

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 50000.1.STR24T3 F.A. PROJ. N/A
COUNTY Cabarrus
PROJECT DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.)
over NCRNSRR

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. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

PROJECT: 50000.1.STR24T3 ID: P-5208F

PERSONNEL

D. Racey

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INVESTIGATED BY F&R, Inc.

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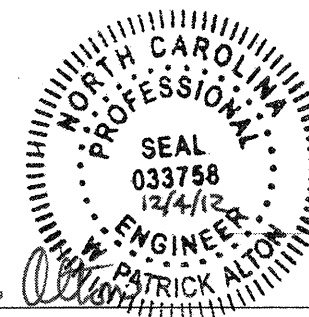
SUBMITTED BY F&R, Inc.

DATE December 2012

DRAWN BY: D. Racey

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.



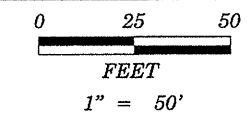
Patrick Alton

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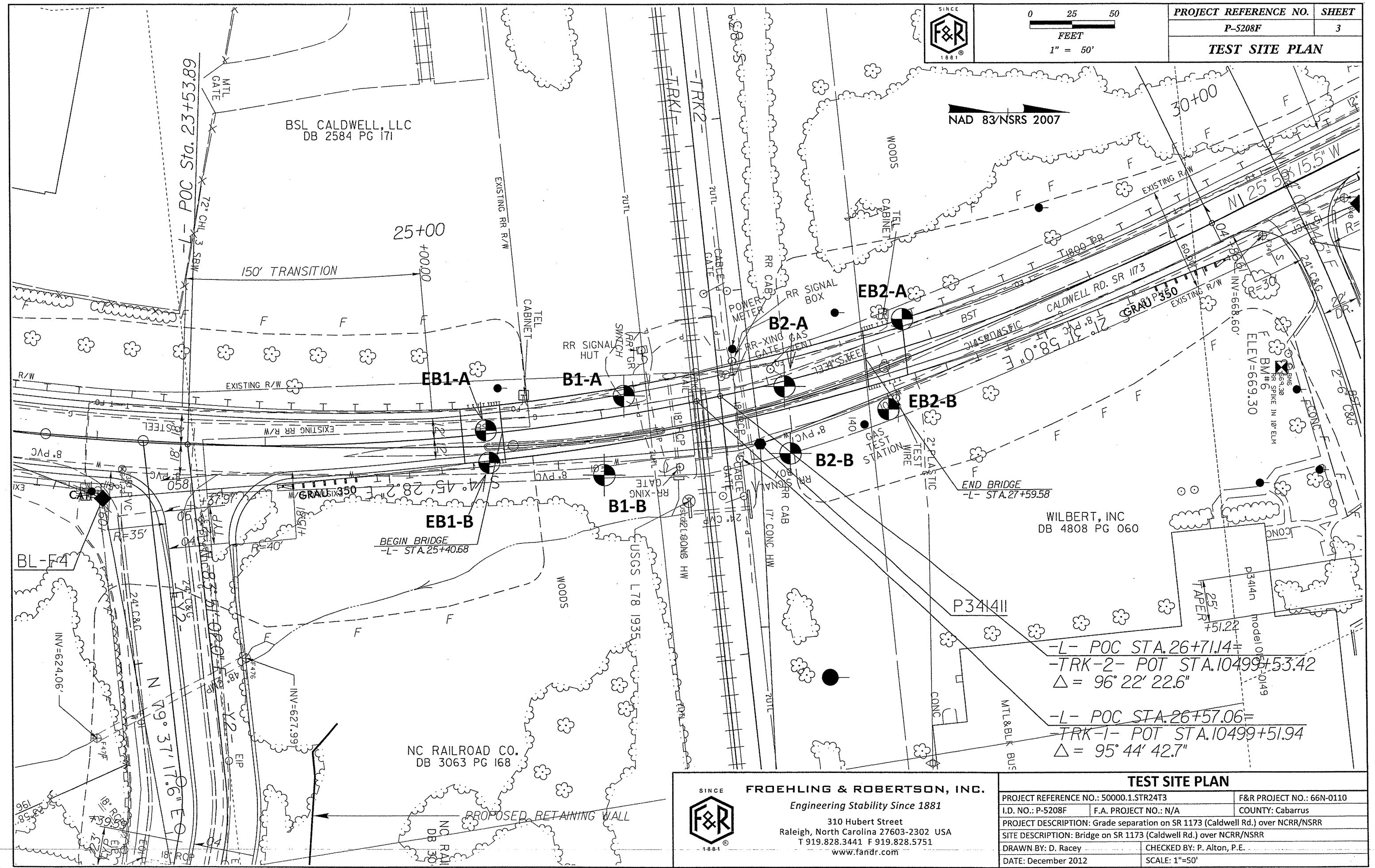
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS																																																																																																																																																		
<p>SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p align="center"><i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>				<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p align="center">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>				<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, 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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>				<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>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.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>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.</p> <p>STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																		
<p align="center">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-7-8</td> <td>A-7-9</td> <td>A-7-10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SYMBOL</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> </tr> <tr> <td>% PASSING</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> </tr> <tr> <td>LIQUID LIMIT</td> <td>5</td> <td>10</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> <td>35</td> <td>40</td> <td>45</td> <td>50</td> <td>55</td> <td>60</td> <td>65</td> <td>70</td> <td>75</td> <td>80</td> <td>85</td> </tr> <tr> <td>PLASTIC INDEX</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> <td>11</td> <td>12</td> <td>13</td> <td>14</td> <td>15</td> <td>16</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>				GENERAL CLASS.	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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				<p align="center">WEATHERING</p> <p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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, YIELDS SPT N VALUES > 100 BPF.</p> <p>VERY SEVERE (V SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF.</p> <p>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.</p>				<p align="center">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽- - STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p>			
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<p align="center">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>				<p align="center">NOTES:</p> <p>TBM 1: BL-F6 N: 573,185.6688 E: 1,501,467.8690 ELEV. = 636.32 FT. TBM 2: BL-F4 N: 573,131.3088 E: 1,501,171.0561 ELEV. = 639.84 FT. TBM 3: BL-F5 N: 573,874.1983 E: 1,500,999.0037 ELEV. = 672.99 FT.</p>																																																																																																																																																										
<p>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.</p>				<p align="center">BENCH MARK: SEE BELOW</p> <p align="right">ELEVATION: FT.</p>																																																																																																																																																										



PROJECT REFERENCE NO.	SHEET
P-5208F	3
TEST SITE PLAN	



NAD 83/NSRS 2007

BSL CALDWELL, LLC
DB 2584 PG 171

WILBERT, INC
DB 4808 PG 060

NC RAILROAD CO.
DB 3063 PG 168

-L- POC STA. 26+71.14 =
-TRK-2- POT STA. 10499+53.42
Δ = 96° 22' 22.6"

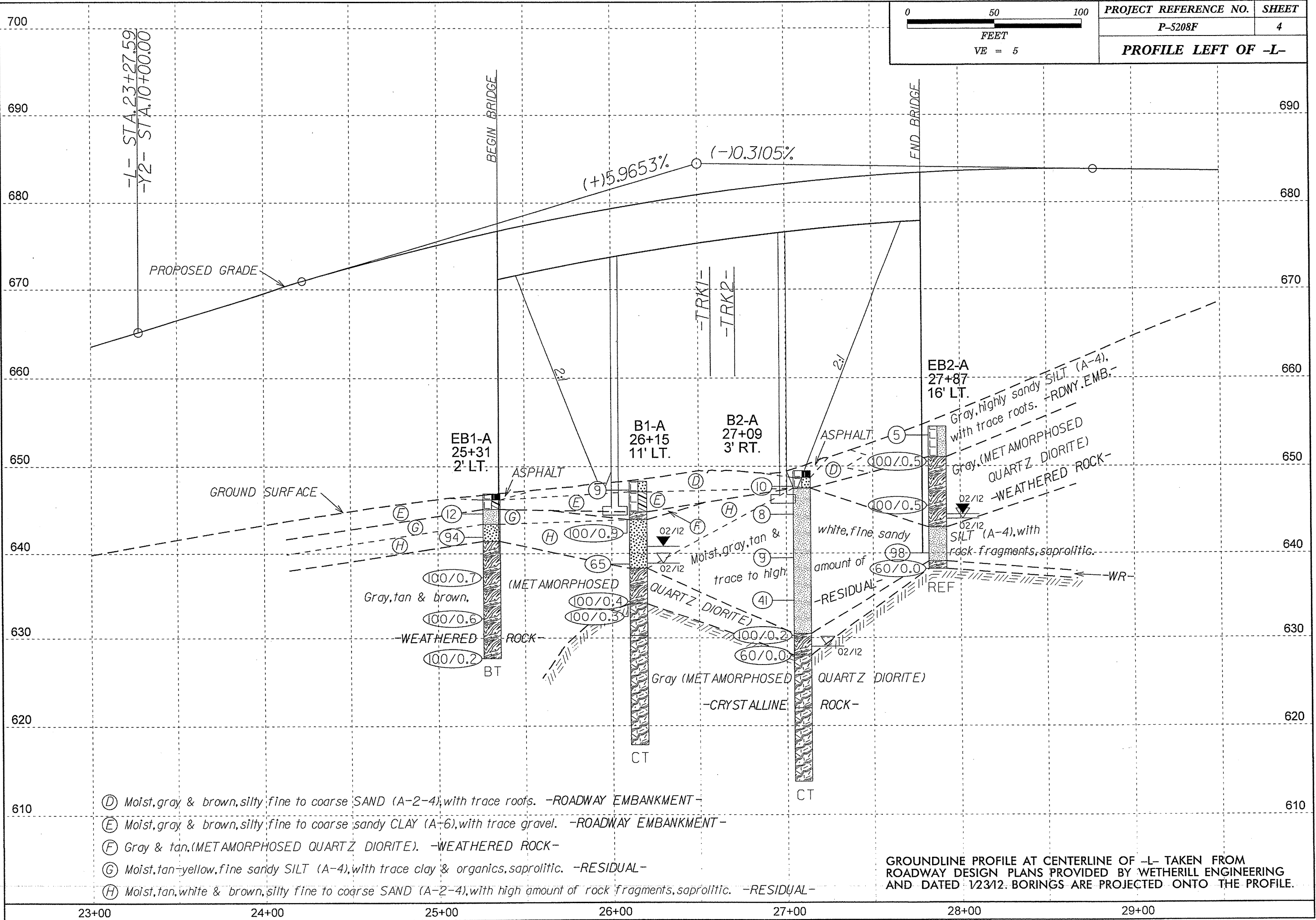
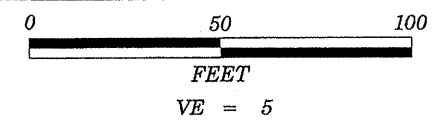
-L- POC STA. 26+57.06 =
-TRK-1- POT STA. 10499+51.94
Δ = 95° 44' 42.7"

SINCE
F&R
1881

FROEHLING & ROBERTSON, INC.
Engineering Stability Since 1881

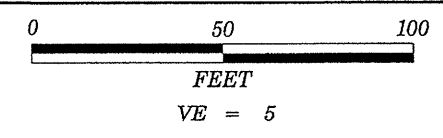
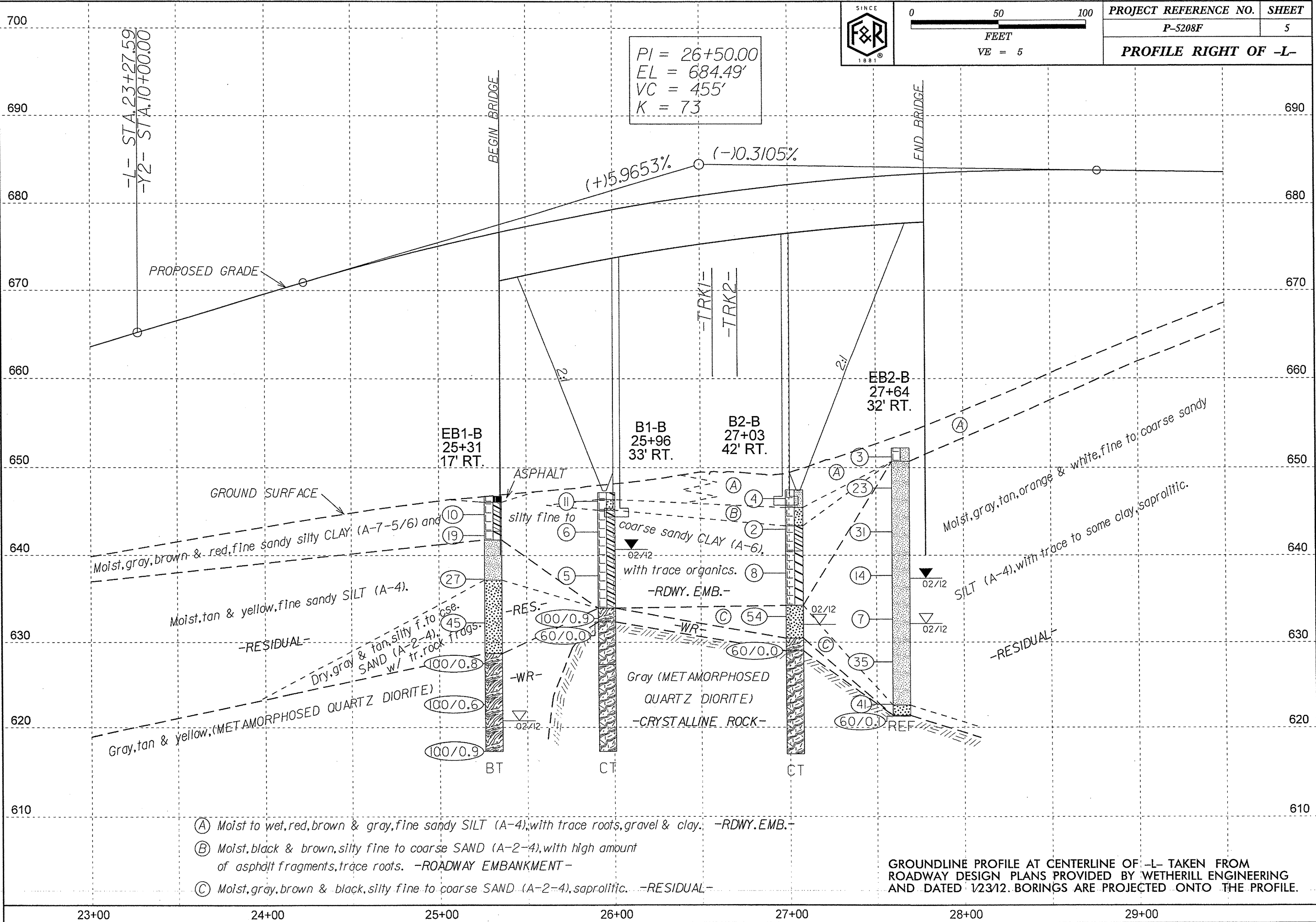
310 Hubert Street
Raleigh, North Carolina 27603-2302 USA
T 919.828.3441 F 919.828.5751
www.fandr.com

TEST SITE PLAN	
PROJECT REFERENCE NO.: 50000.1.STR24T3	F&R PROJECT NO.: 66N-0110
I.D. NO.: P-5208F	F.A. PROJECT NO.: N/A
COUNTY: Cabarrus	
PROJECT DESCRIPTION: Grade separation on SR 1173 (Caldwell Rd.) over NCR/NSRR	
SITE DESCRIPTION: Bridge on SR 1173 (Caldwell Rd.) over NCR/NSRR	
DRAWN BY: D. Racey	CHECKED BY: P. Alton, P.E.
DATE: December 2012	SCALE: 1"=50'



- (D) Moist, gray & brown, silty, fine to coarse SAND (A-2-4), with trace roots. -ROADWAY EMBANKMENT-
- (E) Moist, gray & brown, silty, fine to coarse sandy CLAY (A-6), with trace gravel. -ROADWAY EMBANKMENT-
- (F) Gray & tan, (METAMORPHOSED QUARTZ DIORITE). -WEATHERED ROCK-
- (G) Moist, tan-yellow, fine sandy SILT (A-4), with trace clay & organics, saprolitic. -RESIDUAL-
- (H) Moist, tan, white & brown, silty fine to coarse SAND (A-2-4), with high amount of rock fragments, saprolitic. -RESIDUAL-

GROUNDLINE PROFILE AT CENTERLINE OF -L- TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY WETHERILL ENGINEERING AND DATED 1/23/12. BORINGS ARE PROJECTED ONTO THE PROFILE.



PROJECT REFERENCE NO.	SHEET
P-5208F	5
PROFILE RIGHT OF -L-	

$PI = 26+50.00$
 $EL = 684.49'$
 $VC = 455'$
 $K = 7.3$

-L- STA. 23+27.59
 -Y2- STA. 10+00.00

PROPOSED GRADE

BEGIN BRIDGE

END BRIDGE

$(+)5.9653\%$ $(-)-0.3105\%$

EB1-B
25+31
17' RT.

B1-B
25+96
33' RT.

B2-B
27+03
42' RT.

EB2-B
27+64
32' RT.

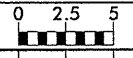
ASPHALT
 silty fine to coarse sandy CLAY (A-6)
 with trace organics.
 -RDWY. EMB.-
 -RES.-
 Gray (METAMORPHOSED QUARTZ DIORITE)
 -CRYSTALLINE ROCK-
 Moist, gray, brown & red, fine sandy silty CLAY (A-7-5/6) and
 Moist, tan & yellow, fine sandy SILT (A-4).
 Dry, gray & tan, silty f. to coarse SAND (A-2-4) w/ tr. rock frags.
 Gray, tan & yellow, (METAMORPHOSED QUARTZ DIORITE)
 Moist, gray, tan, orange & white, fine to coarse sandy
 SILT (A-4), with trace to some clay, saprolitic.
 -RESIDUAL-

- (A) Moist to wet, red, brown & gray, fine sandy SILT (A-4), with trace roots, gravel & clay. -RDWY. EMB.-
- (B) Moist, black & brown, silty fine to coarse SAND (A-2-4), with high amount of asphalt fragments, trace roots. -ROADWAY EMBANKMENT-
- (C) Moist, gray, brown & black, silty fine to coarse SAND (A-2-4), saprolitic. -RESIDUAL-

GROUNDLINE PROFILE AT CENTERLINE OF -L- TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY WETHERILL ENGINEERING AND DATED 1/23/12. BORINGS ARE PROJECTED ONTO THE PROFILE.

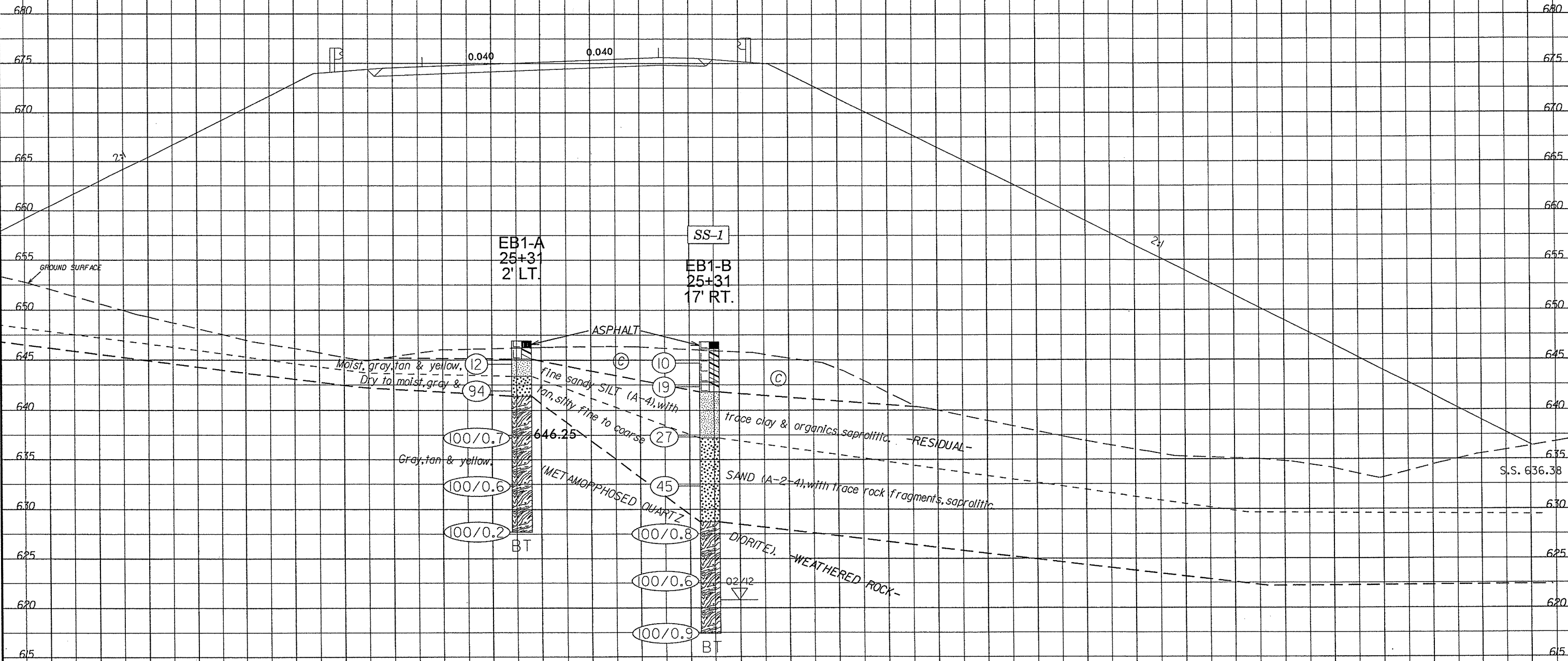
23+00 24+00 25+00 26+00 27+00 28+00 29+00

8/23/99



50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE
							C. SAND	F. SAND	SILT	CLAY	10	40	200	
SS-1	17' RT.	25+31	1.1'-2.6'	A-6(2)	32	12	22.6	28.3	21.0	28.1	77.3	64.3	42.8	10.6

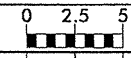


(C) Moist, gray, red & brown, fine sandy silty CLAY (A-7-5) and fine to coarse sandy CLAY (A-6), with trace organics & gravel. -ROADWAY EMBANKMENT-

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY WETHERILL ENGINEERING DATED 1/23/12. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

8/23/99



PROJ. REFERENCE NO. P-5208F SHEET NO. 7

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

685 685

680 680

675 675

670 670

665 665

660 660

655 655

650 650

645 645

640 640

635 635

630 630

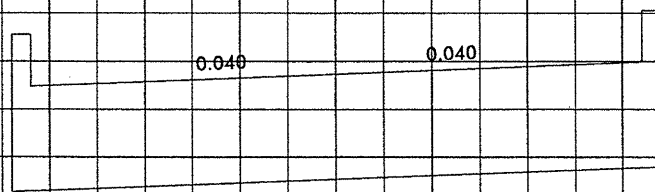
625 625

620 620

615 615

610 610

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



B1-A
26+15
11' LT.

B1-B
25+96
33' RT.

GROUND SURFACE

White & brown silty fine to coarse SAND (A-2-4),
with high amount of rock fragments. -RESIDUAL-

Moist, gray, brown & red, fine sandy silty CLAY (A-7-5)
and silty fine to coarse sandy CLAY (A-6),
Gray & tan, with trace organics.

-ROADWAY EMBANKMENT-

(METAMORPHOSED QUARTZ DIORITE) -WEATHERED ROCK-

REC=87%
RQD=24%

REC=92%
RQD=40%

Gray, (METAMORPHOSED QUARTZ DIORITE)

-CRYSTALLINE ROCK-

REC=100%
RQD=84%

REC=100%
RQD=94%

CT

CT

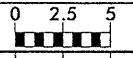
26 + 00.00

(D) Moist, black & brown, silty fine to coarse SAND (A-2-4), with high amount of asphalt fragments, trace roots. -ROADWAY EMBANKMENT-

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY WETHERILL ENGINEERING DATED 1/23/12. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ON THE SECTION.

PLotted on 11/15/99 by JLD/MSB

8/23/99



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

690 690

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE
							C. SAND	F. SAND	SILT	CLAY	10	40	200	
SS-3	3' RT.	27+09	9.0'-10.5'	A-4(2)	40	NP	6.8	19.2	57.1	16.9	100.0	95.6	79.6	32.2

685 685

680 680

675 675

670 670

665 665

660 660

655 655

650 650

645 645

640 640

635 635

630 630

625 625

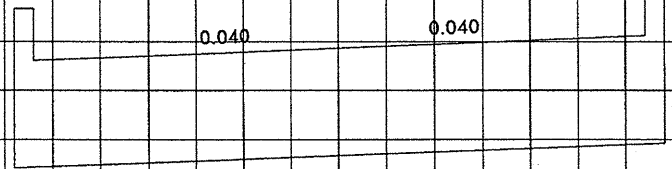
620 620

615 615

610 610

600 600

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



SS-3
B2-A
27+09
3' RT.

B2-B
27+03
42' RT.

GROUND SURFACE

ASPHALT

10

8

649.43

9

41

100/0.2

60/0.0

REC=100%
RQD=77%

REC=100%
RQD=100%

CT

4

2

8

54

60/0.0

REC=99%
RQD=98%

CT

Moist, gray, white & brown, fine sandy SILT (A-4).

Moist, brown, silty fine to coarse SAND (A-2-4).

Moist to saturated, gray, red & brown, fine to coarse sand, and

with trace rock fragments.

little clay, saprolitic.

-RESIDUAL-

Gray, (METAMORPHOSED QUARTZ DIORITE)

-CRYSTALLINE ROCK-

silty CLAY (A-7-5), with trace

silty fine sandy CLAY (A-6).

-ROADWAY EMBANKMENT-

Moist, gray, brown & black, silty fine to coarse SAND (A-2-4), saprolitic.

-RESIDUAL-

WEATHERED ROCK

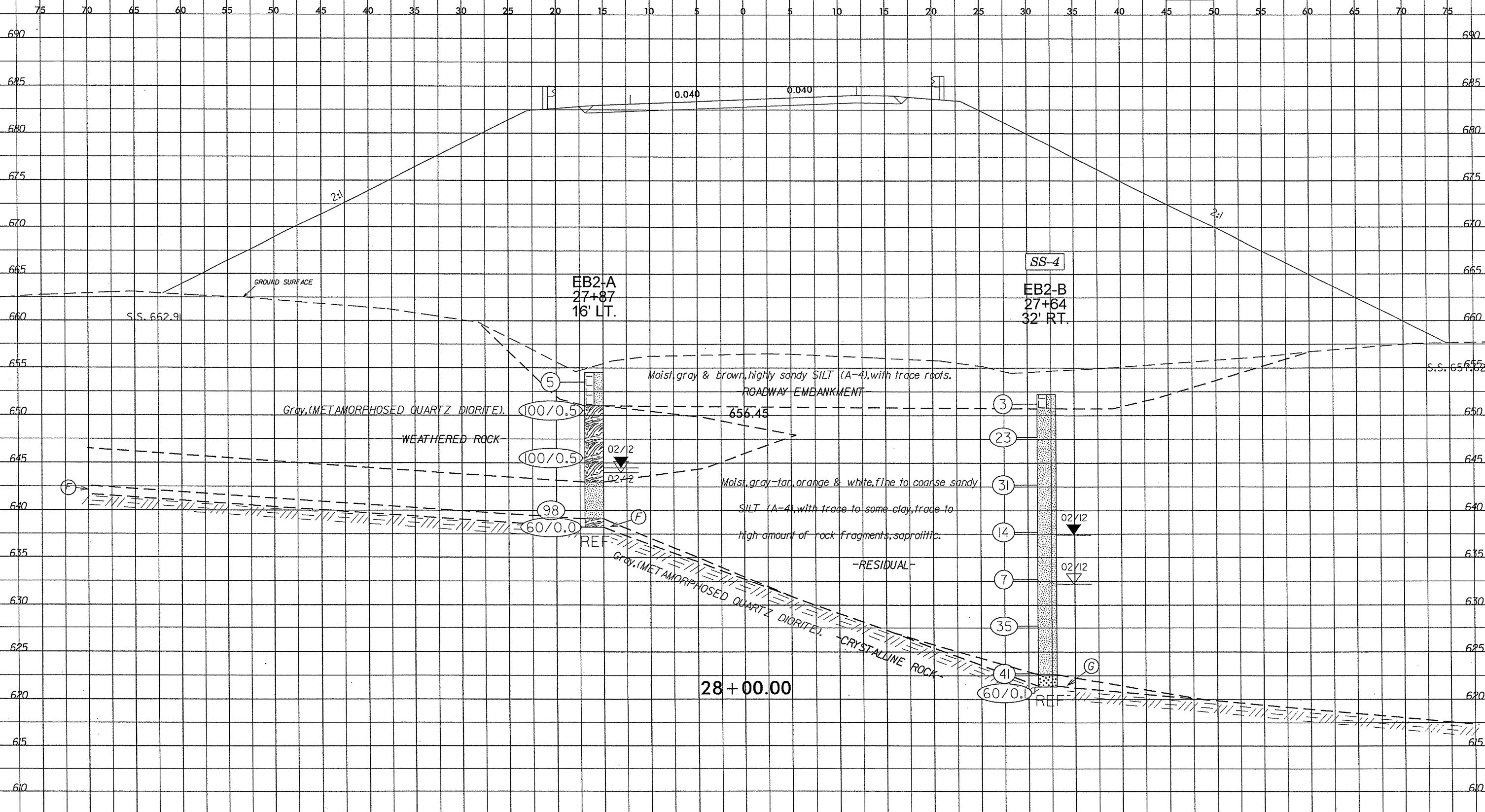
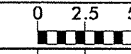
(E) Moist, gray-brown, highly fine sandy SILT (A-4), with trace roots. -ROADWAY EMBANKMENT-

27+00.00

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY WETHERILL ENGINEERING DATED 1/23/12. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ON THE SECTION.

VERTICAL SCALE: 1"=10'

8/23/99



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE
							C. SAND	F. SAND	SILT	CLAY	10	40	200	
SS-4	32' RT.	27+64	13.5'-15.0'	A-4(0)	33	NP	15.5	33.8	40.1	10.6	99.4	91.9	57.4	32.6

- (F) Gray, (METAMORPHOSED QUARTZ DIORITE). -WEATHERED ROCK-
- (G) Gray, silty, fine to coarse SAND (A-2-4), with some rock fragments. -RESIDUAL-

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY WETHERILL ENGINEERING DATED 12/3/12. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

8/23/99

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR			GROUND WTR (ft)
BORING NO. EB1-A	STATION 25+31	OFFSET 2 ft LT	ALIGNMENT -L-
COLLAR ELEV. 646.9 ft	TOTAL DEPTH 19.2 ft	NORTHING 573,358	EASTING 1,501,131
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA	HAMMER TYPE Automatic
DRILLER J. Gilchrist	START DATE 02/07/12	COMP. DATE 02/07/12	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				
650													ROADWAY	0.0
													ASPHALT (8")	0.7
645	645.6	1.3	8	6	6								ROADWAY EMBANKMENT	1.8
													Gray & brown, fine to coarse sandy CLAY (A-6), with some silt, trace gravel.	3.5
640	642.9	4.0	23	34	60								RESIDUAL	5.5
													Tan-yellow, fine sandy SILT (A-4), with trace clay & organics, saprolitic.	
													Tan, silty fine to coarse SAND (A-2-4), saprolitic.	
635	637.9	9.0	68	32/0.2									WEATHERED ROCK	
													Tan & brown to gray, (METAMORPHOSED QUARTZ DIORITE).	
630	632.9	14.0	64	36/0.1										
	627.9	19.0	100/0.2											

NOTES:
 1) Geologist indicates strata break in split spoon at a depth of 1.8'.
 2) Driller indicates harder drilling at a depth of 5.5'.
 3) 24 hr. water level not measured due to boring location in roadway.

WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR			GROUND WTR (ft)
BORING NO. EB1-B	STATION 25+31	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 646.8 ft	TOTAL DEPTH 29.4 ft	NORTHING 573,360	EASTING 1,501,150
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA	HAMMER TYPE Automatic
DRILLER J. Gilchrist	START DATE 02/07/12	COMP. DATE 02/07/12	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				
650													ROADWAY	0.0
													ASPHALT (8")	0.7
645	645.7	1.1	4	5	5								ROADWAY EMBANKMENT	1.8
													Brown, fine to coarse sandy CLAY (A-6), with trace roots & gravel, some silt.	4.0
640	643.3	3.5	5	9	10								RESIDUAL	5.0
													Red, tan & gray, fine sandy silty CLAY (A-7-5).	
													RESIDUAL	
													Yellow & tan, fine sandy SILT (A-4).	
635	638.3	8.5	5	5	22								WEATHERED ROCK	9.6
													Gray & tan, silty fine to coarse SAND (A-2-4), with trace rock fragments.	
630	633.3	13.5	29	26	19									
625	628.3	18.5	13	87/0.3									WEATHERED ROCK	18.1
													Tan-yellow & gray, (METAMORPHOSED QUARTZ DIORITE).	
620	623.3	23.5	57	43/0.1										
	618.3	28.5	56	44/0.4										

NOTES:
 1) Geologist indicates strata breaks in split spoon at depths of 4.0' & 9.6'.
 2) Driller indicates harder drilling at a depth of 18.1'.
 3) 24 hr. water level not measured due to boring location in roadway.

NCDOT BORE DOUBLE P-5208F_BORELOGS.GPJ NC_DOT.GDT 12/3/12

WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR			GROUND WTR (ft)
BORING NO. B1-A	STATION 26+15	OFFSET 11 ft LT	ALIGNMENT -L-
COLLAR ELEV. 648.3 ft	TOTAL DEPTH 30.4 ft	NORTHING 573,440	EASTING 1,501,111
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA/H casing/NQ3 core	HAMMER TYPE Automatic
DRILLER J. Gilchrist	START DATE 02/08/12	COMP. DATE 02/08/12	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				
650													648.3 GROUND SURFACE 0.0	
	648.3	0.0	4	5	4							M	647.1 ROADWAY EMBANKMENT 1.2	
													644.8 Gray-brown, silty fine SAND (A-2-4), with trace roots. 3.5	
645	644.8	3.5	43	57/0.4									643.9 Brown, silty fine to coarse sandy CLAY (A-6). 4.4	
													WEATHERED ROCK 643.9	
													Gray & tan, (METAMORPHOSED QUARTZ DIORITE). 643.9	
													RESIDUAL 638.3	
			27	36	29								White & brown, silty fine to coarse SAND (A-2-4), with high amount of rock fragments. 10.0	
640	639.8	8.5											WEATHERED ROCK 638.3	
													Gray & tan, (METAMORPHOSED QUARTZ DIORITE). 638.3	
													CRYSTALLINE ROCK 634.1	
635	634.8	13.5	100/0.4										Gray, (METAMORPHOSED QUARTZ DIORITE). 14.2	
	634.4	13.9	100/0.3										CRYSTALLINE ROCK 634.1	
													Gray, (METAMORPHOSED QUARTZ DIORITE). 18.0	
630												RS-1	Gray, (METAMORPHOSED QUARTZ DIORITE). 18.0	
625												RS-2		
620														

Boring Terminated at Elevation 617.9 ft in CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)

NOTES:
 1) Boring located in gravel parking area, 0.0-0.2'=Surficial Organic Soils & gravel.
 2) Geologist indicates strata break in split spoon at a depth of 1.2'.
 3) Driller indicates harder drilling at a depth of 10.0'.
 4) Auger refusal at a depth of 13.9', began coring at a depth of 14.2'.

NCDOT BORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT.GDT 12/3/12

WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR			GROUND WTR (ft)
BORING NO. B1-A	STATION 26+15	OFFSET 11 ft LT	ALIGNMENT -L-
COLLAR ELEV. 648.3 ft	TOTAL DEPTH 30.4 ft	NORTHING 573,440	EASTING 1,501,111
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA/H casing/NQ3 core	HAMMER TYPE Automatic
DRILLER J. Gilchrist	START DATE 02/08/12	COMP. DATE 02/08/12	SURFACE WATER DEPTH N/A

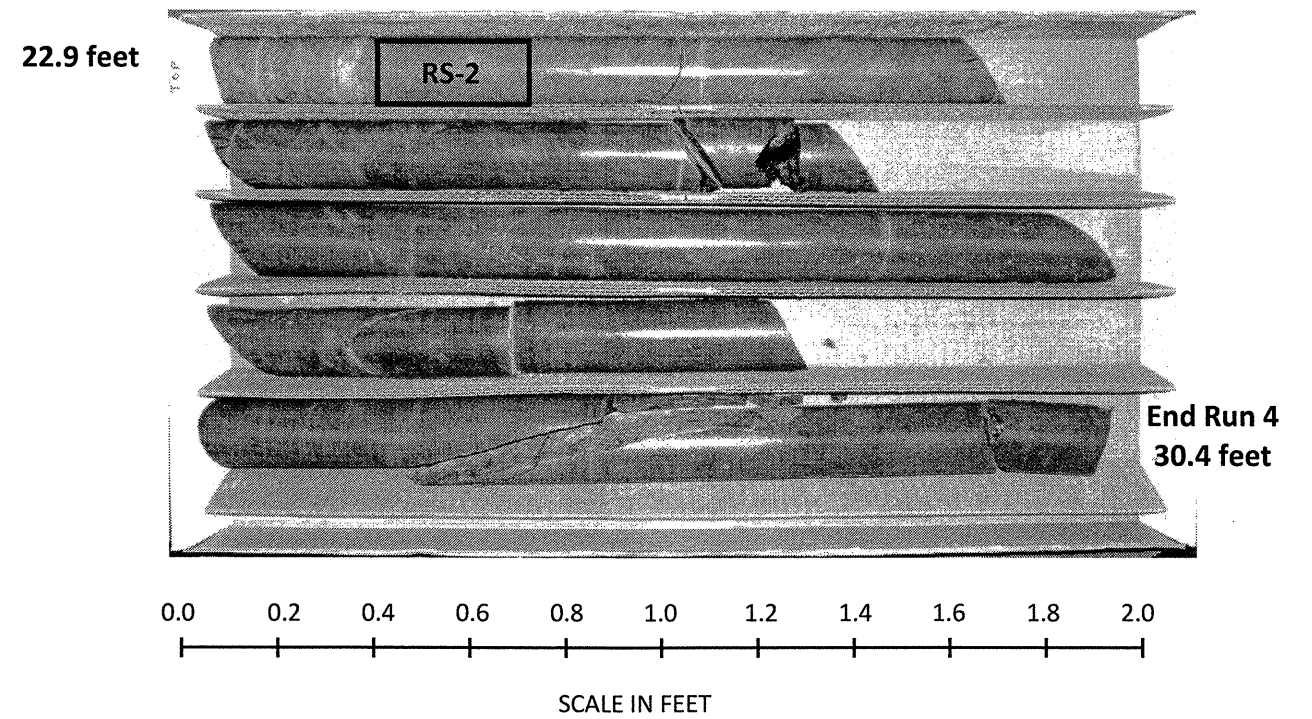
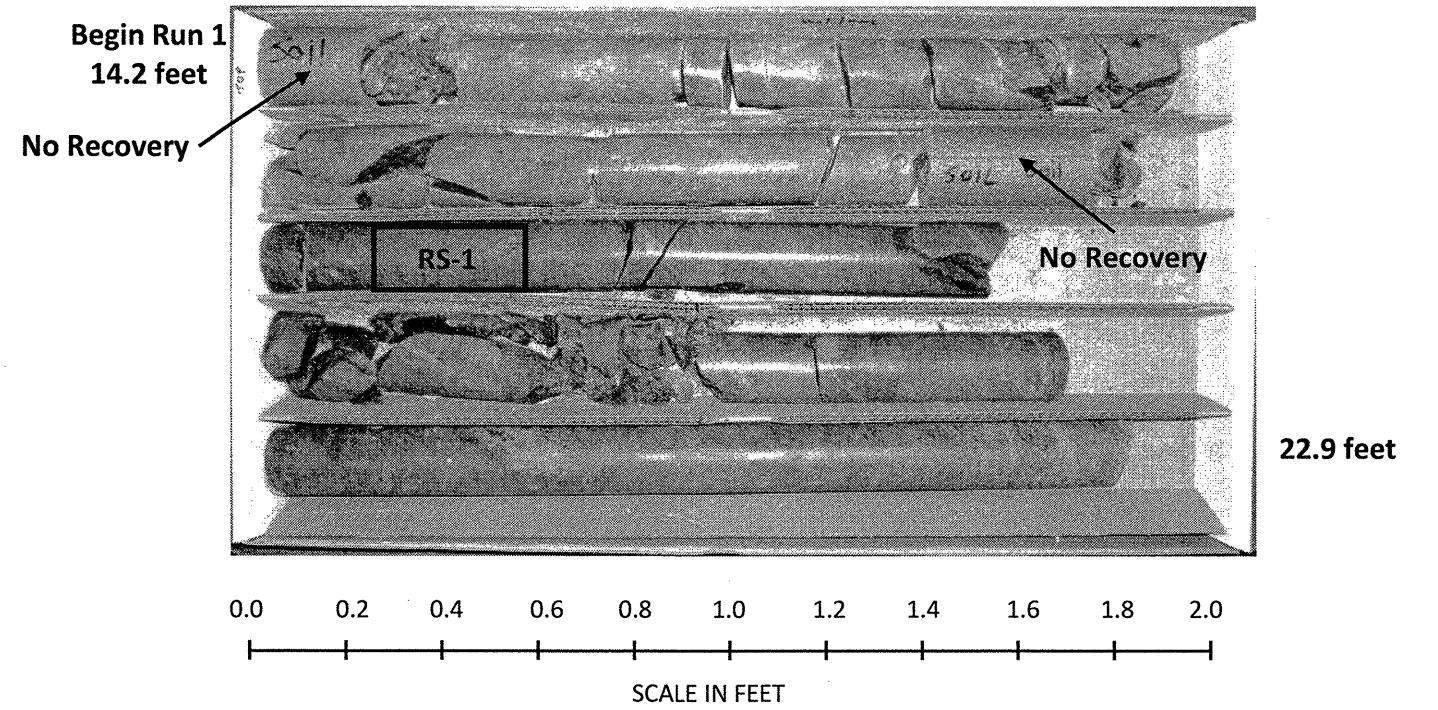
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
634.1											Begin Coring @ 14.2 ft	
	634.1	14.2	1.2	3:36/1.0	(1.0)	(0.4)		(3.3)	(0.9)		CRYSTALLINE ROCK	14.2
	632.8	15.4	5.0	1:09/0.2	83%	33%		87%	24%		Gray, moderately severely to moderately weathered, moderately hard to hard (METAMORPHOSED QUARTZ DIORITE), very close to close fracture spacing.	18.0
630				3:39/1.0	(4.7)	(1.7)					Geologist indicated water color change from 17.4'-17.7'.	
				2:03/1.0	94%	34%	RS-1	(12.4)	(10.4)		Gray, very slightly weathered to fresh, hard (METAMORPHOSED QUARTZ DIORITE), close to moderately close fracture spacing.	
				3:14/1.0							RS-1: 18.0'-18.3' qu=18,097 psi	
				2:30/1.0							R ₁ =12, R ₂ =8, R ₃ =10, R ₄ =12, R ₅ =7 RMR=49	
625				3:40/1.0	(5.0)	(4.8)					RS-2: 23.3'-23.6' qu=20,829 psi	
				3:46/1.0	100%	96%	RS-2				R ₁ =12, R ₂ =17, R ₃ =20, R ₄ =20, R ₅ =7 RMR=76	
				3:34/1.0							Rock Type=E	
620				4:08/1.0								
				4:35/1.0								
				4:30/1.0	(5.0)	(4.4)						
				3:43/1.0	100%	88%						
				3:36/1.0								
				3:49/1.0								
				4:26/1.0								
617.9		30.4									Boring Terminated at Elevation 617.9 ft in CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)	30.4

NOTES:
 1) Boring located in gravel parking area, 0.0-0.2'=Surficial Organic Soils & gravel.
 2) Geologist indicates strata break in split spoon at a depth of 1.2'.
 3) Driller indicates harder drilling at a depth of 10.0'.
 4) Auger refusal at a depth of 13.9', began coring at a depth of 14.2'.

NCDOT CORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT.GDT 12/3/12



P-5208F: Caldwell Rd Grade Separation over NCRR/NSRR, CORE PHOTOGRAPHS: B1-A: Station 26+15, 11 feet Left



WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCR/NSRR			GROUND WTR (ft)
BORING NO. B1-B	STATION 25+96	OFFSET 33 ft RT	ALIGNMENT -L-
COLLAR ELEV. 647.2 ft	TOTAL DEPTH 29.8 ft	NORTHING 573,428	EASTING 1,501,157
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA/H casing/NQ3 core	HAMMER TYPE Automatic
DRILLER J. Gilchrist	START DATE 02/07/12	COMP. DATE 02/07/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
650													GROUND SURFACE	0.0
645	647.2	0.0	3	5	6							M	ROADWAY EMBANKMENT	0.8
640	643.7	3.5	3	3	3							M	Red & tan, fine sandy silty CLAY (A-7-5), with trace coarse sand & organics.	2.0
635	638.7	8.5	2	2	3							W	Black, silty fine to coarse SAND (A-2-4), with high amount of asphalt fragments, trace roots.	
630	633.7	13.5											Brown, silty fine to coarse sandy CLAY (A-6), with trace roots from 3.5'-5.0'.	
625	632.4	14.8	27	73/0.4									WEATHERED ROCK	13.2
620			60/0.0										Gray & tan, (METAMORPHOSED QUARTZ DIORITE).	14.8
													CRYSTALLINE ROCK	19.8
													Gray, (METAMORPHOSED QUARTZ DIORITE).	19.8
													Gray, (METAMORPHOSED QUARTZ DIORITE).	19.8
														617.4

NOTES:
 1) 0.0-0.2'-Surficial Organic Soils
 2) Geologist indicates strata break in split spoon at a depth of 0.8'.
 3) Driller indicates harder drilling at a depth of 13.2'.
 4) Auger refusal at a depth of 14.8', began coring.

NCDOT BORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT_GDT 12/3/12

WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCR/NSRR			GROUND WTR (ft)
BORING NO. B1-B	STATION 25+96	OFFSET 33 ft RT	ALIGNMENT -L-
COLLAR ELEV. 647.2 ft	TOTAL DEPTH 29.8 ft	NORTHING 573,428	EASTING 1,501,157
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA/H casing/NQ3 core	HAMMER TYPE Automatic
DRILLER J. Gilchrist	START DATE 02/07/12	COMP. DATE 02/07/12	SURFACE WATER DEPTH N/A

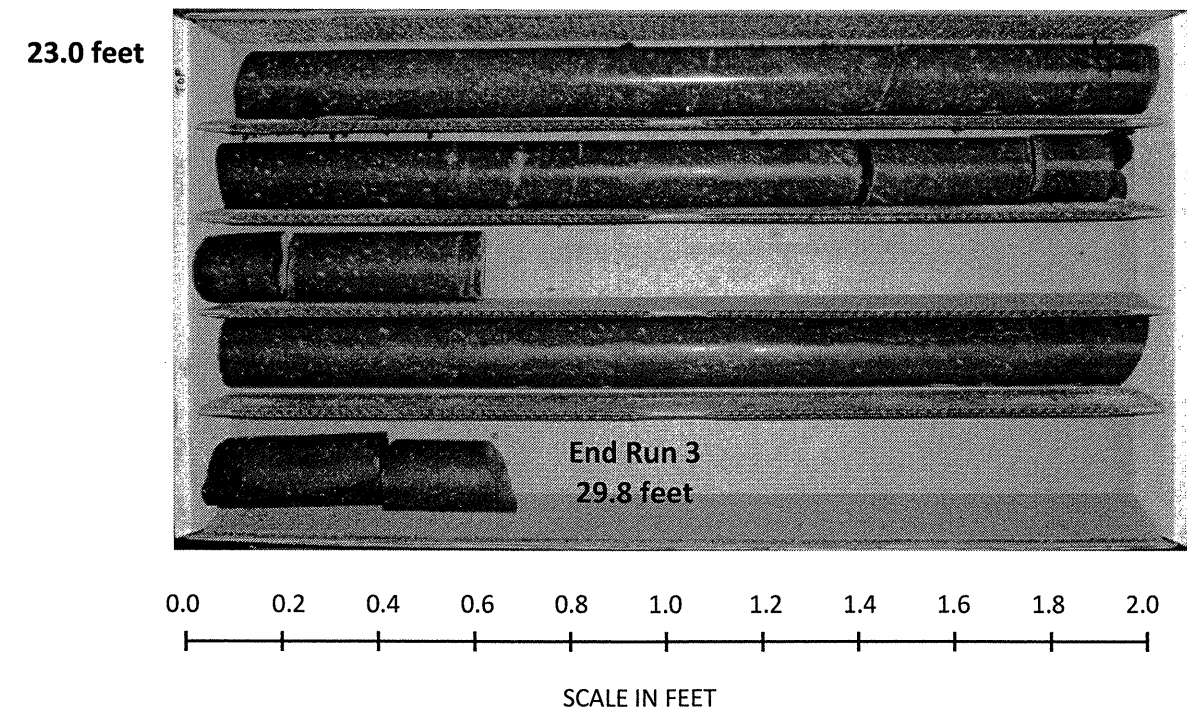
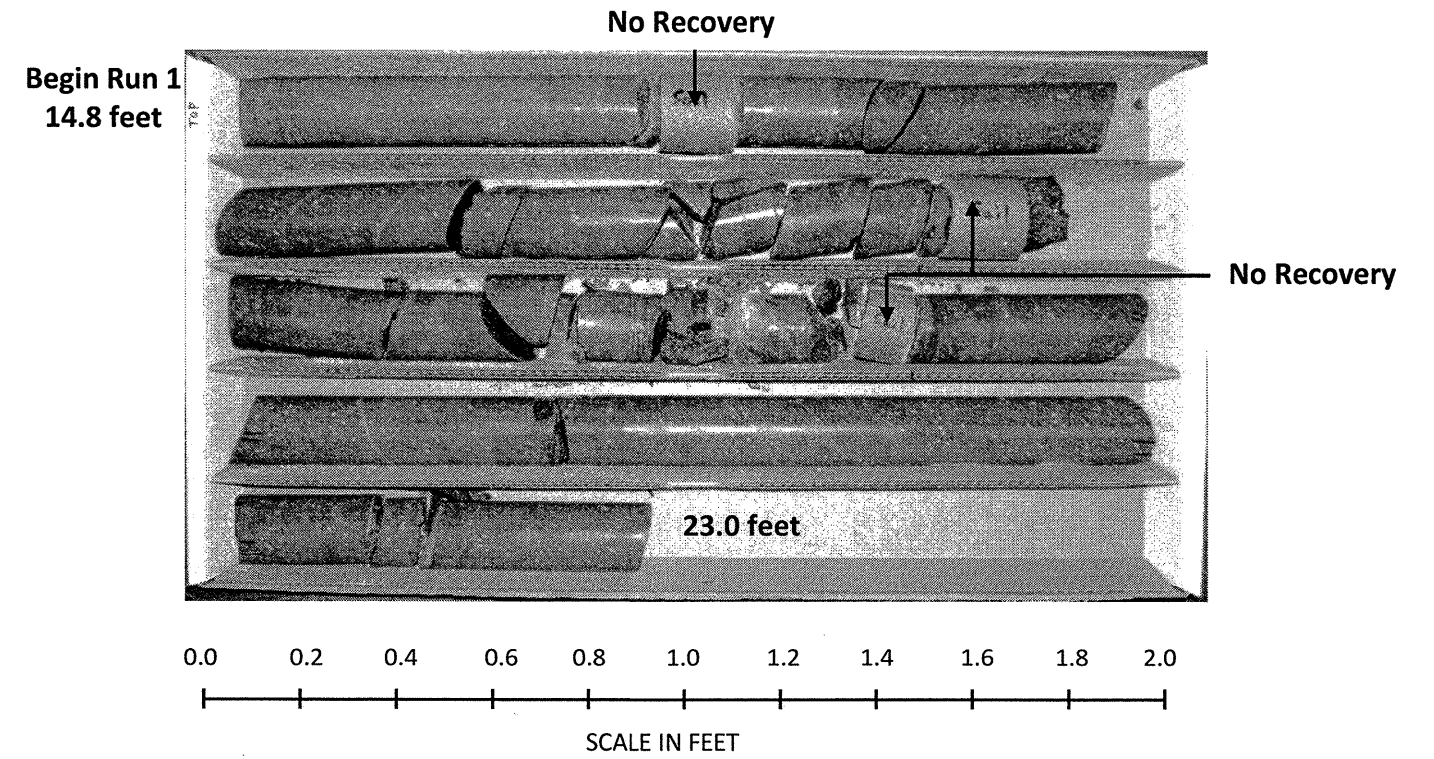
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC (ft) %	RQD (ft) %		REC (ft) %	RQD (ft) %			
632.4		14.8	5.0	N=60/0.0 4:45/1.0 6:31/1.0 5:42/1.0 7:11/1.0 4:31/1.0	(4.6)	(2.0)		(4.6)	(2.0)		Begin Coring @ 14.8 ft	14.8
630	632.4				92%	40%		92%	40%		CRYSTALLINE ROCK	14.8
625	627.4	19.8	5.0	3:58/1.0 3:42/1.0 4:10/1.0 4:35/1.0 4:19/1.0	(5.0)	(4.9)		(10.0)	(9.4)		Gray, slightly to very slightly weathered, hard (METAMORPHOSED QUARTZ DIORITE), very close to close fracture spacing.	19.8
620	622.4	24.8	5.0	5:06/1.0 5:40/1.0 4:25/1.0 4:40/1.0 4:25/1.0	(5.0)	(4.5)		100%	90%		Gray, very slightly weathered to fresh, hard (METAMORPHOSED QUARTZ DIORITE), close to moderately close fracture spacing.	19.8
	617.4	29.8									Boring Terminated at Elevation 617.4 ft in CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)	29.8

NOTES:
 1) 0.0-0.2'-Surficial Organic Soils
 2) Geologist indicates strata break in split spoon at a depth of 0.8'.
 3) Driller indicates harder drilling at a depth of 13.2'.
 4) Auger refusal at a depth of 14.8', began coring.

NCDOT BORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT_GDT 12/3/12



P-5208F: Caldwell Rd Grade Separation over NCRR/NSRR, CORE PHOTOGRAPHS: B1-B: Station 25+96, 33 feet Right



WBS 50000.1.STR22T1B		TIP P-5208F		COUNTY CABARRUS		GEOLOGIST D. Racey										
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR							GROUND WTR (ft)									
BORING NO. B2-A		STATION 27+09		OFFSET 3 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 649.5 ft		TOTAL DEPTH 35.7 ft		NORTHING 573,534		EASTING 1,501,105										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011				DRILL METHOD 2.25" ID HSA/H casing/NQ3 core		HAMMER TYPE Automatic										
DRILLER J. Gilchrist		START DATE 02/06/12		COMP. DATE 02/06/12		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
650																
	648.7	0.8	8	5	5											649.5 ROADWAY ASPHALT (9") 0.0
																648.7 ROADWAY EMBANKMENT 0.8
																647.5 BROWN, SILTY FINE TO COARSE SAND (A-2-4) 2.0
645	645.5	4.0	3	3	5											RESIDUAL 645.5
																Gray, white & brown, fine sandy SILT (A-4), with trace rock fragments, little clay, saprolitic.
640	640.5	9.0	3	4	5						SS-3	32%				640.5
635	635.5	14.0	9	20	21											635.5
630	630.5	19.0														630.5 WEATHERED ROCK 19.0
																Gray, (METAMORPHOSED QUARTZ DIORITE).
																628.0 CRYSTALLINE ROCK 21.5
625											RS-3					Gray, (METAMORPHOSED QUARTZ DIORITE).
																622.0 Gray, (METAMORPHOSED QUARTZ DIORITE).
620																620.0
																613.8 Boring Terminated at Elevation 613.8 ft in CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE) 35.7
615																
NOTES: 1) Driller indicates harder drilling at a depth of 13.5'. 2) 0 hr. water level measured inside HSA prior to coring. 1 hr. water level at a depth of 7.3' upon HSA removal. 3) 24 hr. water level not measured due to boring location in roadway. 4) Auger refusal at a depth of 21.5', began coring.																

NCDOT BORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT.GDT 12/3/12

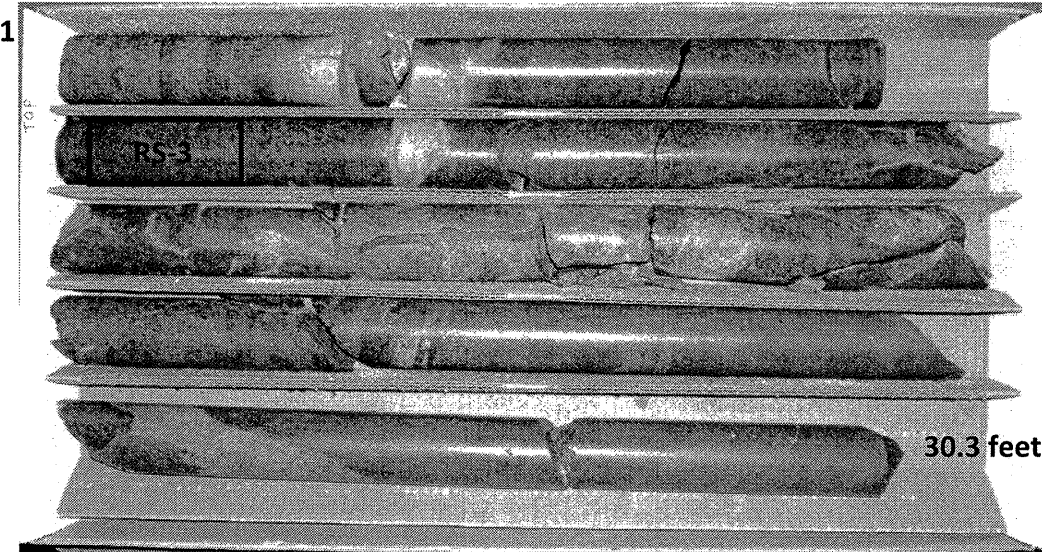
WBS 50000.1.STR22T1B		TIP P-5208F		COUNTY CABARRUS		GEOLOGIST D. Racey						
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR							GROUND WTR (ft)					
BORING NO. B2-A		STATION 27+09		OFFSET 3 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 649.5 ft		TOTAL DEPTH 35.7 ft		NORTHING 573,534		EASTING 1,501,105						
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011				DRILL METHOD 2.25" ID HSA/H casing/NQ3 core		HAMMER TYPE Automatic						
DRILLER J. Gilchrist		START DATE 02/06/12		COMP. DATE 02/06/12		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 14.2 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
628	628.0	21.5	4.2	N=60/0.0 3:20/1.0 3:25/1.0 3:36/1.0 3:45/1.0 4:01/1.0 3:09/1.0 4:00/1.0 4:21/1.0 4:25/1.0	(4.2)	(3.6)		(6.0)	(4.6)		Begin Coring @ 21.5 ft	21.5
625	623.8	25.7	5.0	100%	86%		RS-3	100%	77%		Gray, moderately to slightly weathered, moderately hard to hard (METAMORPHOSED QUARTZ DIORITE), close fracture spacing. RS-3: 23.2'-23.5' qu=6,960 psi R ₁ =4, R ₂ =17, R ₃ =10, R ₄ =12, R ₅ =7 RMR=50	27.5
620	618.8	30.7	5.0	100%	84%			(8.2)	(8.2)		Rock Type=E Gray, very slightly weathered to fresh, hard (METAMORPHOSED QUARTZ DIORITE), moderately close to wide fracture spacing. RS-4: 31.2'-31.5' qu=22,839 psi R ₁ =12, R ₂ =20, R ₃ =20, R ₄ =20, R ₅ =7 RMR=79	
615	613.8	35.7	5.0	100%	100%		RS-4	100%	100%		Rock Type=E Boring Terminated at Elevation 613.8 ft in CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)	35.7
NOTES: 1) Driller indicates harder drilling at a depth of 13.5'. 2) 0 hr. water level measured inside HSA prior to coring. 1 hr. water level at a depth of 7.3' upon HSA removal. 3) 24 hr. water level not measured due to boring location in roadway. 4) Auger refusal at a depth of 21.5', began coring.												

NCDOT CORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT.GDT 12/3/12



P-5208F: Caldwell Rd Grade Separation over NCRR/NSRR, CORE PHOTOGRAPHS: B2-A: Station 27+09, 3 feet Right

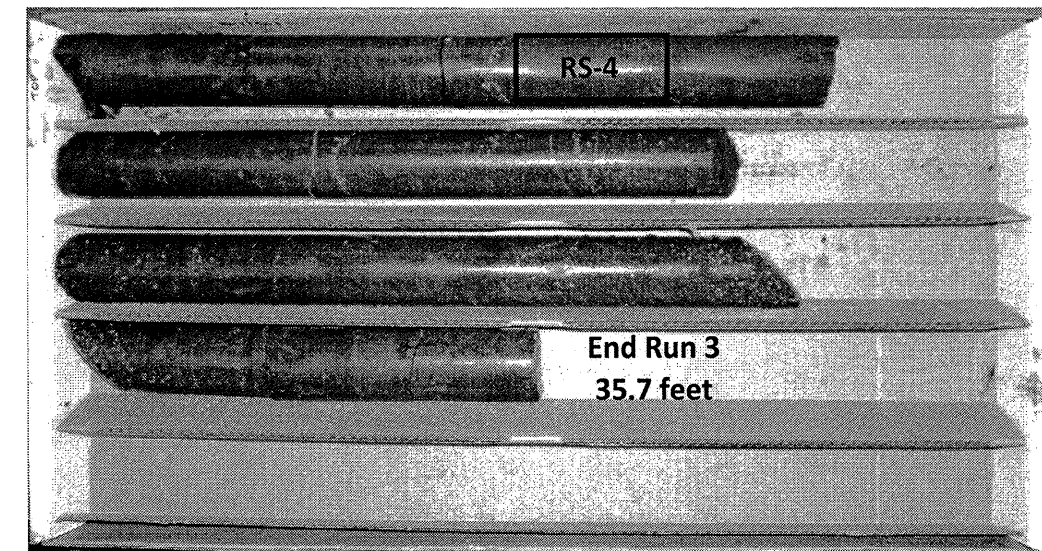
Begin Run 1
21.5 feet



0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

30.3 feet



0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

WBS 50000.1.STR22T1B		TIP P-5208F		COUNTY CABARRUS		GEOLOGIST D. Racey								
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR							GROUND WTR (ft)							
BORING NO. B2-B		STATION 27+03		OFFSET 42 ft RT		ALIGNMENT -L-								
COLLAR ELEV. 647.5 ft		TOTAL DEPTH 30.4 ft		NORTHING 573,538		EASTING 1,501,144								
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA/H casing/NQ3 core		HAMMER TYPE Automatic										
DRILLER J. Gilchrist		START DATE 02/08/12		COMP. DATE 02/09/12		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
650													647.5 GROUND SURFACE 0.0	
645	647.5	0.0	1	3	1						M	645.5 ROADWAY EMBANKMENT Gray-brown, highly fine sandy SILT (A-4), with trace roots.	2.0	
	644.0	3.5	1	1	1						W Sat.	643.4 Brown, silty fine to coarse SAND (A-2-4).	4.1	
640												640.5 Gray & red, silty fine sandy CLAY (A-6).	7.0	
	639.0	8.5	2	3	5						M	640.5 Gray & brown, silty CLAY (A-7-5), with trace fine to coarse sand.	7.0	
635												634.3 RESIDUAL Gray, brown & black, silty fine to coarse SAND (A-2-4), saprolitic.	13.2	
	634.0	13.5	8	15	39						M	630.5 WEATHERED ROCK (METAMORPHOSED QUARTZ DIORITE)	17.0	
630												629.0 CRYSTALLINE ROCK Gray, (METAMORPHOSED QUARTZ DIORITE).	18.5	
	629.0	18.5											617.1 Boring Terminated at Elevation 617.1 ft in CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)	30.4
625														
620														

WBS 50000.1.STR22T1B		TIP P-5208F		COUNTY CABARRUS		GEOLOGIST D. Racey						
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCRR/NSRR							GROUND WTR (ft)					
BORING NO. B2-B		STATION 27+03		OFFSET 42 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 647.5 ft		TOTAL DEPTH 30.4 ft		NORTHING 573,538		EASTING 1,501,144						
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011		DRILL METHOD 2.25" ID HSA/H casing/NQ3 core		HAMMER TYPE Automatic								
DRILLER J. Gilchrist		START DATE 02/08/12		COMP. DATE 02/09/12		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
629												629.0 Begin Coring @ 18.5 ft
	629.0	18.5	1.9	N=60/0.0 4:30/1.0 3:25/0.9	(1.8) 95%	(1.8) 95%		(11.8) 99%	(11.7) 98%			18.5
625			5.0	3:01/1.0 3:03/1.0 3:27/1.0 3:30/1.0 3:25/1.0	(5.0) 100%	(4.9) 98%						629.0 Gray, very slightly weathered to fresh, hard (METAMORPHOSED QUARTZ DIORITE), moderately close to wide fracture spacing.
	622.1	25.4										
620			5.0	2:40/1.0 3:20/1.0 3:29/1.0 3:38/1.0 2:49/1.0	(5.0) 100%	(5.0) 100%						
	617.1	30.4										30.4

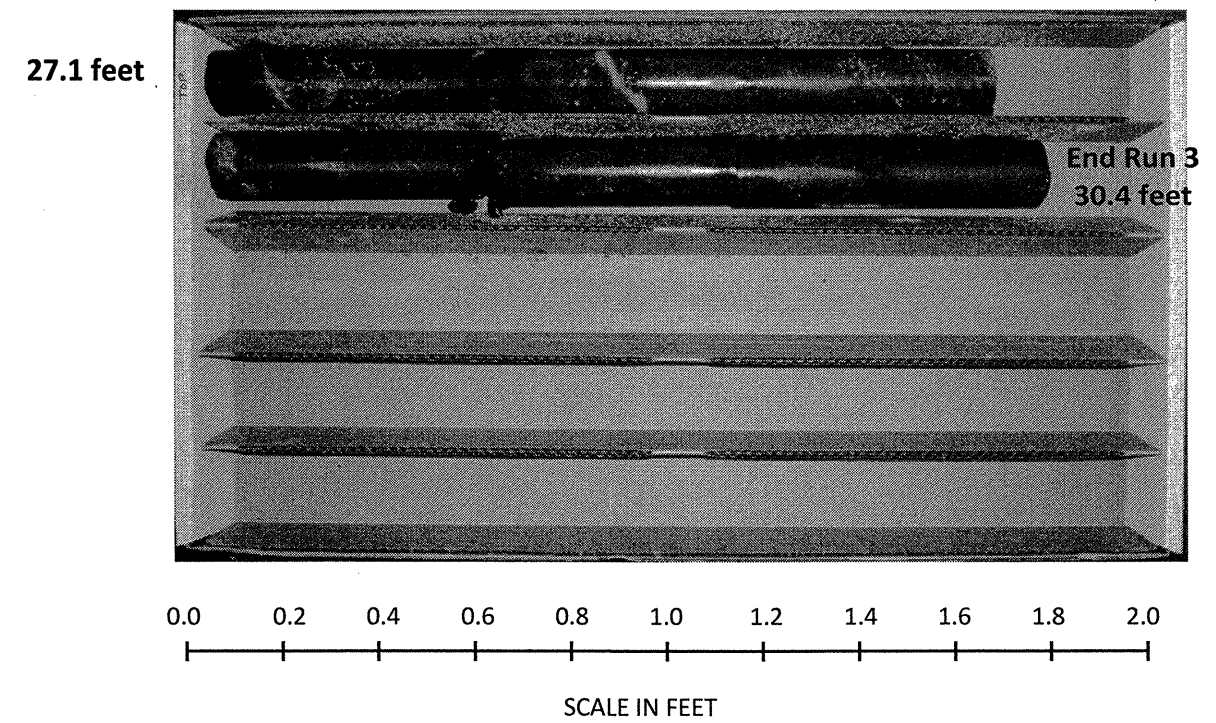
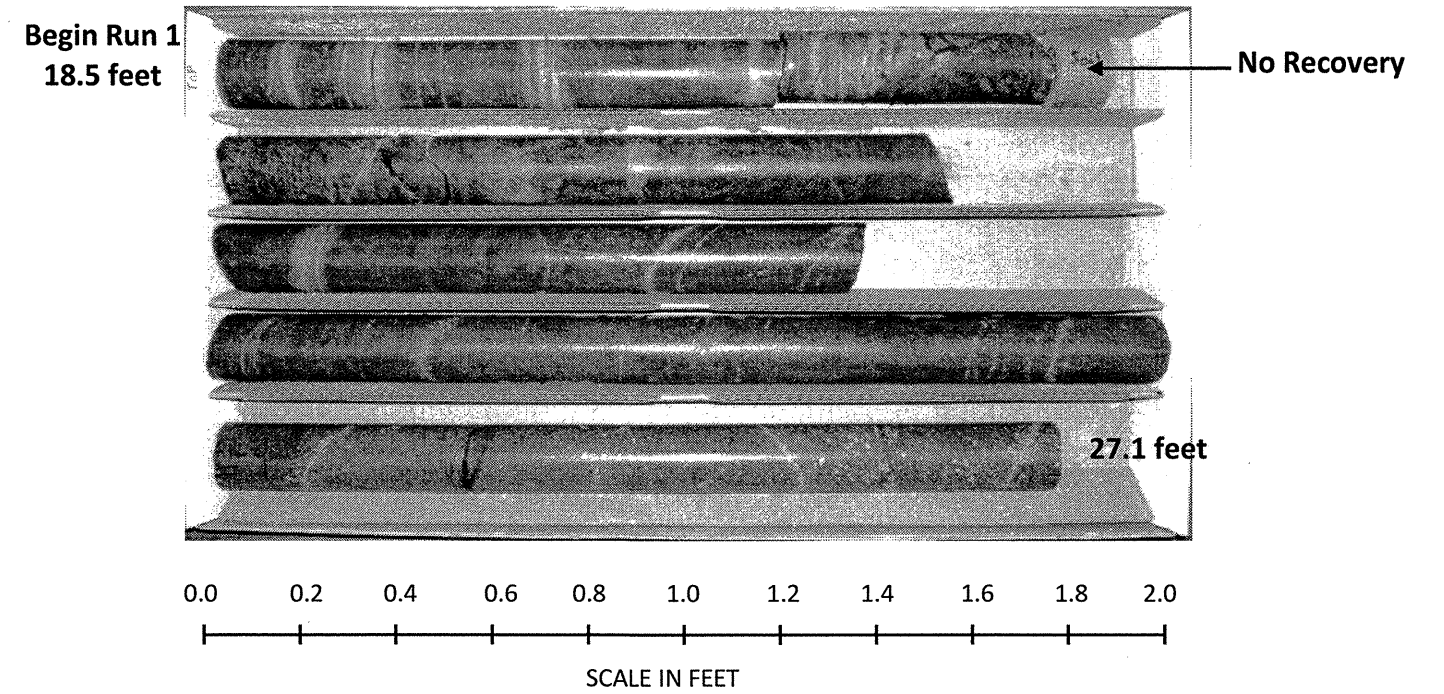
- NOTES:
- 1) 0.0-0.2'=Surficial Organic Soils
 - 2) Geologist indicates strata break in split spoon at a depth of 4.1'.
 - 3) Driller indicates harder drilling at depths of 13.2' & 17.0'.
 - 4) Auger refusal at a depth of 18.5', began coring.

NCDOT BORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT_GDT 12/3/12

NCDOT CORE SINGLE P-5208F_BORELOGS.GPJ NC_DOT_GDT 12/3/12



P-5208F: Caldwell Rd Grade Separation over NCRR/NSRR, CORE PHOTOGRAPHS: B2-B: Station 27+03, 42 feet Right



WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCR/NSRR			GROUND WTR (ft)
BORING NO. EB2-A	STATION 27+87	OFFSET 16 ft LT	ALIGNMENT -L-
COLLAR ELEV. 654.5 ft	TOTAL DEPTH 16.3 ft	NORTHING 573,604	EASTING 1,501,066
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011			DRILL METHOD 2.25" ID HSA
DRILLER J. Gilchrist			HAMMER TYPE Automatic
START DATE 02/02/12	COMP. DATE 02/02/12	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				
655	654.5	0.0	1	2	3								GROUND SURFACE	0.0
	651.0	3.5											ROADWAY EMBANKMENT Gray & brown, highly sandy SILT (A-4), with trace roots.	3.5
650	646.0	8.5											WEATHERED ROCK Gray, (METAMORPHOSED QUARTZ DIORITE).	
645	641.0	13.5											RESIDUAL Gray & tan, fine sandy SILT (A-4), with high amount of rock fragments, saprolitic.	11.5
640	638.2	16.3											WEATHERED ROCK Gray, (METAMORPHOSED QUARTZ DIORITE).	16.3

NOTES:

- 1) 0.0-0.2'=Surficial Organic Soils
- 2) Driller indicates softer drilling at a depth of 11.5'.
- 3) Driller indicates harder drilling at a depth of 15.4'.
- 4) Auger refusal at a depth of 16.3'.

WBS 50000.1.STR22T1B	TIP P-5208F	COUNTY CABARRUS	GEOLOGIST D. Racey
SITE DESCRIPTION Grade separation on SR 1173 (Caldwell Rd.) over NCR/NSRR			GROUND WTR (ft)
BORING NO. EB2-B	STATION 27+64	OFFSET 32 ft RT	ALIGNMENT -L-
COLLAR ELEV. 652.2 ft	TOTAL DEPTH 30.9 ft	NORTHING 573,596	EASTING 1,501,119
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011			DRILL METHOD 2.25" ID HSA
DRILLER J. Gilchrist			HAMMER TYPE Automatic
START DATE 02/02/12	COMP. DATE 02/02/12	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				
655	652.2	0.0											GROUND SURFACE	0.0
	650.7	1.5											ROADWAY EMBANKMENT Gray & brown, highly sandy SILT (A-4).	1.5
650	648.7	3.5											RESIDUAL Gray-tan, orange & white, fine to coarse sandy SILT (A-4), with trace to some clay, saprolitic.	
645	643.7	8.5												
640	638.7	13.5												
635	633.7	18.5												
630	628.7	23.5												
625	623.7	28.5												
	621.4	30.8												

NOTES:

- 1) 0.0-0.2'=Surficial Organic Soils
- 2) Geologist indicates strata break in split spoon at a depth of 29.6'.
- 3) Driller indicates harder drilling at a depth of 29.6'.
- 4) Auger refusal at a depth of 30.8'.

North Carolina Department of Transportation
 Division of Highways
 Materials and Test Unit
 Soils Laboratory

T.I.P. ID NO.: P-5208F
 DESCRIPTION: Caldwell Road Grade Separation over NCRR/NSRR
 STRUCTURE

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT: 50000.1.STR24T3
 DATE SAMPLED: 2/12
 SAMPLED FROM: -L-
 SUBMITTED BY: W.P. Alton, PE

COUNTY: Cabarrus
 RECEIVED: 2/10/12
 REPORTED: 2/17/12
 BY: D. Jenks
 Cert No. 101-02-0603

TEST RESULTS

PROJ. SAMPLE NO.	SS-1	SS-3	SS-4											
BORING NO.	EB1-B	B2-A	EB2-B											
Retained #4 Sieve %	15.5	0.0	0.0											
Passing #10 Sieve %	77.3	100.0	99.4											
Passing #40 Sieve %	64.3	95.6	91.9											
Passing #200 Sieve %	42.8	79.6	57.4											

SOIL MORTAR - 100%														
Coarse Sand Ret - #60 %	22.6	6.8	15.5											
Fine Sand Ret - #270 %	28.3	19.2	33.8											
Silt 0.053 - 0.010 mm %	21.0	57.1	40.1											
Clay < 0.010 mm %	28.1	16.9	10.6											
L.L.	32	40	33											
P.L.	20	NP	NP											
P.I.	12	NP	NP											
AASHTO Classification	A-6 (2)	A-4 (2)	A-4 (0)											
Station -L-	25+31	27+09	27+64											
Offset	17' RT	3' RT	32' RT											
Depth (ft)	1.1	9.0	13.5											
to	2.6	10.5	15.0											
Moisture Content (%)	10.6	32.2	32.6											

NP = Not plastic
 NT = Not tested
 ND = Not Determined
 CL = Centerline

W.P. Alton, P.E.
 Soils Engineer

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 50000.1.STR24T3
TIP NO.: P-5208F
COUNTY: Cabarrus
DESCRIPTION: Caldwell Road Grade Separation over NCRR/NSRR

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksi)
RS-1	B1-A	18.0 - 18.3	Metamorphosed Quartz Diorite	PzZq	34%	4.42	1.77	166.3	18,097	35
RS-2	B1-A	23.3 - 23.6	Metamorphosed Quartz Diorite	PzZq	96%	4.34	1.77	166.0	20,829	45
RS-3	B2-A	23.2 - 23.5	Metamorphosed Quartz Diorite	PzZq	77%	4.29	1.76	178.1	6,960	26
RS-4	B2-A	31.2 - 31.5	Metamorphosed Quartz Diorite	PzZq	100%	4.27	1.77	179.5	22,839	58