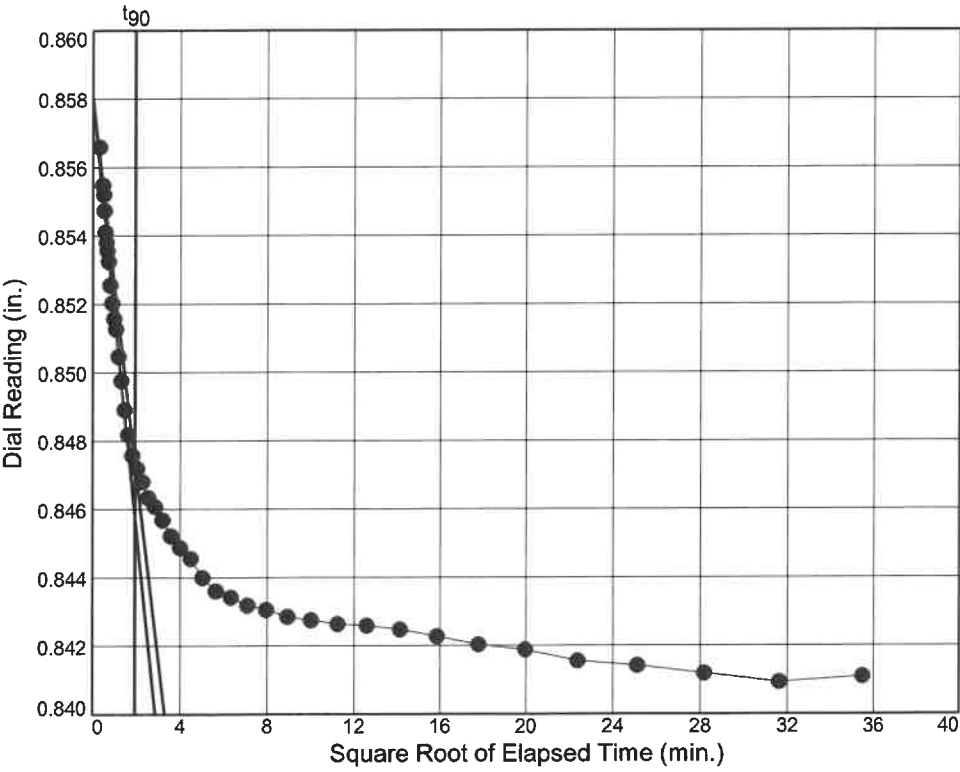
Project No.: 75235097
Project: I-77& NC 73 Interchange-I-5715

Location: S2B_EB2-B Depth: 5.0-7.0 ft Sample Number: ST-3



Load No.= 17
Load=2000 psf
D₀ = 0.8703
D₉₀ = 0.8617
D₁₀₀ = 0.8607
T₉₀ = 2.15 min.

C_v @ T₉₀
0.080 in.²/min.



Load No.= 18
Load=500 psf
D₀ = 0.8580
D₉₀ = 0.8474
D₁₀₀ = 0.8462
T₉₀ = 3.80 min.

C_v @ T₉₀
0.046 in.²/min.

Figure 10

SITE PHOTOGRAPHS

WIDENING OF BRIDGE NO.358 OVER I-77 NORTHBOUND
-L3NB- ON NC 73 (-Y2-)

PROJECT REFERENCE NO.	SHEET NO.
I-5715	21



END BENT NO. 1 LOOKING EAST ALONG SOUTH SIDE OF BRIDGE



BENT NO. LOOKING SOUTH ALONG I-77 NORTHBOUND

REFERENCE: I-5715

PROJECT: 50128

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5 - 8	CROSS SECTIONS
9 - 13	BORE LOGS
14	SOIL TEST RESULTS
15 - 19	CONSOLIDATION TEST RESULTS
20	SITE PHOTOGRAPHS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
PROJECT DESCRIPTION I-77 AND NC 73 INTERCHANGE,
UPGRADE EXISTING INTERCHANGE TO
SPLIT DIAMOND CONFIGURATION

SITE DESCRIPTION WIDENING OF BRIDGE NO.359 OVER
I-77 SOUTHBOUND (-L3SB-) ON NC 73 (-Y2-)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5715	1	20

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.

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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

DRISCOLL, C.

KIKER, Z.

GRAINGER, P.

GRAHL, D.

TOOTHMAN, R.

INVESTIGATED BY GRAINGER, P.

DRAWN BY FIELDS, W. D.

CHECKED BY RIGGS, A.F., JR.

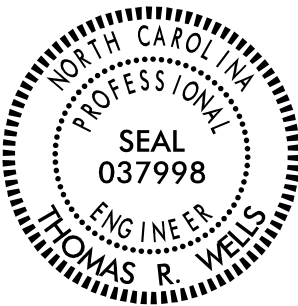
SUBMITTED BY WELLS, T. R.

DATE MARCH 2025

Prepared in the Office of:



7327-G W. FRIENDLY AVE.
GREENSBORO, NORTH CAROLINA 27410
NC REGISTERED ENGINEERING FIRM: E-0869
NC REGISTERED GEOLOGIC FIRM: C-367



DocuSigned by:
Thomas R. Wells 04/09/2025

F38C7774588541FA 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

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, *VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6*

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.75	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)
GRAIN SIZE	MM 305 IN. 12	75 3	2.0	0.25	0.05	0.005

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING

STATIC WATER LEVEL AFTER 24 HOURS

PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA

SPRING OR SEEP

MISCELLANEOUS SYMBOLS

ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION

SOIL SYMBOL

ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT

INFERRED SOIL BOUNDARY

INFERRED ROCK LINE

ALLUVIAL SOIL BOUNDARY

DIP & DIP DIRECTION OF ROCK STRUCTURES

TEST BORING

AUGER BORING

CORE BORING

MONITORING WELL

PIEZOMETER INSTALLATION

SLOPE INDICATOR INSTALLATION

CONE PENETROMETER TEST

SOUNDING ROD

TEST BORING WITH CORE

SPT N-VALUE

RECOMMENDATION SYMBOLS

UNDERCUT

SHALLOW UNDERCUT

UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE

UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK

UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL - CLAY
CPT - CONE PENETRATION TEST
CSE - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS - FOSSILIFEROUS
FRAC - FRACTURED, FRACTURES
FRAGS - FRAGMENTS
HL - HIGHLY

MED. - MEDIUM
MICA - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY

VST - VANE SHEAR TEST
WEA. - WEATHERED
W - UNIT WEIGHT
Wg - DRY UNIT WEIGHT

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
☐ CME-45C
☐ CME-55
☐ CME-550
☐ VANE SHEAR TEST
☐ PORTABLE HOIST
☒ CME-55 (TR10055)
☒ MOBILE B-57 (TR4013)

ADVANCING TOOLS:
☐ CLAY BITS
☐ 6" CONTINUOUS FLIGHT AUGER
☐ 8" HOLLOW AUGERS
☐ HARD FACED FINGER BITS
☐ TUNG-CARBIDE INSERTS
☐ CASING ☐ W/ ADVANCER
☐ TRICONE ☐ STEEL TEETH
☒ TRICONE 2-15/16" TUNG-CARB.
☐ CORE BIT
☒ 3-1/4" HOLLOW STEM AUGERS

HAMMER TYPE:
☒ AUTOMATIC ☐ MANUAL
CORE SIZE:
☐ -B ☐ -H ☐ -N
HAND TOOLS:
☐ POST HOLE DIGGER
☐ HAND AUGER
☐ SOUNDING ROD
☐ VANE SHEAR TEST

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)

CRYSTALLINE ROCK (CR)

NON-CRYSTALLINE ROCK (NCR)

COASTAL PLAIN SEDIMENTARY ROCK (CP)

NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.

FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.

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 SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH
ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.

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

SLIGHT (SL.)
ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.

MODERATE (MOD.)
SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.

MODERATELY SEVERE (MOD. SEV.)
ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*

SEVERE (SEV.)
ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*

VERY SEVERE (V SEV.)
ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*

COMPLETE
ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

HARD
CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.

MODERATELY HARD
CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.

MEDIUM HARD
CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.

SOFT
CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.

VERY SOFT
CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE
RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.

MODERATELY INDURATED
GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.

INDURATED
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.

EXTREMELY INDURATED
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND 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 INTRUDED ROCKS.

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH 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.

BENCH MARK: SEE BELOW

ELEVATION: SEE BELOW FEET

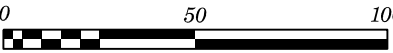
NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

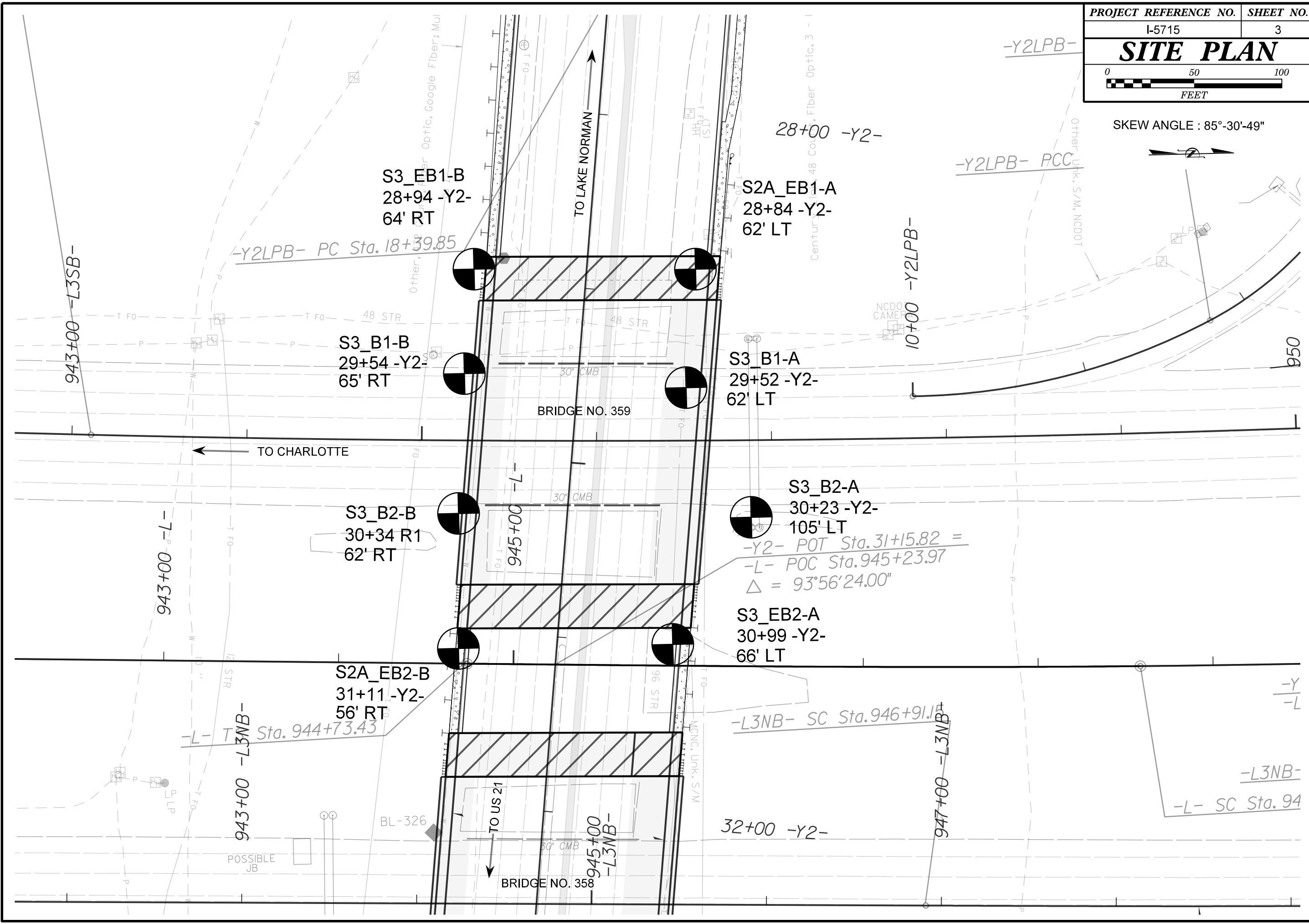
BENCHMARKS:

BENCHMARK J5405-28, STA. 28+86, -Y2-, 48' RT
N: 621,180 FT, E: 1,443,148 FT, ELEV. 738.88 FT

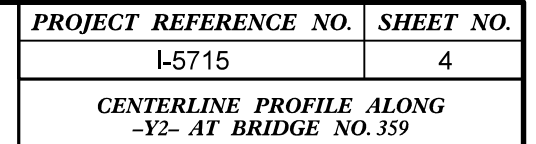
TOP OF DROP INLET, STA. 30+79, -Y2-, 48' LT
N: 621,256 FT, E: 1,443,349 FT, ELEV. 744.99 FT

PROJECT REFERENCE NO.	SHEET NO.
I-5715	3
SITE PLAN	
	
FEET	

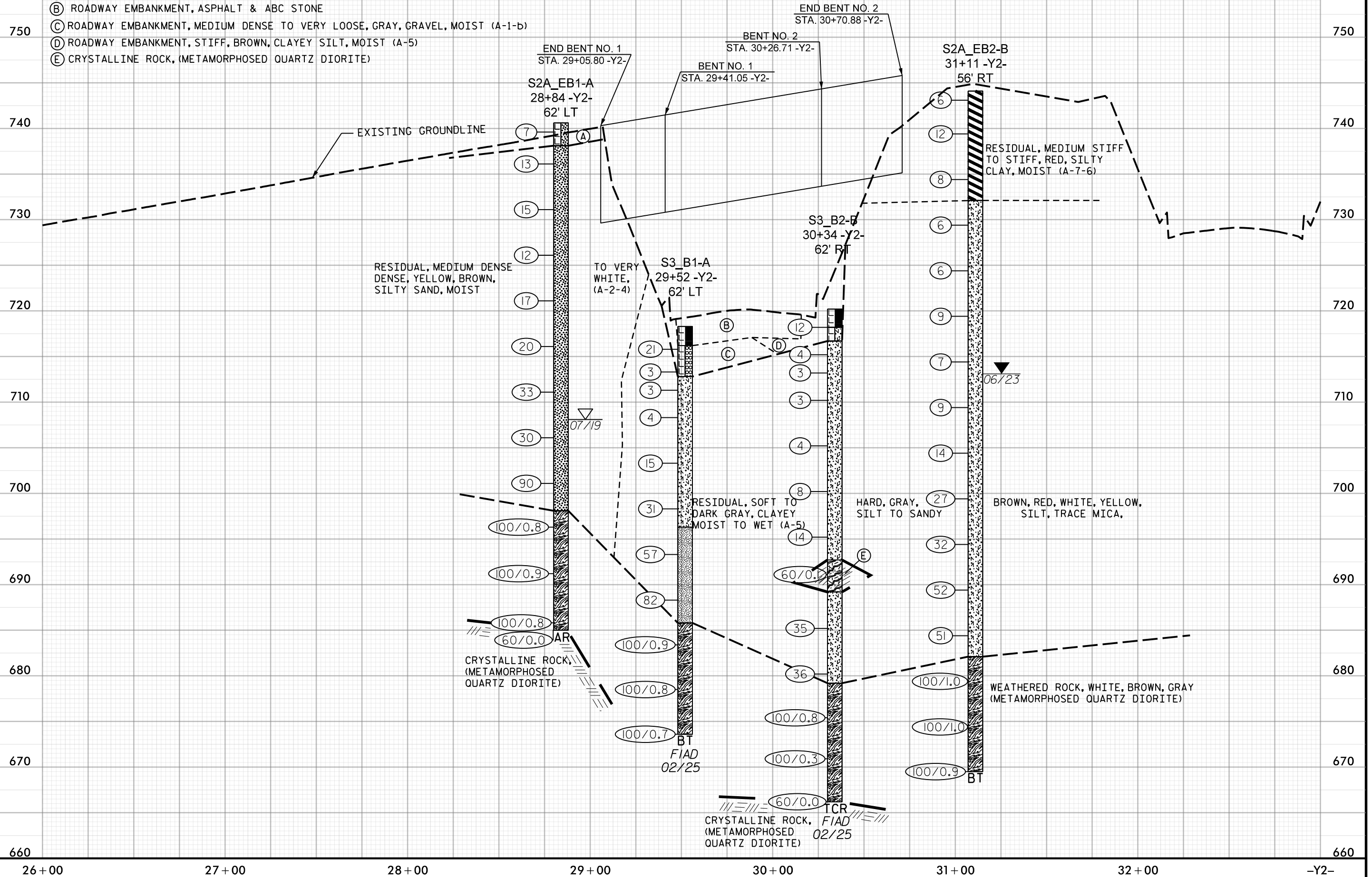
SKREW ANGLE : 85°-30'-49"

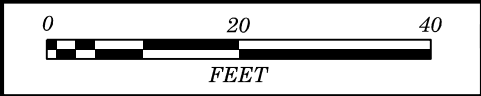


NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE EXISTING GROUND PROFILE ALONG THE CENTERLINE OF -Y2- TAKEN FROM THE PROVIDED PROJECT TIN FILE (i5715_Is_tin.tin).



- 750



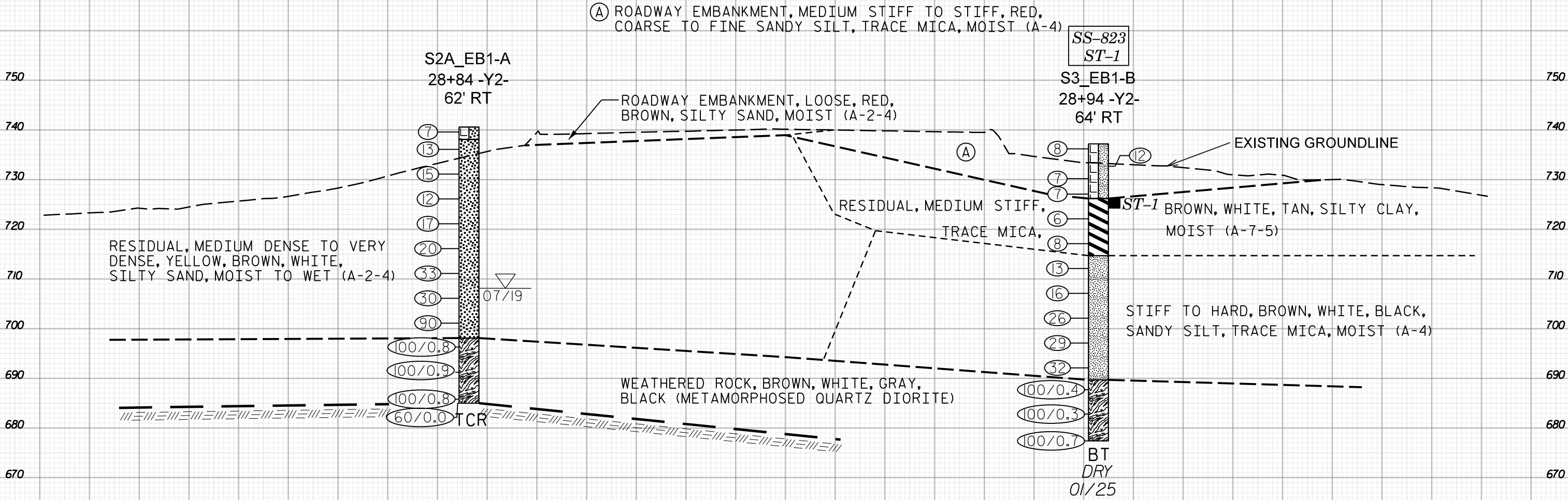


PROJ. REFERENCE NO.	SHEET NO.
I-5715	5

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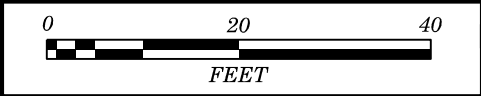
NOTE:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED
ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_ls_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 32' 30"

CROSS SECTION THROUGH END BENT NO. 1 AT STA. 29 + 05.80 -Y1-



29 + 05.80
-Y2-

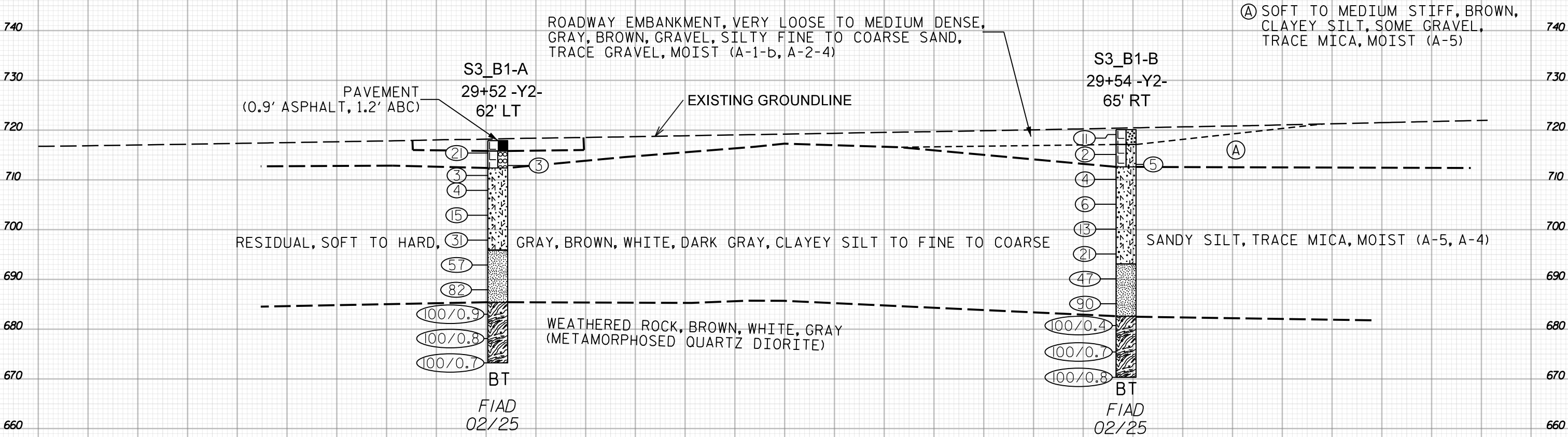
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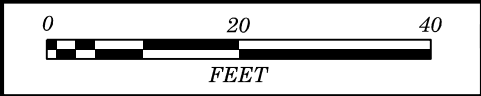
NOTE:
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ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_Is_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 32' 30"

CROSS SECTION THROUGH BENT NO. 1 AT STA. 29 + 41.05 -Y2-



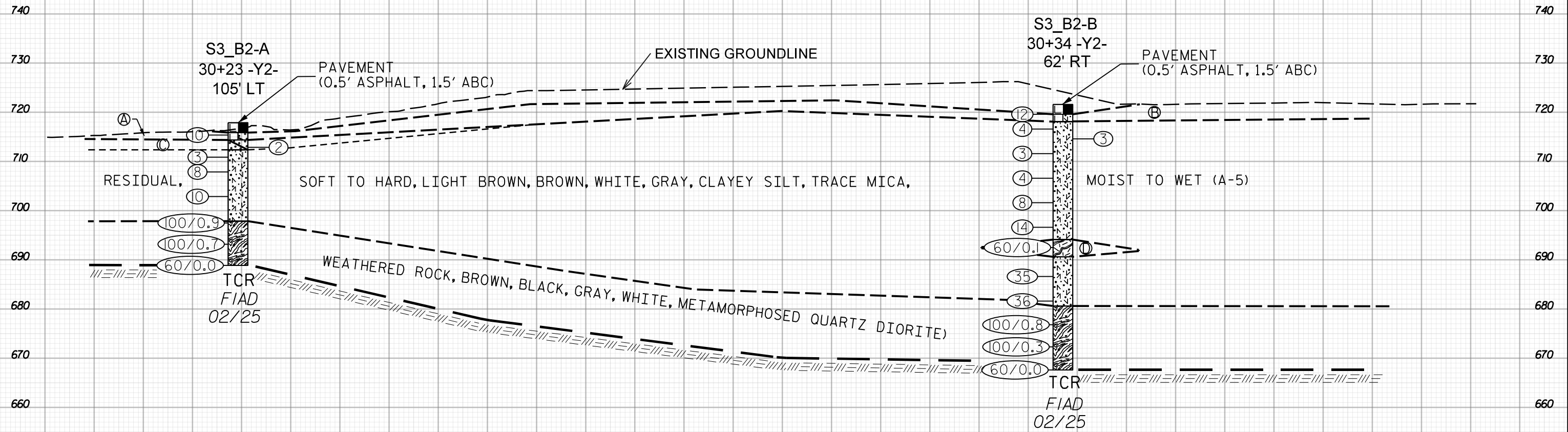
29 + 41.05
-Y2-

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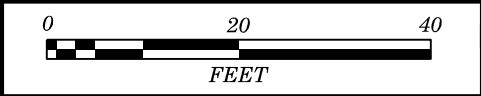
NOTE:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED
ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_ls_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 32' 30"

CROSS SECTION THROUGH BENT NO. 2 AT STA. 30+26.71 -Y2-



- Ⓐ ROADWAY EMBANKMENT, MEDIUM DENSE, GRAY, CLAYEY SAND, MOIST (A-2-6)
- Ⓑ ROADWAY EMBANKMENT, STIFF, BROWN, CLAYEY SILT, MOIST (A-5)
- Ⓒ RESIDUAL, VERY LOOSE, LIGHT BROWN, CLAYEY SAND, MOIST (A-2-6)
- Ⓓ CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)

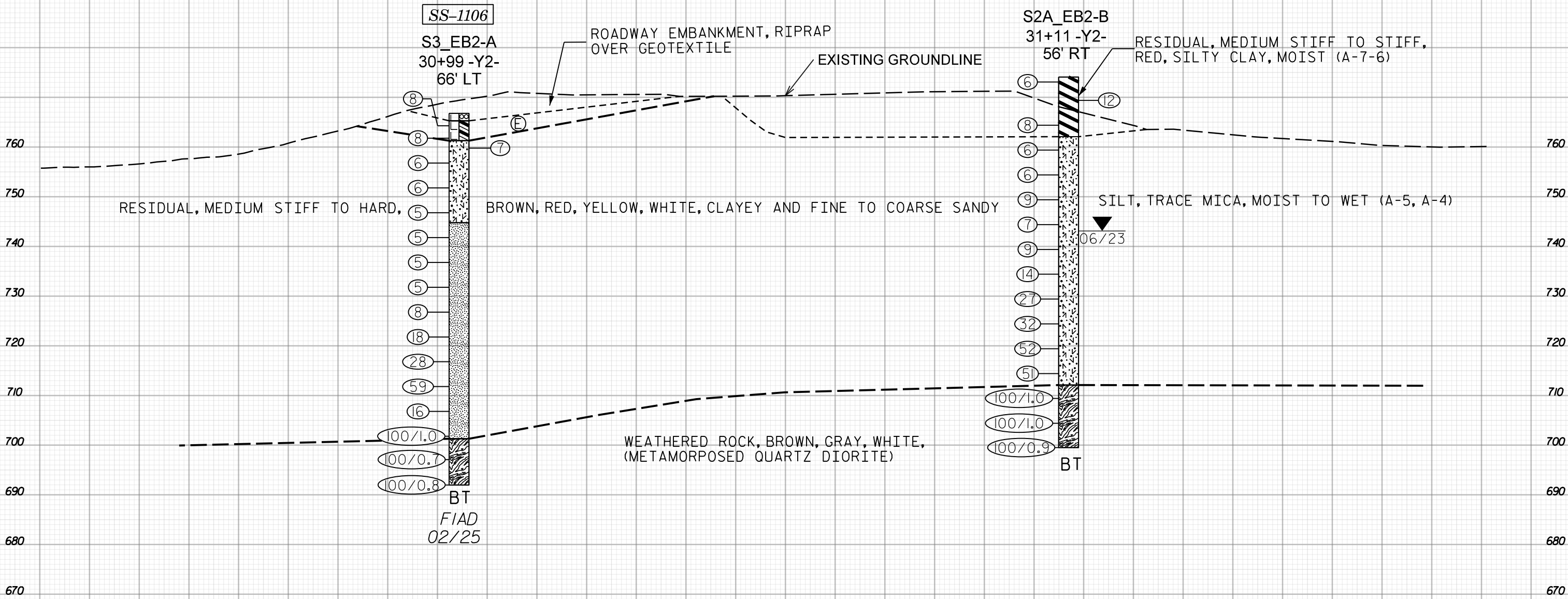
30+26.71
-Y2-



PROJ. REFERENCE NO.	SHEET NO.
I-5715	8

NOTE:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED
ON TO THE CROSS SECTION GROUNDLINE TAKEN FROM
THE PROVIDED PROJECT TIN FILE (i5715_ls_tin.tin) DATE 12/18/2024.
SKEW ANGLE - 85° 32' 30"

CROSS SECTION THROUGH END BENT NO. 2 AT STA. 30+70.88 -Y2-



Ⓔ ROADWAY EMBANKMENT, MEDIUM STIFF, BROWN, FINE TO COARSE
SANDY CLAY, TRACE GRAVEL, MOIST (A-6)

30+70.88
-Y2-

NCDOT BORE DOUBLE I5715 GEO STRUC.GPJ NC DOT.GDT 3/31/25

WBS		50128.1.FS1		TIP		I-5715		COUNTY		MECKLENBURG		GEOLOGIST		GRAINGER, P.											
SITE DESCRIPTION													Widening of Bridge No. 359 over I-77 Southbound (-L3SB-) on NC 73 (-Y2-)			GROUND WTR (ft)									
BORING NO.		S3_B1-B		STATION		29+54		OFFSET		65 ft RT		ALIGNMENT		-Y2-		0 HR.	N/A								
COLLAR ELEV.		720.0 ft		TOTAL DEPTH		49.8 ft		NORTHING		621,156		EASTING		1,443,213		24 HR.	FIAD								
DRILL RIG/HAMMER EFF./DATE								TER4013 Mobile B-57 88% 11/12/2024				DRILL METHOD				Mud Rotary		HAMMER TYPE		Automatic					
DRILLER				TURNAGE, J. R.				START DATE				02/27/25		COMP. DATE				02/27/25		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											
			0.5ft	0.5ft	0.5ft	0	25	50	75	100															
720														720.0 GROUND SURFACE 0.0											
715	720.0	0.0	5	7	4							M		ROADWAY EMBANKMENT											
	716.0	4.0	1	1	1							M		MEDIUM DENSE, BROWN, SILTY SAND, TRACE GRAVEL, MOIST (A-2-4)											
710	714.0	6.0	2	3	2							M		SOFT TO MEDIUM STIFF, BROWN, CLAYEY SILT, SOME GRAVEL, TRACE MICA, MOIST (A-5)											
	711.0	9.0	3	2	2							M		RESIDUAL											
705	706.0	14.0	4	2	4							M		MEDIUM STIFF TO VERY STIFF, BROWN, WHITE, GRAY, CLAYEY SILT, TRACE MICA, MOIST (A-5)											
	701.0	19.0	4	5	8							M													
695	696.0	24.0	5	8	13							M		HARD, BROWN, GRAY, WHITE, SANDY SILT, TRACE MICA, MOIST (A-4)											
	691.0	29.0	10	18	29							M													
685	686.0	34.0	14	37	53							M		WEATHERED ROCK											
	681.0	39.0	44	56/0.2							M	BROWN, GRAY, WHITE (METAMORPHOSED QUARTZ DIORITE)													
680	676.0	44.0	44	56/0.2									Boring Terminated at Elevation 670.2 ft IN WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE)												
	671.0	49.0	44	56/0.3									670.2 49.8												

NCDOT BORE DOUBLE I5715_GEO_STRUC.GPJ NC_DOT.GDT 3/31/25

[illegible]

NCDOT BORE DOUBLE I5715 GEO STRUC.GPJ NC DOT.GDT 3/31/25

WBS 50128.1.FS1				TIP I-5715				COUNTY MECKLENBURG				GEOLOGIST GRAINGER, P.					
SITE DESCRIPTION Widening of Bridge No. 359 over I-77 Southbound (-L3SB-) on NC 73 (-Y2-)												GROUND WTR (ft)					
BORING NO. S3_EB2-A				STATION 30+99				OFFSET 66 ft LT				ALIGNMENT -Y2-				0 HR. N/A	
COLLAR ELEV. 746.8 ft				TOTAL DEPTH 74.8 ft				NORTHING 621,271				EASTING 1,443,371				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024								DRILL METHOD Mud Rotary				HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.				START DATE 02/12/25				COMP. DATE 02/13/25				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			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
675						Match Line											
	672.8	74.0				.	.	.	.	.				672.0	74.8		
			27	73/0.3		100/0.8								Boring Terminated at Elevation 672.0 ft IN WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE)			

GEOTECHNICAL BORING REPORT

BORE LOG

WBS				50128.1.FS1				TIP				I-5715				COUNTY				MECKLENBURG				GEOLOGIST				GRAINGER, P.																			
SITE DESCRIPTION																Widening of Bridge No. 359 over I-77 Southbound (-L3SB-) on NC 73 (-Y2-)																GROUND WTR (ft)															
BORING NO.				S2A_EB2-B				STATION				31+11				OFFSET				56 ft RT				ALIGNMENT				-Y2-				0 HR.		34.3													
COLLAR ELEV.				744.1 ft				TOTAL DEPTH				74.6 ft				NORTHING				621,149				EASTING				1,443,370				24 HR.		31.0													
DRILL RIG/HAMMER EFF./DATE																TRI0055 CME-55 83% 05/09/2022																DRILL METHOD				H.S. Augers				HAMMER TYPE				Automatic			
DRILLER				TOOTHMAN, R.				START DATE				06/27/23				COMP. DATE				06/27/23				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																						
						0.5ft 0.5ft 0.5ft			0 25 50 75 100																ELEV. (ft) DEPTH (ft)																						
745		744.1		0.0		WOH			3			3																			744.1 GROUND SURFACE 0.0																
																															RESIDUAL MEDIUM STIFF TO STIFF, RED, SILTY CLAY, MOIST (A-7-6)																
740		740.4		3.7		2			6			6																																			
735		735.4		8.7		2			4			4																																			
730		730.4		13.7		2			3			3																			732.1 MEDIUM STIFF TO STIFF, RED, BROWN, YELLOW, AND WHITE, CLAYEY SILT, TRACE MICA, MOIST TO WET (A-5) 12.0																
725		725.4		18.7		2			2			4																																			
720		720.4		23.7		3			3			6																																			
715		715.4		28.7		2			3			4																																			
710		710.4		33.7		3			4			5																																			
705		705.4		38.7		3			6			8																																			
700		700.4		43.7		7			12			15																																			
695		695.4		48.7		8			14			18																																			
690		690.4		53.7		15			21			31																																			
685		685.4		58.7		16			24			27																																			
680		680.4		63.7		31			69/0.5																			682.1 WEATHERED ROCK 62.0																			
																															BROWN, WHITE (METAMORPHOSED QUARTZ DIORITE)																
675		675.4		68.7		40			60/0.5																																						
670		670.4		73.7		70			30/0.4																			669.5 Boring Terminated at Elevation 669.5 ft IN WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE) 74.6																			

NC DOT BORE DOUBLE I5715 GEO STRUC.GPJ NC_DOT.GDT 3/31/25

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 50128.1.FS1

TIP: I-5715

COUNTY: Mecklenburg

DESCRIPTION:	Widening of Bridge No. 359 over I-77 Southbound (-L3SB-) on NC 73 (-Y2-)
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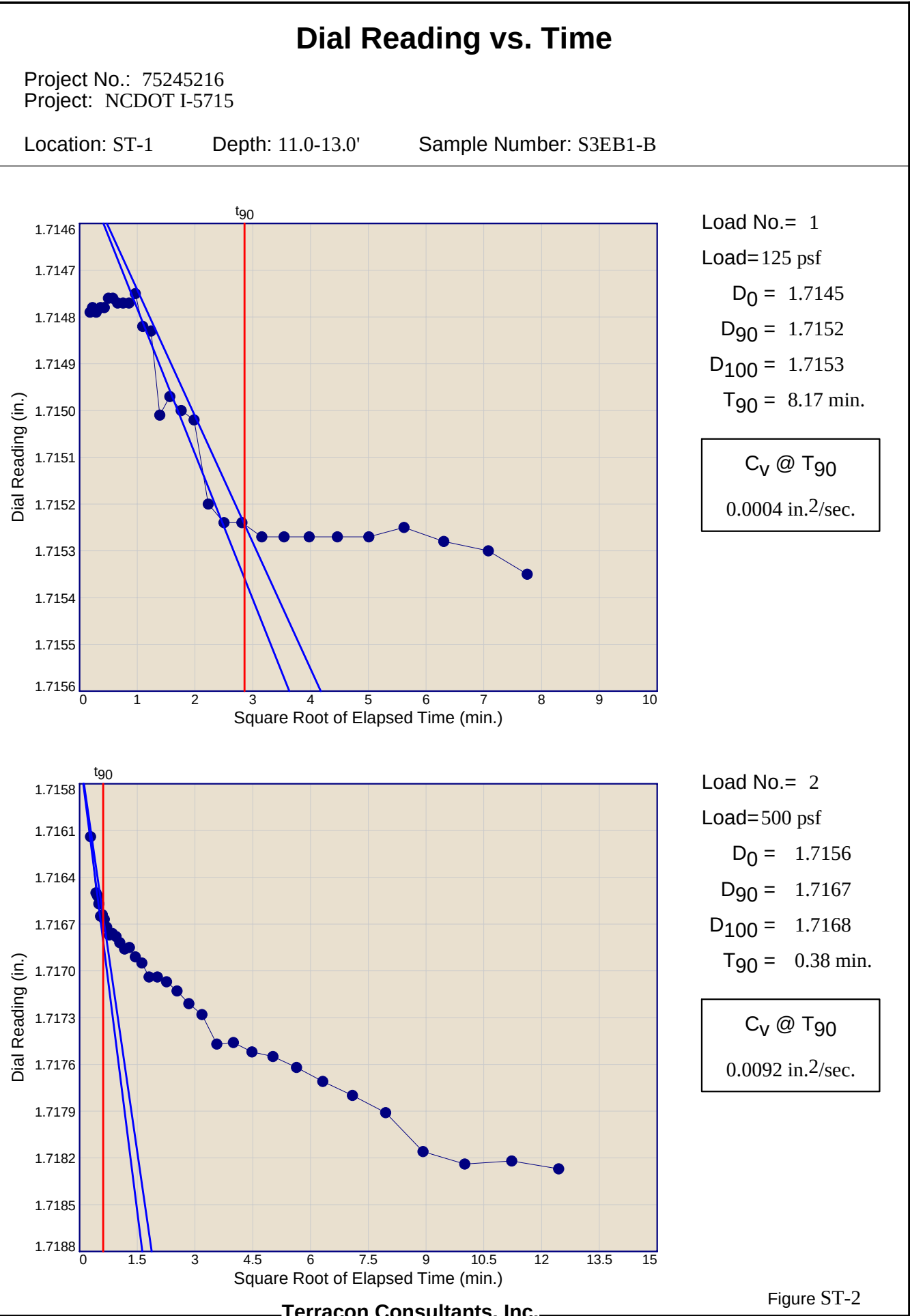
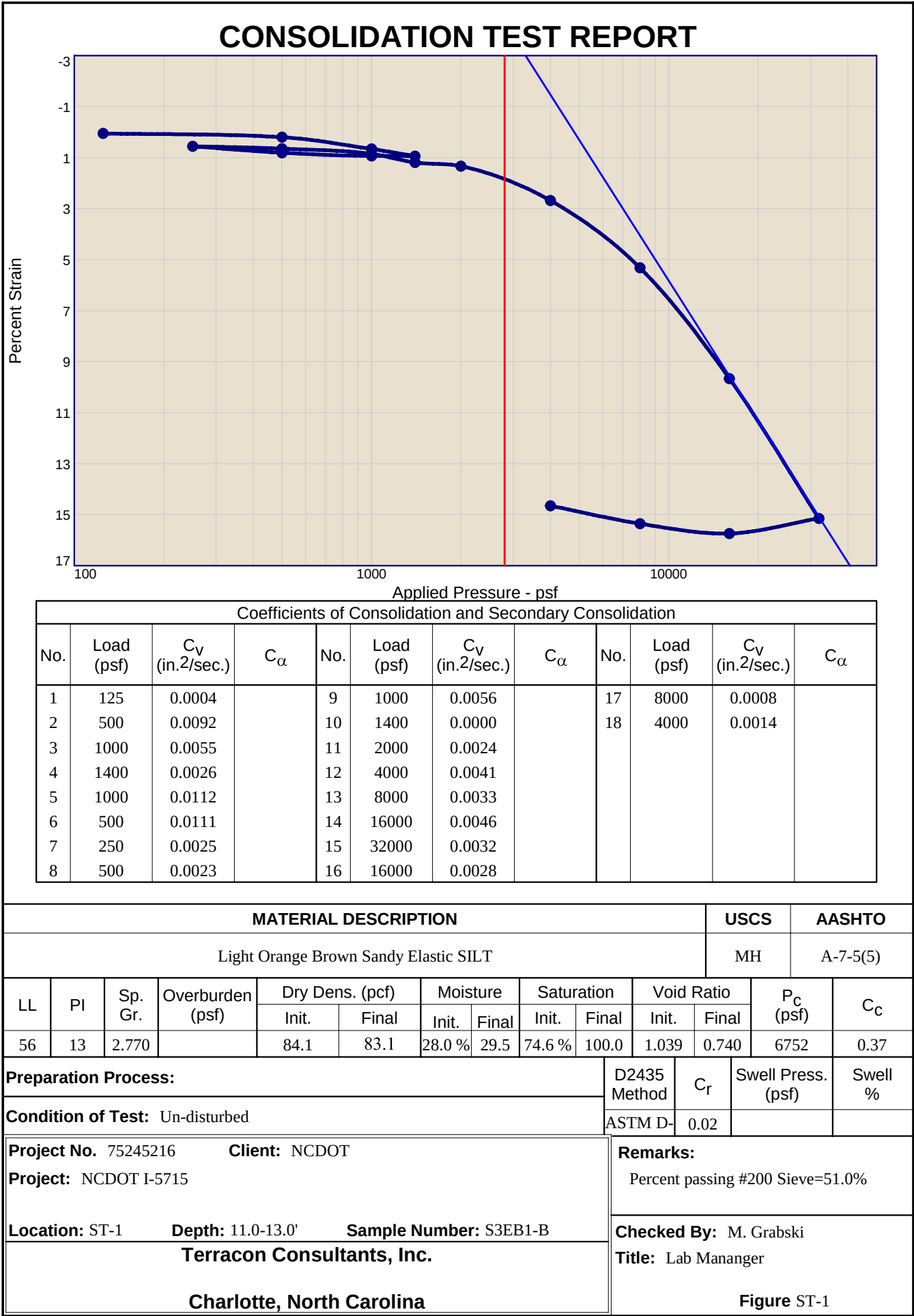
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Mitra Grabski

Certified Lab Technician Signature

114-01-1203

Certification Number



Dial Reading vs. Time

Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B

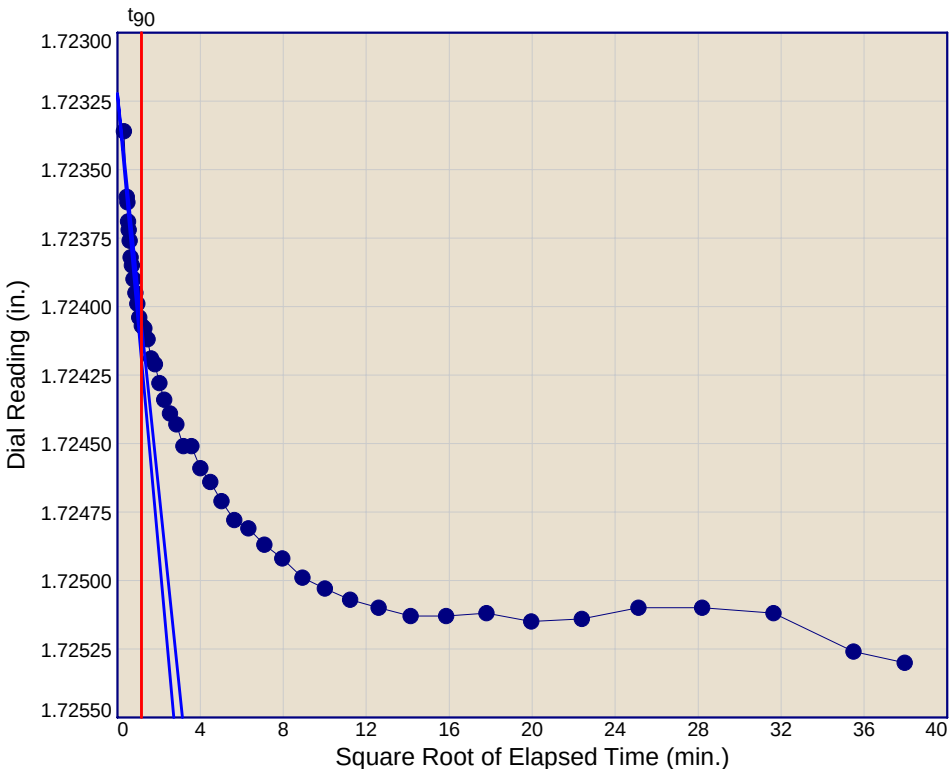
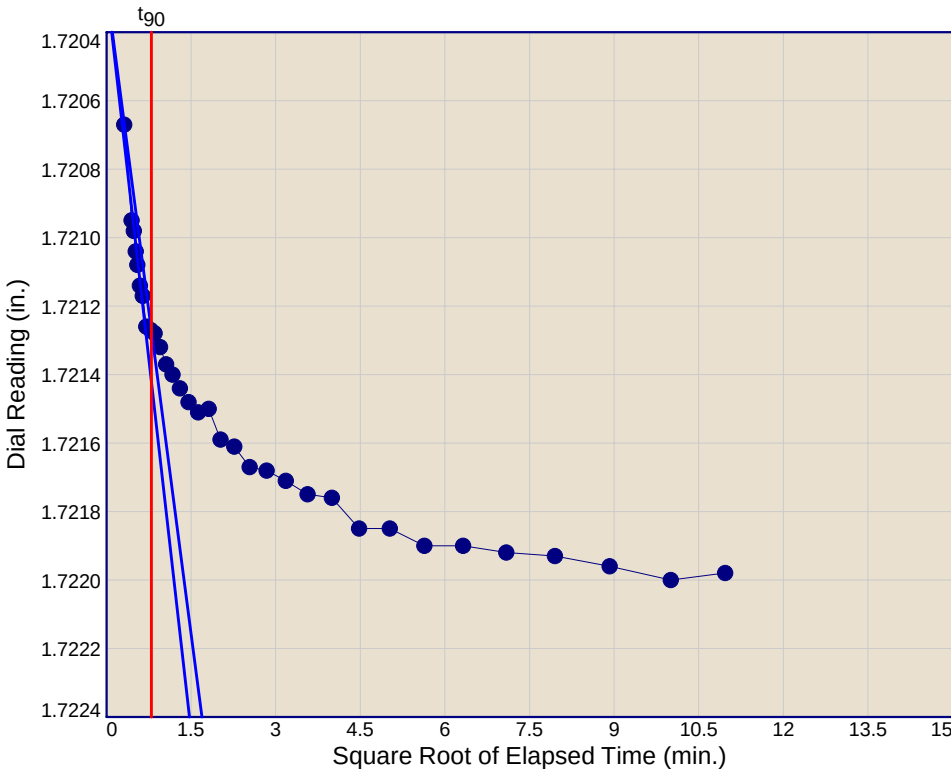


Figure ST-3

Dial Reading vs. Time

Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B

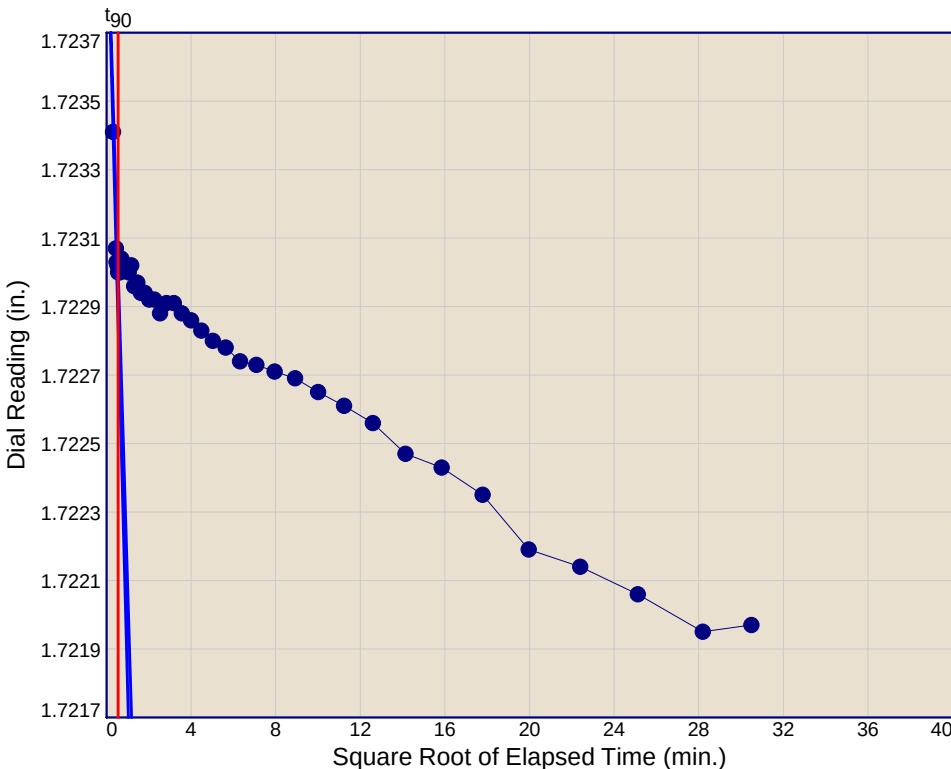
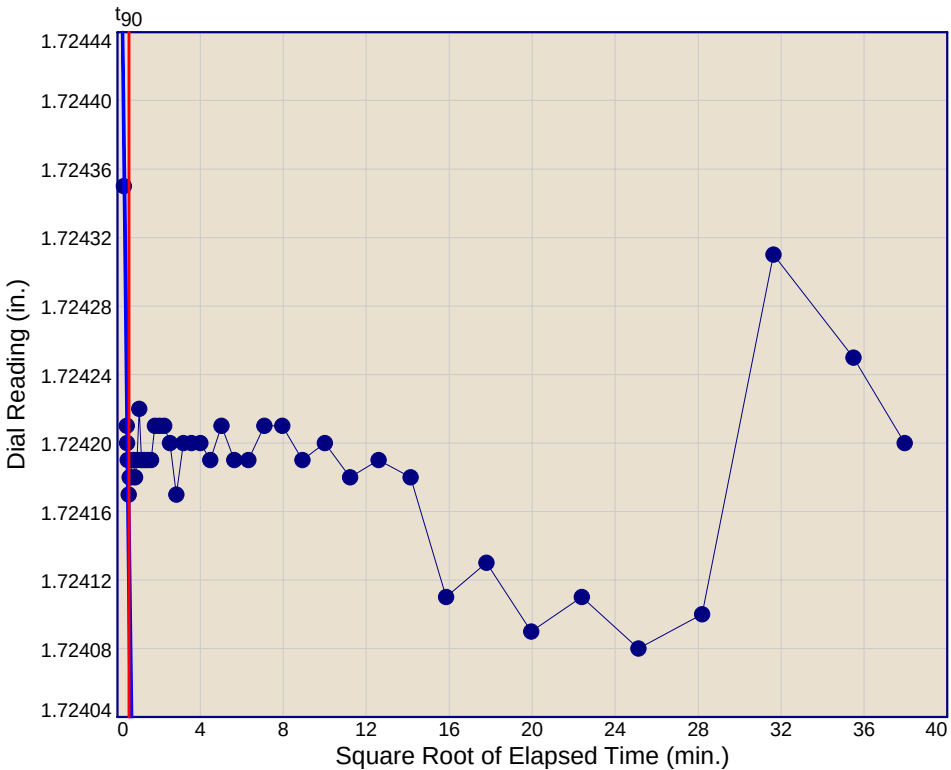


Figure ST-4

Dial Reading vs. Time

Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B

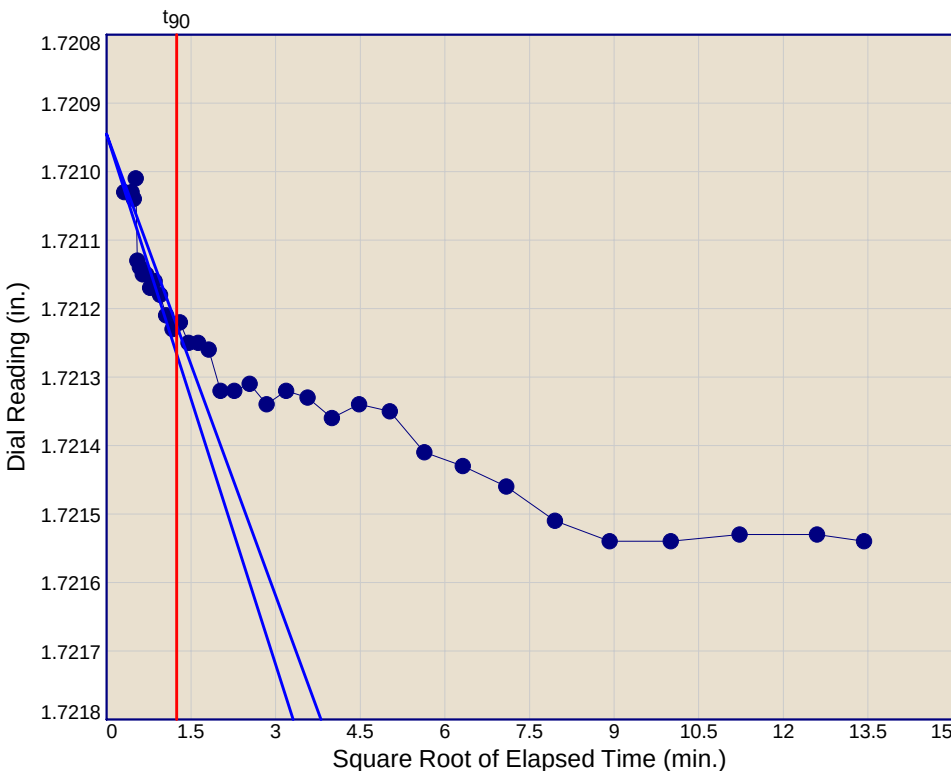
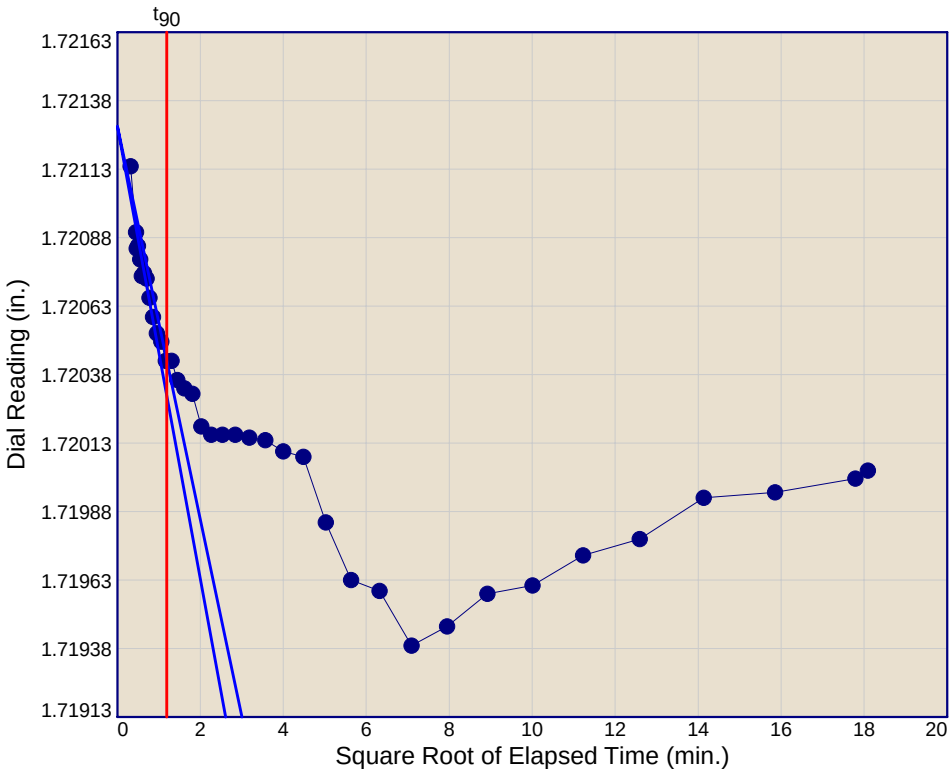


Figure ST-5

Dial Reading vs. Time

Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B

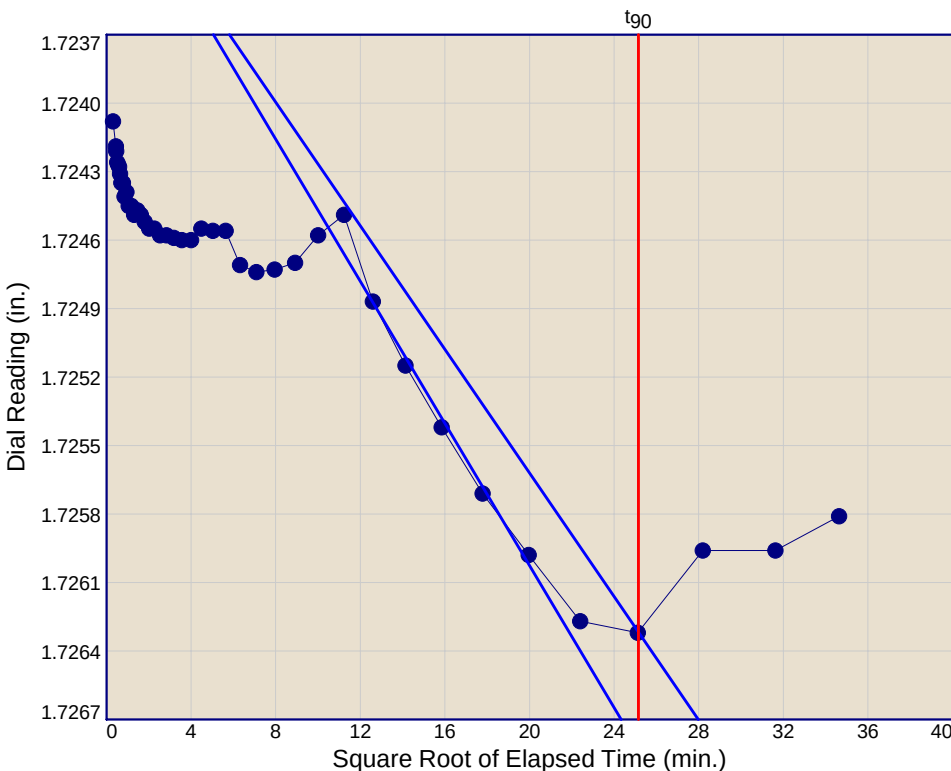
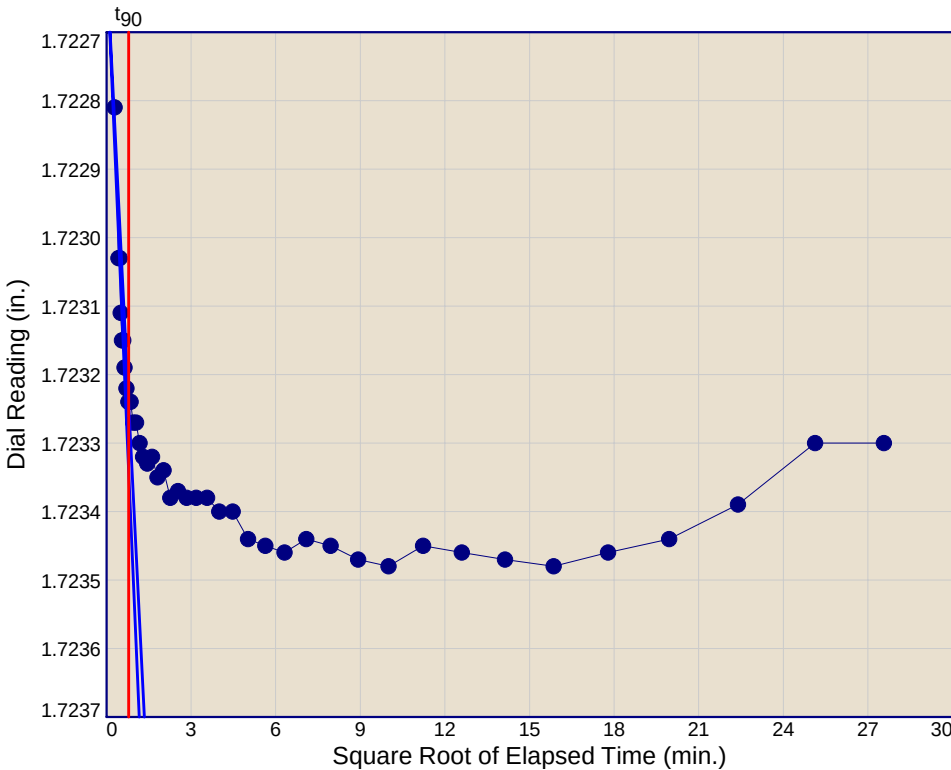


Figure ST-6

Dial Reading vs. Time

Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B

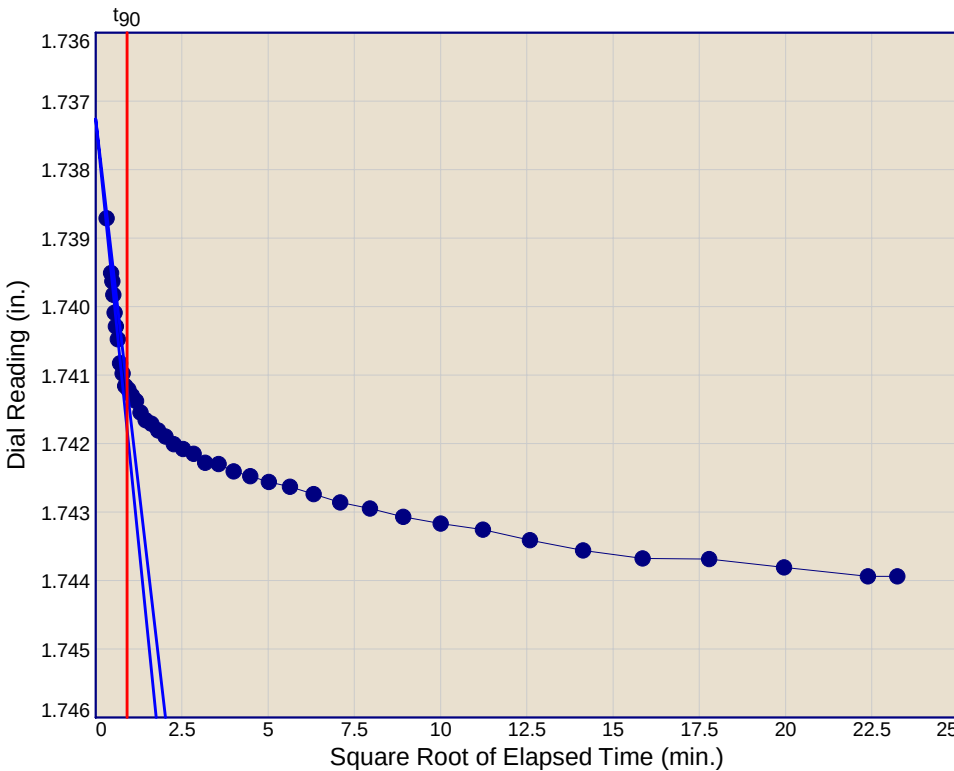
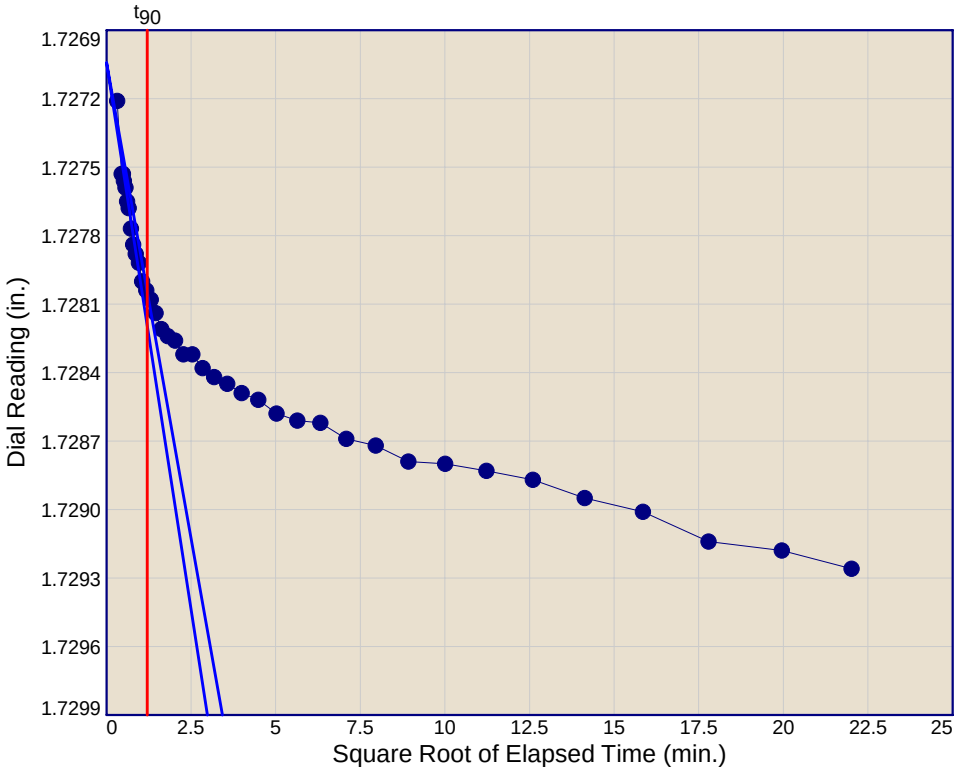


Figure ST-7

Dial Reading vs. Time

Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B

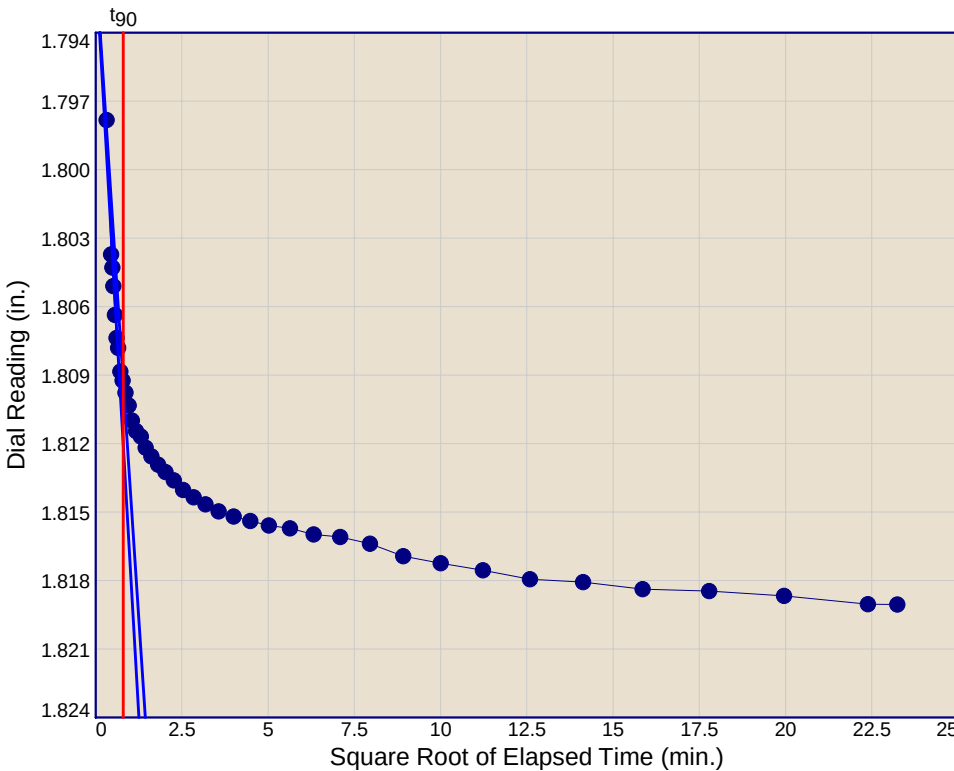
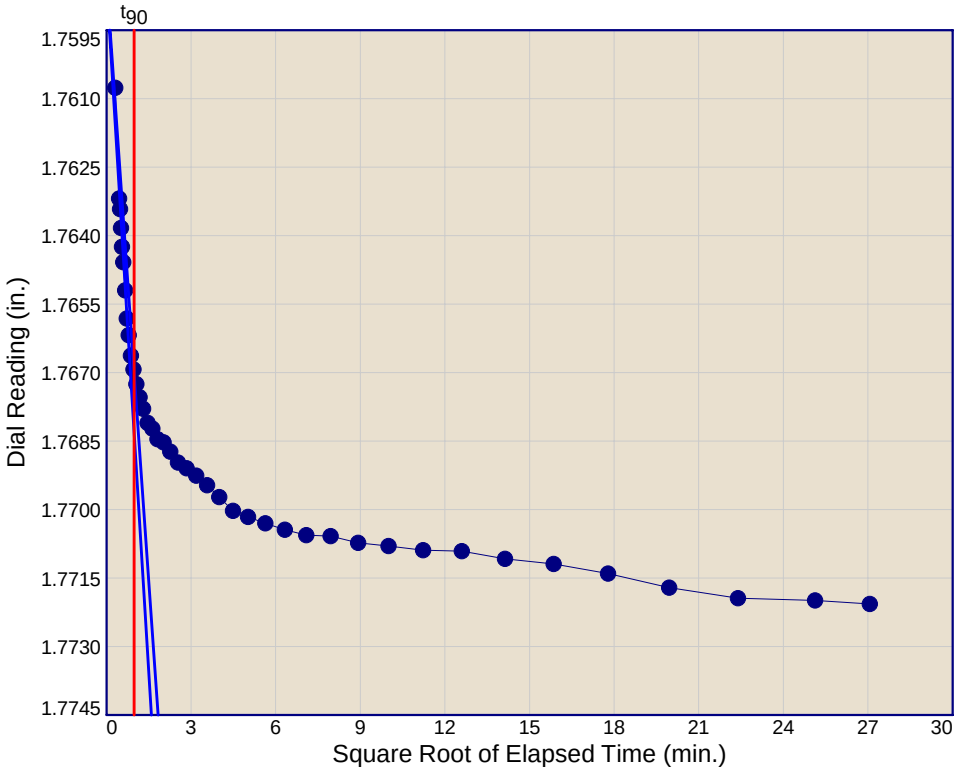
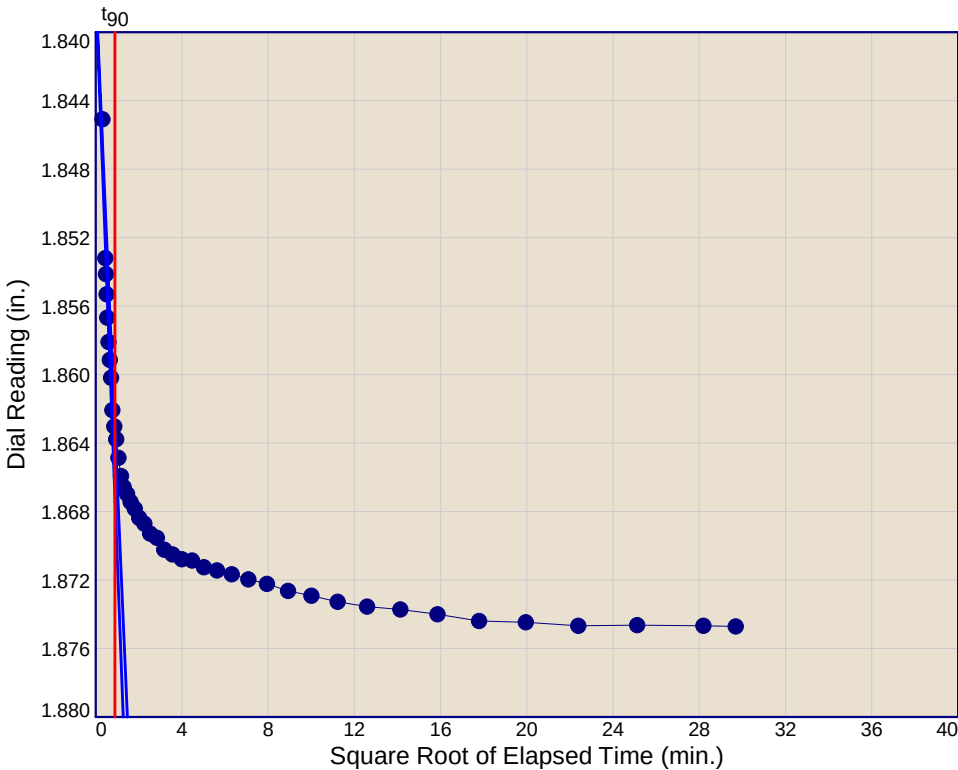


Figure ST-8

Dial Reading vs. Time

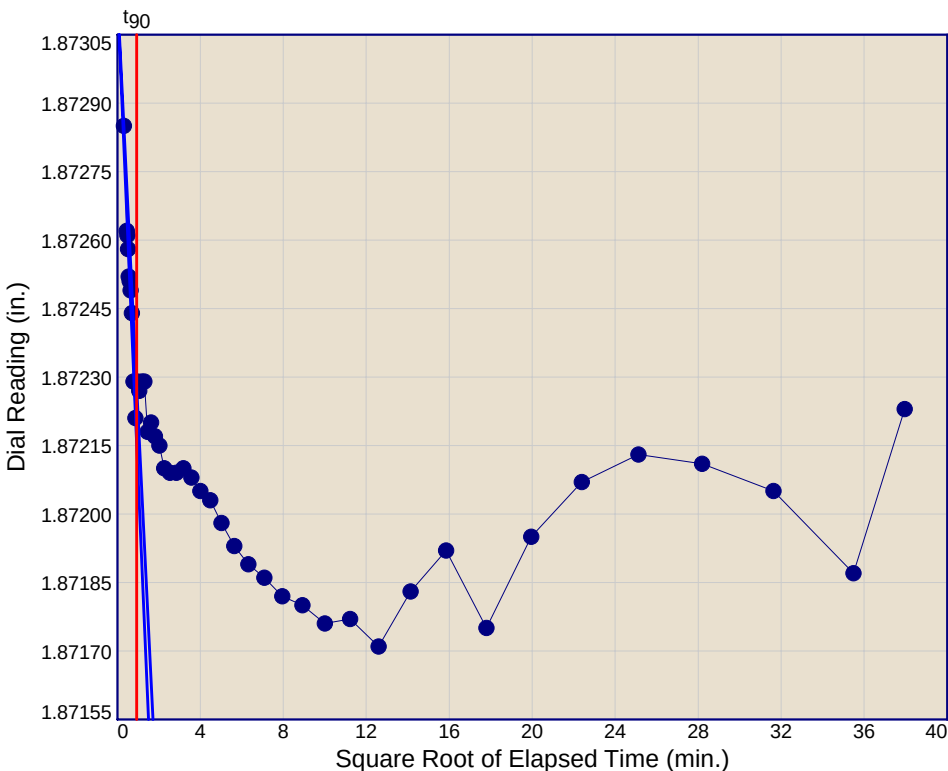
Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B



Load No.= 15
Load=32000 psf
 $D_0 = 1.8372$
 $D_{90} = 1.8633$
 $D_{100} = 1.8662$
 $T_{90} = 0.81$ min.

$C_v @ T_{90}$
0.0032 in.²/sec.



Load No.= 16
Load=16000 psf
 $D_0 = 1.8731$
 $D_{90} = 1.8723$
 $D_{100} = 1.8722$
 $T_{90} = 0.88$ min.

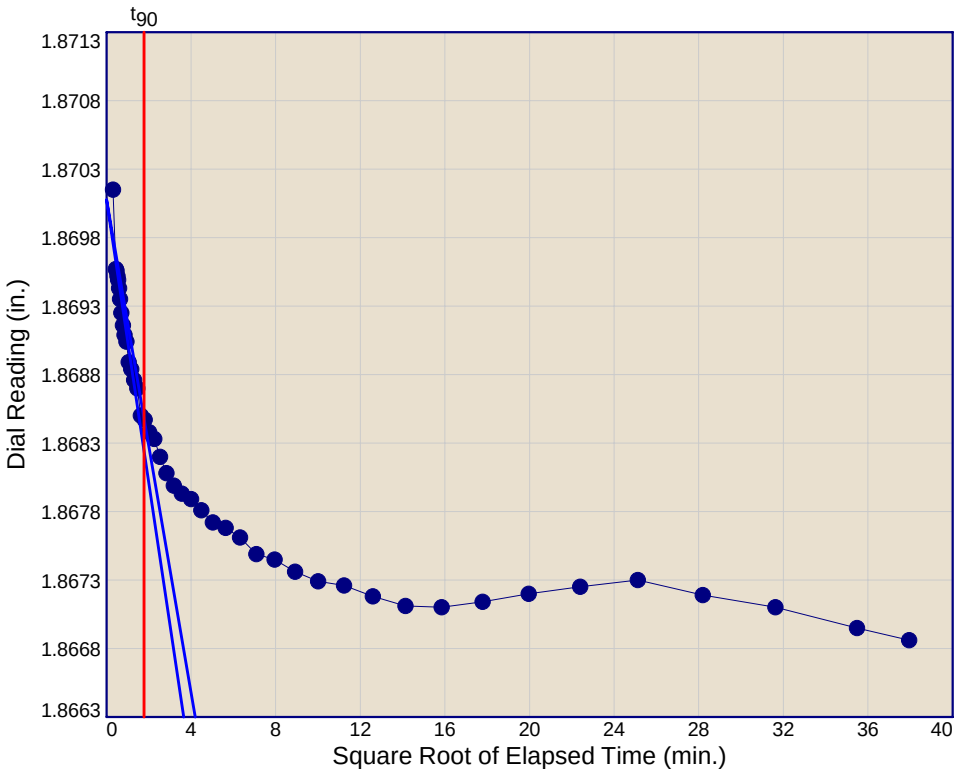
$C_v @ T_{90}$
0.0028 in.²/sec.

Figure ST-9

Dial Reading vs. Time

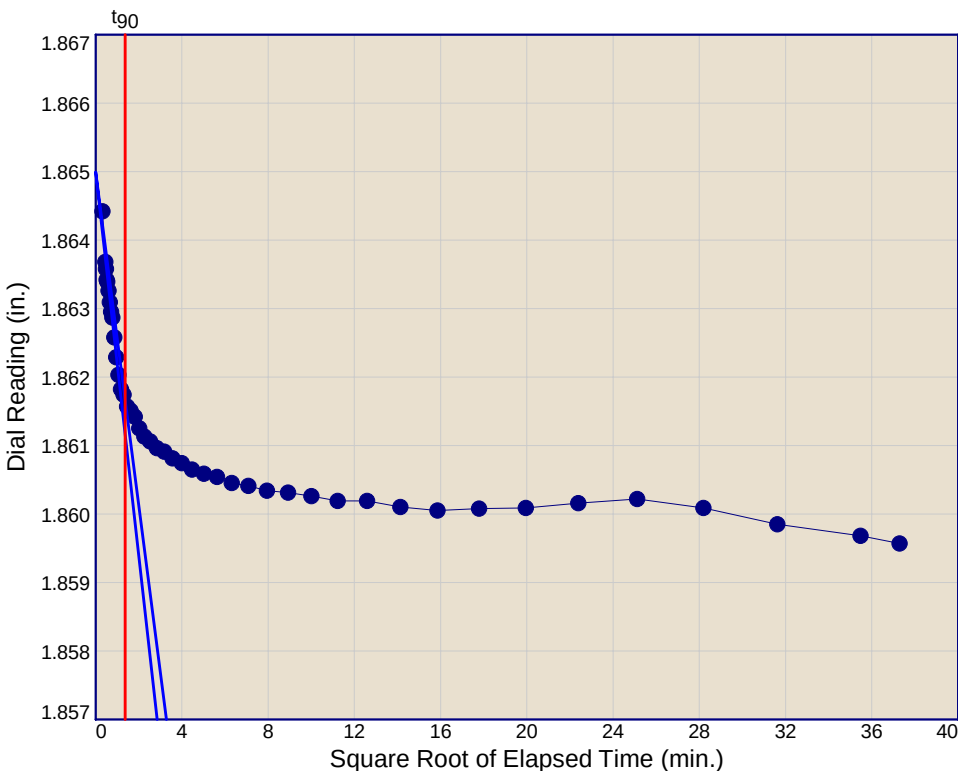
Project No.: 75245216
Project: NCDOT I-5715

Location: ST-1 Depth: 11.0-13.0' Sample Number: S3EB1-B



Load No.= 17
Load=8000 psf
 $D_0 = 1.8701$
 $D_{90} = 1.8685$
 $D_{100} = 1.8683$
 $T_{90} = 3.17$ min.

$C_v @ T_{90}$
0.0008 in.²/sec.



Load No.= 18
Load=4000 psf
 $D_0 = 1.8650$
 $D_{90} = 1.8617$
 $D_{100} = 1.8613$
 $T_{90} = 1.87$ min.

$C_v @ T_{90}$
0.0014 in.²/sec.

Figure ST-10

SITE PHOTOGRAPHS

WIDENING OF BRIDGE NO.359 OVER I-77 SOUTHBOUND
-L3SB- ON NC 73 (-Y2-)

PROJECT REFERENCE NO.	SHEET NO.
I-5715	20



END BENT NO. 1 LOOKING EAST ALONG NORTH SIDE OF BRIDGE



BENT NO. 1 LOOKING SOUTH ALONG I-77 SOUTHBOUND