

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208D	1	25
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50000.1.STR09T1B		UTILITIES - P.E.	
50000.3.STR04T4E		UTILITIES - CONST	
432192.STR09P5208		RIGHT OF WAY	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	10+00 - 34+79	4-6	7-9	13-16
-Y1-	8+10 - 22+28	4	10-11	17-18
-Y2-	11+00 - 14+04	6	-	-
-Y3-	11+45 - 17+50	4	12	-
-Y4-	14+00 - 18+97	6	-	19-21

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. P-5208D F.A. PROJ. _____
COUNTY CABARRUS
PROJECT DESCRIPTION ROBERTA ROAD EXTENSION OVER NSNCR FROM STALLINGS RD. (SR 1161) TO NC 49

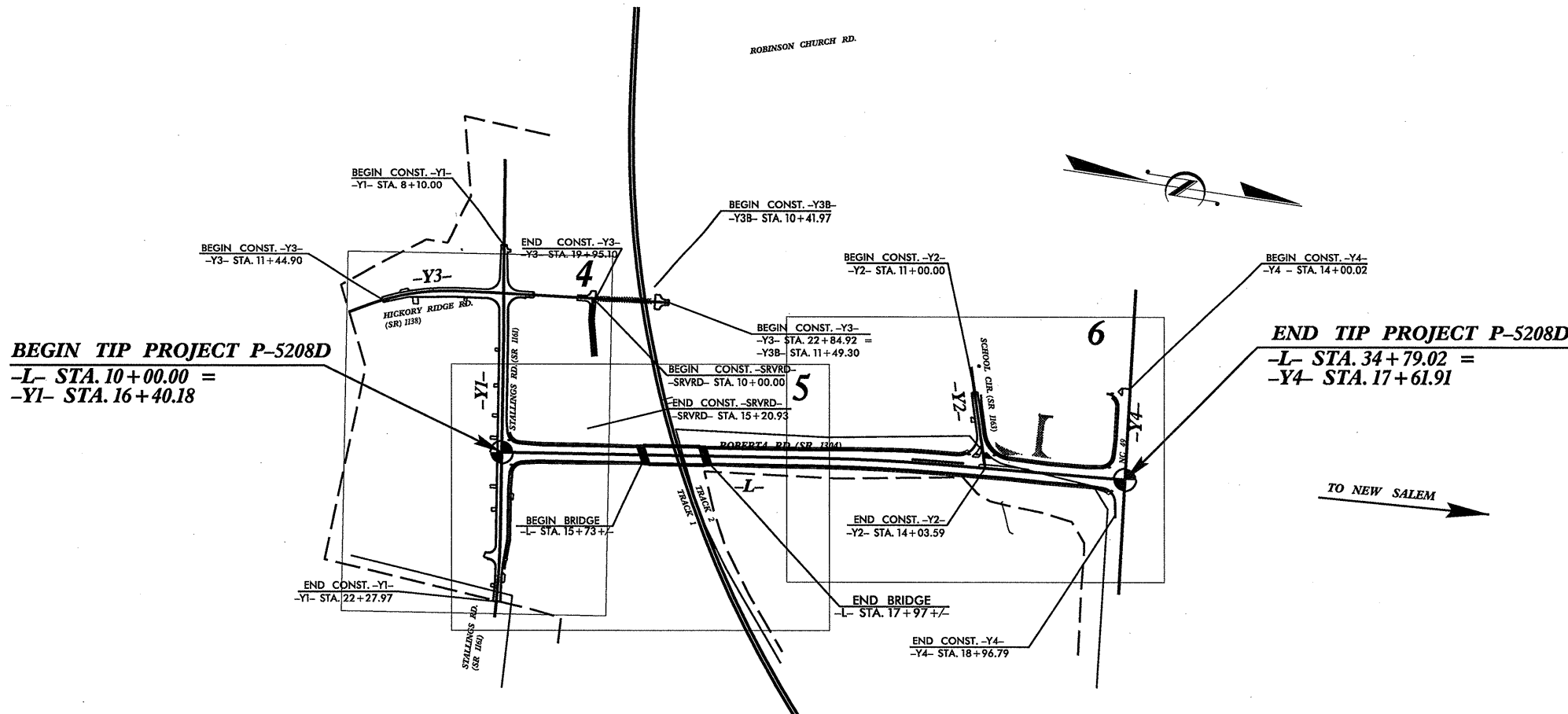
INVENTORY

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) 250-4088. 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.

CONTRACT: C203146 ID: P-5208D



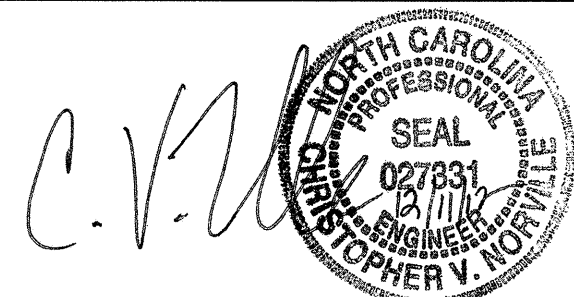
PERSONNEL
C. V. NORVILLE
J. R. HAMM
T. E. EVANS

INVESTIGATED BY T.E.E / J.R.H.
CHECKED BY C. V. NORVILLE
SUBMITTED BY FALCON ENG.
DATE DECEMBER, 2012

DRAWN BY: T. E. EVANS

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS 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.



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

PROJECT REFERENCE NO. P-5208D
SHEET NO. 2

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. EXAMPLES: <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) 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. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>			<p>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, 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 (MOTL.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p>																																																																			
<p align="center">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th>GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th>SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1, A-1-b, A-3</th> <th>A-2, A-2-4, A-2-5, A-2-6, A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6, A-7</th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING</th> <td>50 MX 30 MX 50 MX 15 MX 25 MX</td> <td>10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX</td> <td>10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX</td> <td>10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX</td> <td>10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX 10 MX</td> </tr> <tr> <th>LIQUID LIMIT PLASTIC INDEX</th> <td>6 MX</td> <td>NP</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX 16 MX</td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SILTY</td> <td>CLAYEY CLAYEY</td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <th>GEN. RATING AS A SUBGRADE</th> <td colspan="2">EXCELLENT TO GOOD</td> <td>FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR UNSUITABLE</td> </tr> </table> <p align="center">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>			GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS			GROUP CLASS.	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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p align="center">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p align="center">PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p align="center">GROUND WATER</p> <p> 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</p>			ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	>10%	>20%	HIGHLY 35% AND ABOVE	<p align="center">WEATHERING</p> <p>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, <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>. 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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i>. 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. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i>. 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>		
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STATE OF NORTH CAROLINA
RAIL DIVISIONS

CABARRUS COUNTY

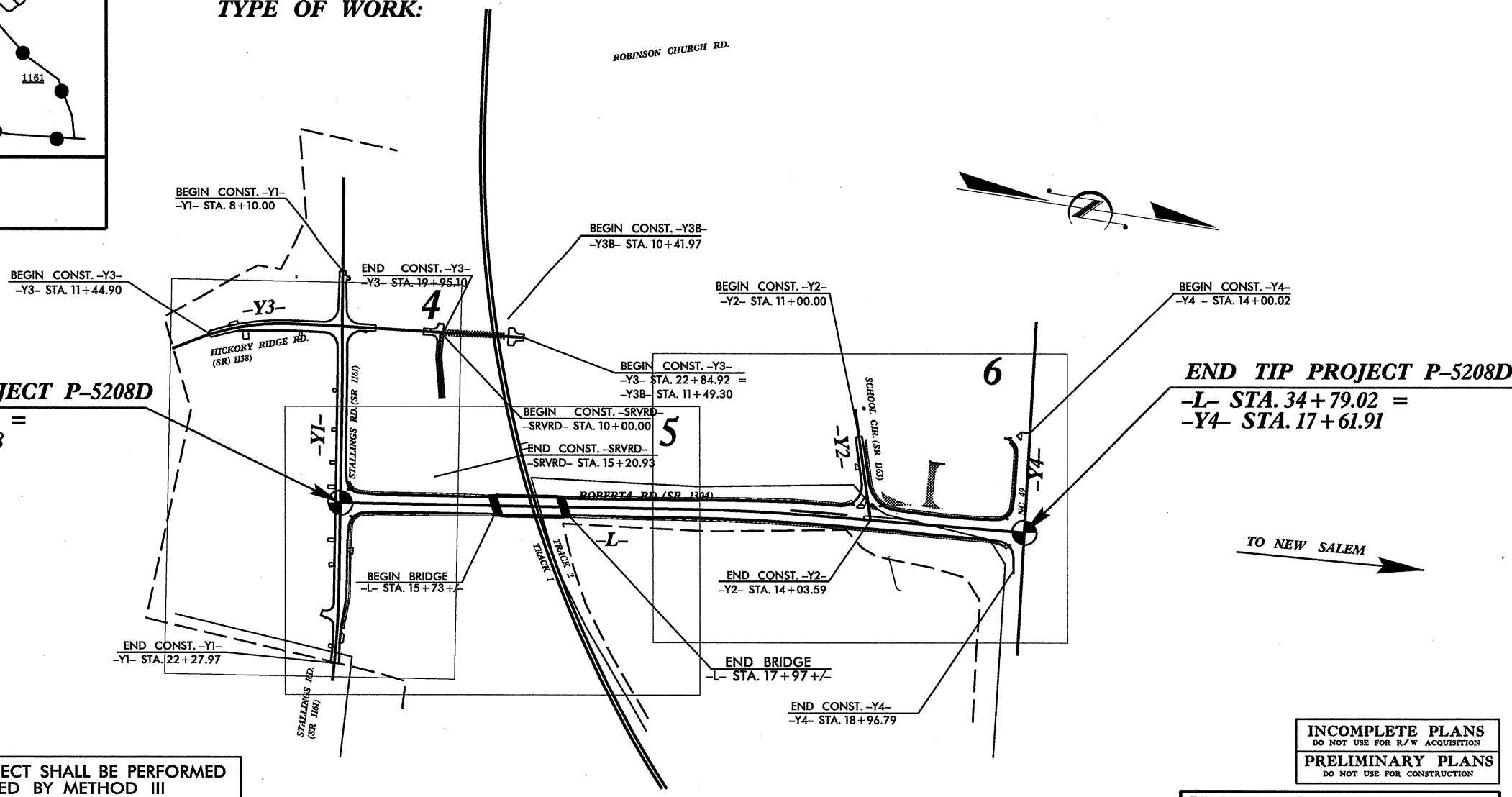
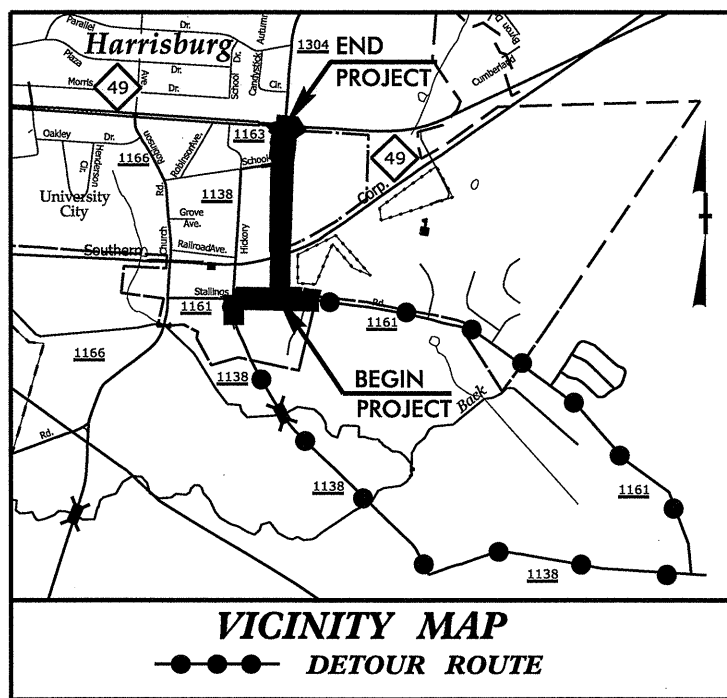
**LOCATION: ROBERTA RD. EXTENSION OVER NS/NCRR FROM
STALLINGS RD. (SR 1161) TO NC49.**

GRADING, PAVING, DRAINAGE, SIGNALS AND STRUCTURES.

TYPE OF WORK:



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208D	2A	25
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50000.1STR09T1B		P.E., UTILITIES P.E.	
50000.1STR10T3		P.E., UTILITIES P.E.	
45219.2STR09P5208		RIGHT OF WAY	
50000.3STR04T4E		UTILITIES - CONST.	



BEGIN TIP PROJECT P-5208D
-L- STA. 10+00.00 =
-Y1- STA. 16+40.18

END TIP PROJECT P-5208D
-L- STA. 34+79.02 =
-Y4- STA. 17+61.91

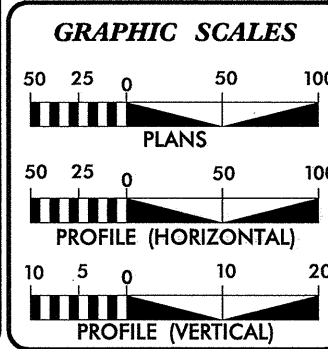
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBMITTAL:
DATE: MONTH DD,YYYY

TIP PROJECT: P-5208D

CONTRACT:



DESIGN DATA

ADT	=	
DHV	=	%
D	=	%
T	=	% *
V	=	MPH
* TTST	=	DUAL
FUNC CLASS	=	

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT P-5208D	=	0.428 MI
LENGTH STRUCTURE TIP PROJECT P-5208D	=	0.042 MI
TOTAL LENGTH OF TIP PROJECT P-5208D	=	0.470 MI

Prepared In the Office of:

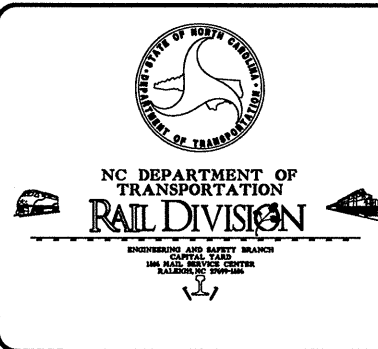
2006 STANDARD SPECIFICATIONS	
RIGHT OF WAY DATE:	PAUL AUCLAIR, PE PROJECT ENGINEER
LETTING DATE:	WARREN JOHNSON PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

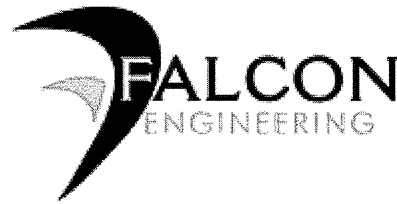
SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



\$\$\$\$\$SYTIME\$\$\$\$\$
\$\$\$\$\$DCGN\$\$\$\$\$
\$\$\$\$\$USERNAME\$\$\$\$\$



Roadway Subsurface Investigation Report

Inventory

Roberta Rd (SR 1304) Grade Separation over
NS/NCRR from NC-49 to Stallings Road (SR 1161)
Cabarrus County, North Carolina

Prepared for:

Michael Baker Engineering, Inc.
8000 Regency Parkway, Suite 600
Cary, NC 27518

Submitted by:

Falcon Engineering, Inc.
1210 Trinity Road, Suite 110
Raleigh, North Carolina 27607
(919) 871-0800
www.falconengineers.com

Falcon Project Number | G11027.00

December 11, 2012

www.FalconEngineers.com

Engineering | Inspection | Testing | Agency CM

1210 Trinity Road, Suite 110 | Raleigh, North Carolina 27607 | T 919.871.0800 | F 919.871.0803

PREFACE

This roadway subsurface investigation was conducted in February 2012 in general accordance with our proposal number F2011-055, dated September 6, 2011. The recommendations provided in this report are based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of fifteen (15) Standard Penetration Test (SPT) borings were drilled for the new roadway alignments. Additional borings were drilled for the bridge structure and are included in a separate Structure Subsurface Investigation Report. The end bent borings have been utilized in this report since they provide additional pertinent subsurface information relating to approach embankments. All borings were drilled using either a CME-55 all-terrain-vehicle (ATV) mounted drill rig, or a CME-55, truck-mounted drill rig, both equipped with 2 1/4-inch inside diameter hollow-stem augers and an automatic hammer. Representative soil samples, collected with a split-barrel sampler, were selected for laboratory testing to verify visual field classifications.

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

FALCON ENGINEERING, INC.

Report Prepared By:

Report Reviewed By:

Jeremy Hamm, EI
Geotechnical Designer



Christopher V. Norville, PE
Director of Geotechnical Services



WBS: 50000.1.STR09T1B
TIP: P-5208D
COUNTY: Cabarrus
DESCRIPTION: Roberta Rd. Extension over NS/NCRR Stallings Rd. (SR 1161) to NC 49
SUBJECT: Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

The Roberta Road Extension Project consists of the following:

- Extension of Roberta Road from the existing intersection with NC 49 southward to Stallings Road in the vicinity of the existing intersection with Martin Street (gravel residential drive).
- A new four bent, three span bridge carrying the new Roberta Road alignment over Norfolk Southern (NS) / North Carolina Railroad (NCRR) corridor.
- Widening of NC 49 in the vicinity of the intersection with Roberta Road to accommodate a new right turn lane to Roberta Road.
- Realigning School Circle to intersect the new Roberta Road extension with turning lanes.
- Realigning Stallings Road and Hickory Ridge Road slightly to accommodate proposed elevated grades along the Roberta Road extension.
- Closing of the existing at-grade crossing along NS/NCRR at Hickory Ridge Road and Robinson Church Road.

Construction of the project will follow the construction of new rail bed and track paralleling the existing tracks to the north along the NS/NCRR Corridor. This work will require cuts on the order of 8-10 feet. Three bents of the proposed bridge will be located north of the existing railroad tracks and one to the south. The Roberta Road Extension will predominantly traverse an existing agricultural field north of the railroad. To the south of the railroad, the alignment will traverse an open grassy field and residential area (Martin Street). The entire Roberta Road extension will be constructed on fills ranging in height from a few feet to nearly 30 feet (in the vicinity of the end bent 1 approach). In order to accommodate the grades required to span over the railroad tracks, fills approaching 6 feet will be required at the intersection with Stallings Road where Roberta Road ends. The fills taper down in either direction along Stallings Road to meet existing grades.

The following alignments, totaling approximately 4,341 feet (.82 miles) were investigated. Subsurface profiles and cross sections of these alignments are included in this report.

<u>Line</u>	<u>Station</u>
Roberta Road (-L-)	10+00 – 34+79
Stallings Road (-Y1-)	09+20 – 22+28
Hickory Ridge Road (-Y3-)	11+45 – 17+00

Subsurface profiles and cross sections showing the existing and proposed grades along Roberta Road, Stallings Road, and Hickory Ridge Road are included in this report on pages 10 through 17. Boring logs are included on pages 18 through 27.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

The following areas contained topsoil and/or rootmat exceeding four (4) inches in thickness:

<u>Station</u>	<u>Offset</u>
-L- 15+72 (End Bent 1)	16 ft LT
-L- 15+83 (End Bent 1)	24 ft RT

Large rootballs and thick rootmat exceeding four inches should be expected in other areas throughout the site, particularly areas which are wooded or were minimally disturbed during previous clearing/grading operations. Additionally, stripping and grubbing within the agricultural lands may expose buried organic materials which will need to be removed prior to placement of fills.

The following areas contained wet soils near the ground surface which may also be encountered elsewhere.

<u>Station</u>	<u>Offset</u>
-L- 14+00	14 ft RT
-L- 18+09	38 ft RT
-L- 22+00	14 ft RT
-L- 28+00	2 ft RT
-L- 32+00	CL

The majority of the boring locations contained clayey soils with medium to high plasticity (A-7) near the ground surface. These soils degrade rapidly when exposed to water and may not adequately support construction equipment or fill placement.

The following areas contained medium to high plasticity soils near the ground surface which may also be encountered elsewhere.



<u>Station</u>	<u>Offset</u>
-Y1- 20+01	8 ft RT
-L- 12+00	14 ft RT
-L- 14+00	14 ft RT
-L- 15+72	2 ft LT
-L- 15+82	38 ft RT
-L- 17+96	2 ft LT
-L- 18+09	38 ft RT
-L-22+00	14 ft RT
-L- 24+00	12 ft RT
-L- 26+00	7 ft RT
-L- 28+00	2 ft RT
-L- 30+00	CL
-L- 32+00	CL

bedrock at the site is noted to consist of metamorphosed quartz diorite (**PzZq**), which is consistent with our findings.

SOIL PROPERTIES

In general, the subsurface soil conditions encountered across the site were relatively consistent; roadway embankment fills, residual soils underlain by and interlayered with weathered and crystalline metadiorite rock.

Based on the borings drilled on the existing roadway (R-1 through R-6), paved roadway sections consisted of 5.0 to 7.0 inches of bituminous concrete over 2.5 to 5.0 inches of aggregate base course.

Roadway Embankment soils encountered in borings R-1 and R-2 consisted of tan and brown, stiff, silts and clays (A-4, A-6) with gravel and little to trace amounts of organics.

Residual soils were encountered in all borings at the surface or below fills, consisting of brown, tan and green, medium stiff to hard, clays and silts (A-4, A-5, A-6, A-7), and loose to very dense sands (A-2-4), with rock fragments, weathered rock layers, and some with trace to little amounts of mica. The majority of residual soils were noted to be saprolitic. In general, the surficial clay layer throughout the project site is noted to be moderately to highly plastic clay (A-7) that could potentially be expansive.

Weathered rock was encountered in some borings underlying residual soils or as layers within residual soils and extending to boring termination or auger refusal depths. Weathered rock materials consist of diorite metamorphosed to varying degrees (Metadiorite). Auger refusal, indicating the potential presence of crystalline rock, was encountered in some borings at elevations ranging from approximately 550 to 597 feet, NAVD.

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in most cases after at least 24 hours. Borings near or within existing roadways were backfilled immediately after completion due to safety considerations. Groundwater was observed directly in many borings, ranging in depth from approximately 5 to 27 feet below existing grades (elevations ranging from 575 to 604 feet, NAVD). Wet soils and cave-ins were observed in many borings as well, potentially indicating the present of groundwater near the caved-in elevation. Detailed groundwater measurement data are included in the boring logs.

In general, shallow groundwater, including potentially perched water and wet fine grained soils were encountered near the existing ground surface at both termini of the project. Overall, surficial site soils appear to exhibit poor permeability and slow infiltration of stormwater.

PHYSIOGRAPHY AND GEOLOGY

The project site is located in the Piedmont physiographic province of North Carolina.

Existing site topography is gently rolling, and the majority of the site consists of either agricultural fields or grassy areas, with narrow wooded corridors bordering the NS/NCRR corridor, and School Circle, and ditch traversing the agricultural field approximately perpendicular to the alignment.

Adjacent to NS/NCRR to the north, approximately 8 to 10 feet of cut will be performed required to accommodate rail corridor improvements including additional parallel railroad bed and track. We understand this work will performed separately prior to construction of the new roadway and grade separation.

Since the extension crosses primarily through agricultural lands, the presence of pockets containing organic soils should be anticipated during clearing and grubbing. In addition, the presence of loose/soft surficial soils should be anticipated in this area as a result of agricultural operations.

Steep sloped ditches, on the order of 5 to 10 feet deep, are present along existing right-of-ways (Hickory Ridge Road, Stallings Road, and School Circle, NS/NCRR) and bordering the agricultural field.

According to the **Geologic Map of North Carolina** (1985), the proposed site is located within the Charlotte Belt region of the Western Piedmont of North Carolina. Specifically,



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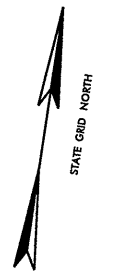
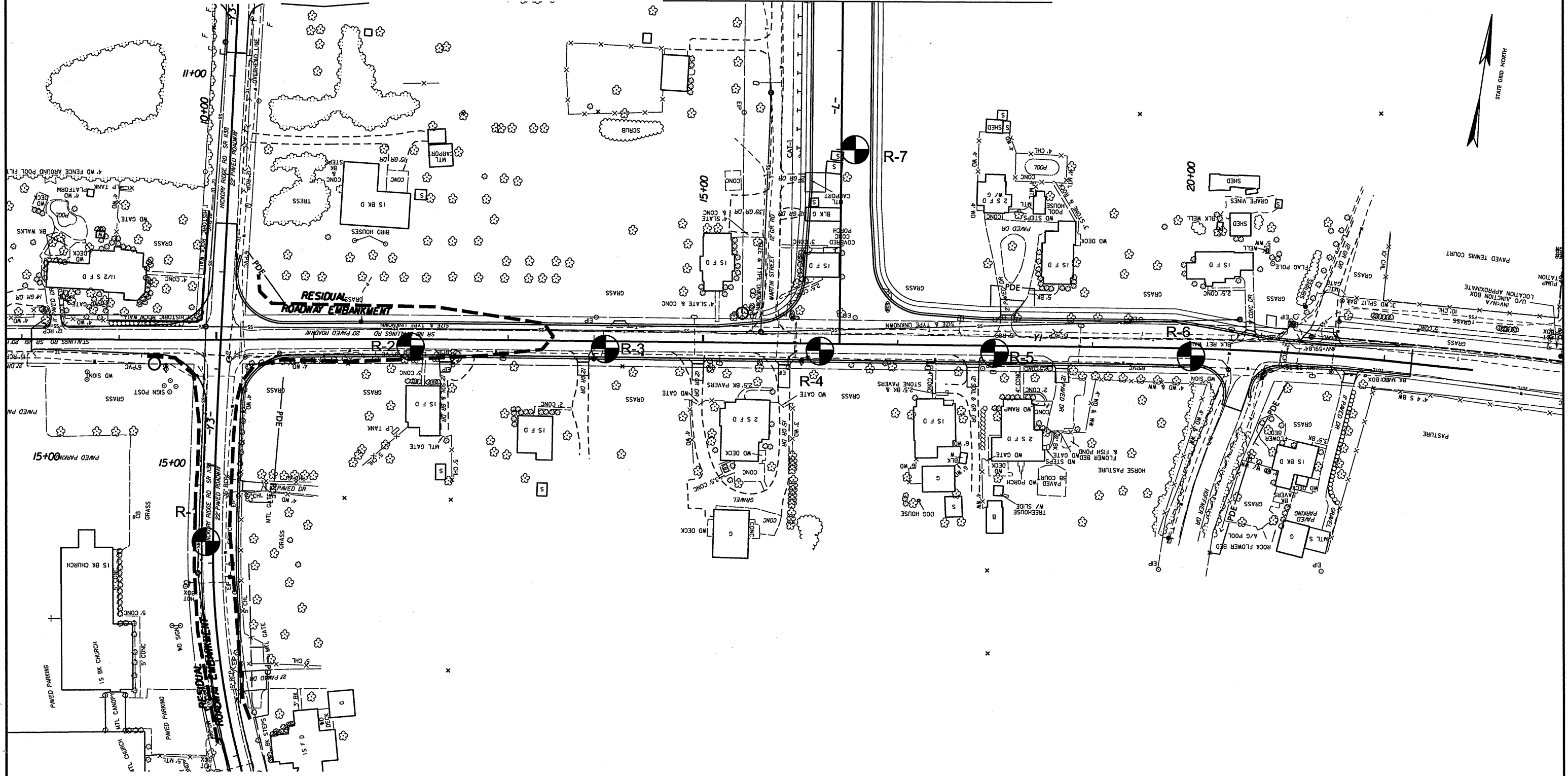
3-C

Volumes in Cubic Yards

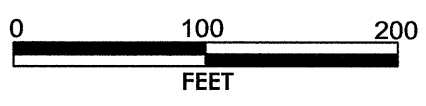
STATION	STATION	EXCAVATION				EMBANKMENT			BORROW	WASTE		
		TOTAL UNCLASS.	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	EARTH	EMBANK. +20%		SUITABLE	UNSUIT.	TOTAL
L Sta. 10+50.00	L Sta. 15+69.41(Begin Bridge)					50,490	50,490	60,588	60,588			
Y1 Sta. 8+10.00	Y1 Sta. 22+27.97	633	348		633	6,914	6,914	8,297	7,664		348	348
Y3 Sta. 11+45.00	Y3 Sta. 15+95.78	151			151	120	120	144		7		7
Y3 Sta. 16+50.00	Y3 Sta. 19+85.10	35			35	137	137	164	129			
-SRVRD- Sta. 10+25.00	-SRVRD- Sta. 12+37.36					203	203	244	244			
	SUBTOTAL # 1	819	348		819	57,864	57,864	69,437	68,625	7	348	355
L Sta. 17+99.41(End Bridge)	L Sta. 34+50.00	48	1,348		48	57,507	57,507	69,008	68,960		1,348	1,348
Y2 Sta. 11+00.00	Y2 Sta. 13+50.00	95			95	1,075	1,075	1,290	1,195			
Y3 Sta. 22+24.19	Y3 Sta. 22+86.37									227	224	451
Y4 Sta 14+50.00	Y4 Sta. 17+08.33	240	224		240	11	11	13				
	SUBTOTAL # 2	383	1,572		383	58,593	58,593	70,312	70,155	227	1,572	1,799
*M1 Sta. 10409+19.40	M1 Sta. 10439+00.00	54,675	1,460		54,675	1,137	1,137	1,364		53,311	1,460	54,771
	SUBTOTAL # 3	54,675	1,460		54,675	1,137	1,137	1,364		53,311	1,460	54,771
*M1 Sta. 10439.+00.00	M1 Sta. 10440+00.00	1,135	75		1,135					1,135	75	1,210
	SUBTOTAL # 4	1,135	75		1,135					1,135	75	1,210
	TOTAL	57,012	3,455		57,012	117,594	117,594	141,113	138,780	54,680	3,455	58,135
*ADDITIONAL UNDERCUT SHOULDER MATERIAL			1,965			860	860	1,032	1,032		1,965	1,965
BORROW TO REPLACE UNDERCUT WASTE IN LIEU OF BORROW						5,420	5,420	6,504	6,504	-54,680		-54,680
PROJECT TOTAL		57,012	5,420		57,012	123,874	123,874	148,649	91,636		5,420	5,420
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT									4,582			
GRAND TOTAL		57,012	5,420						96,218			
SAY		57,100	5,500						96,300			

*DATA FROM ROADBED PLANS AND CONTINGENCY
 EST. DDE = 2340 CY
 EST. SHALLOW UNDERCUT 1,750 CY
 EST. SHALLOW UNDERCUT BY STATIONS 813 CY
 TOTAL SHALLOW UNDERCUT 2563 CY
 CLASS IV SUBGRADE STABILIZATION 200 TONS

MATCH TO SHEET 2 OF 3



NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM BAKER, DATED SEPTEMBER, 2012.

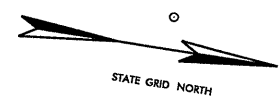
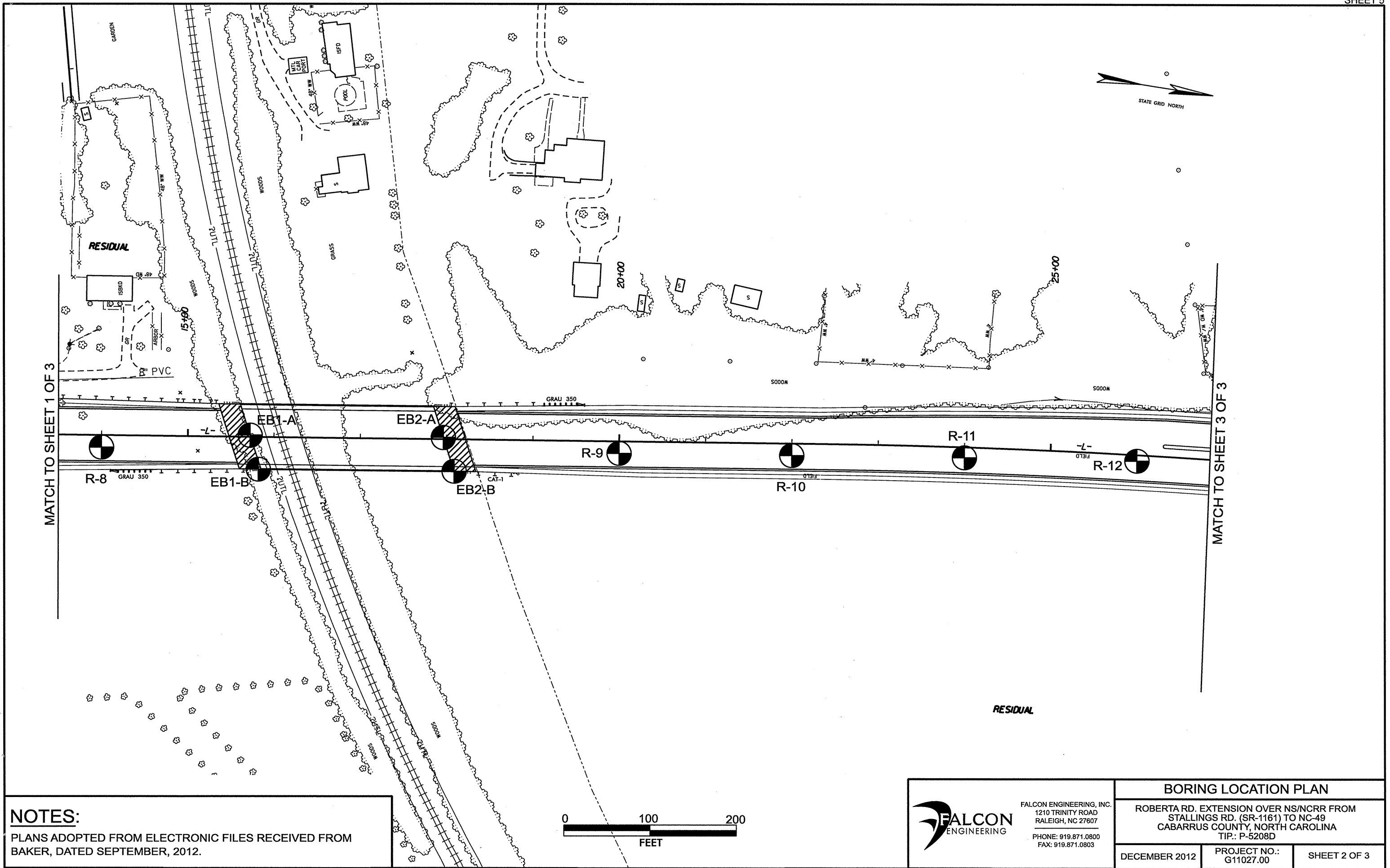


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 FAX: 919.871.0803

BORING LOCATION PLAN

ROBERTA RD. EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR-1161) TO NC-49 CABARRUS COUNTY, NORTH CAROLINA
 TIP.: P-5208D

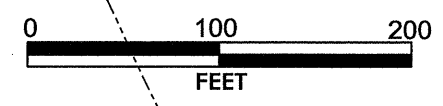
DECEMBER 2012	PROJECT NO.: G11027.00	SHEET 1 OF 3
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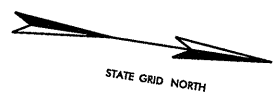
MATCH TO SHEET 1 OF 3

MATCH TO SHEET 3 OF 3

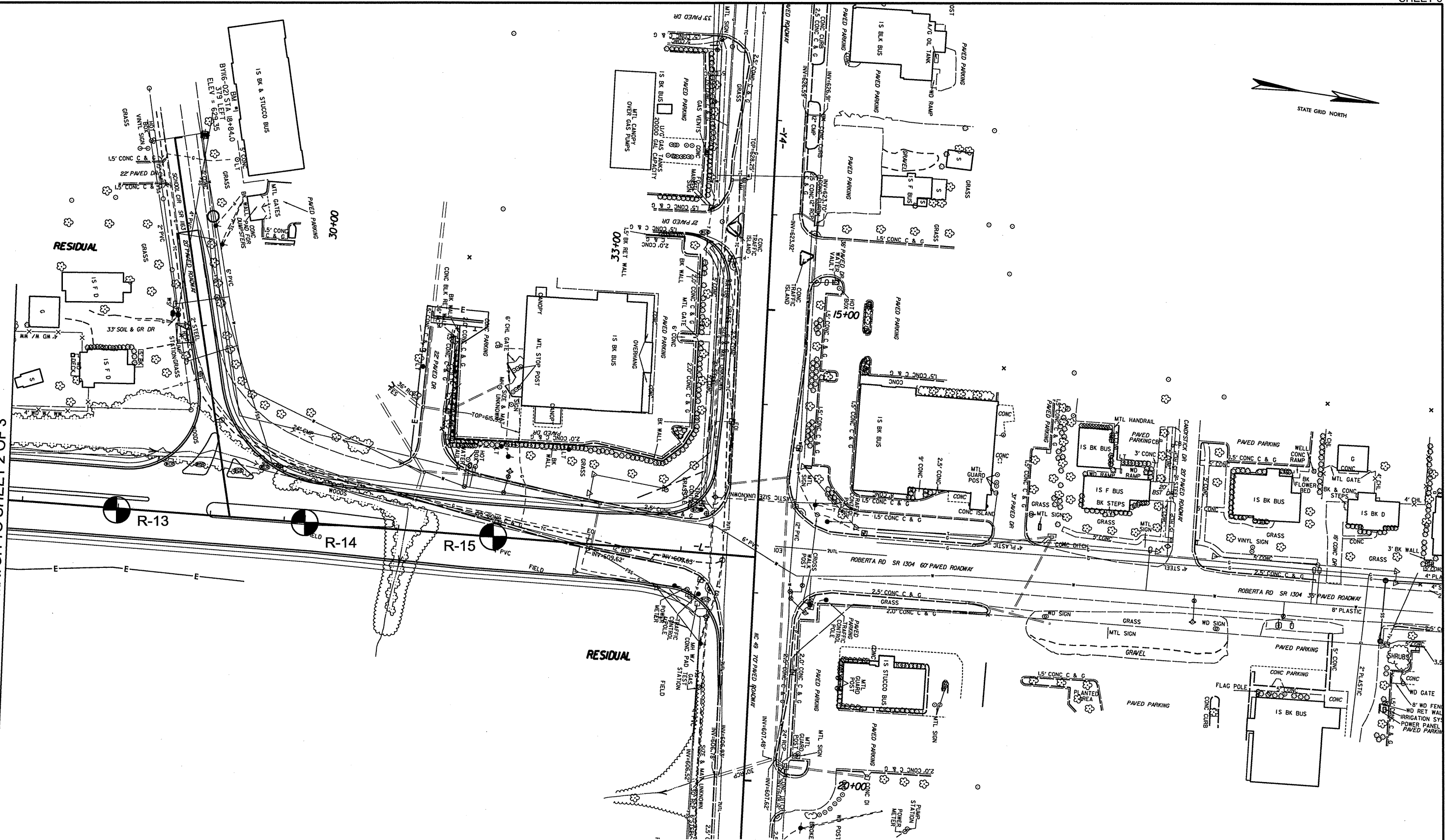
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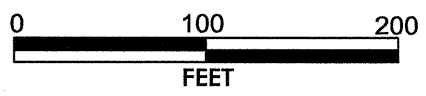
 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	BORING LOCATION PLAN	
	ROBERTA RD. EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR-1161) TO NC-49 CABARRUS COUNTY, NORTH CAROLINA TIP: P-5208D	
	DECEMBER 2012	PROJECT NO.: G11027.00



MATCH TO SHEET 2 OF 3

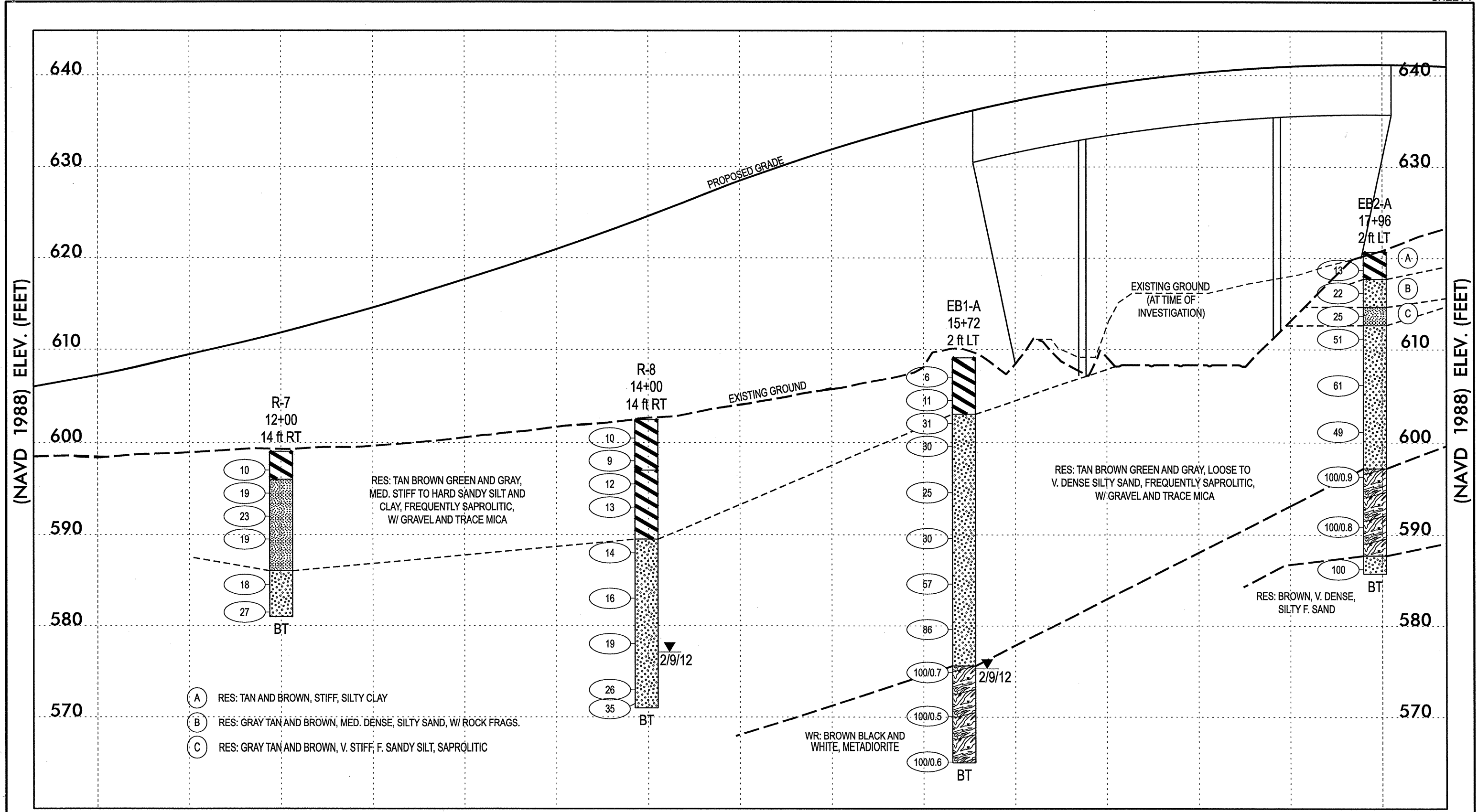


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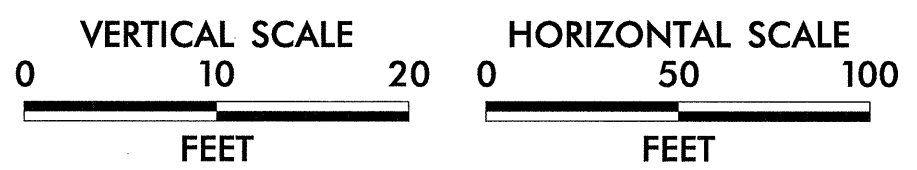
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 FAX: 919.871.0803

BORING LOCATION PLAN		
ROBERTA RD. EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR-1161) TO NC-49 CABARRUS COUNTY, NORTH CAROLINA TIP.: P-5208D		
DECEMBER 2012	PROJECT NO.: G11027.00	SHEET 3 OF 3



NOTES:

- GROUNDLINE AT TIME OF CONSTRUCTION TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
- GROUNDLINE AT TIME OF INVESTIGATION DEVELOPED FROM TOPOGRAPHIC DATA IN ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

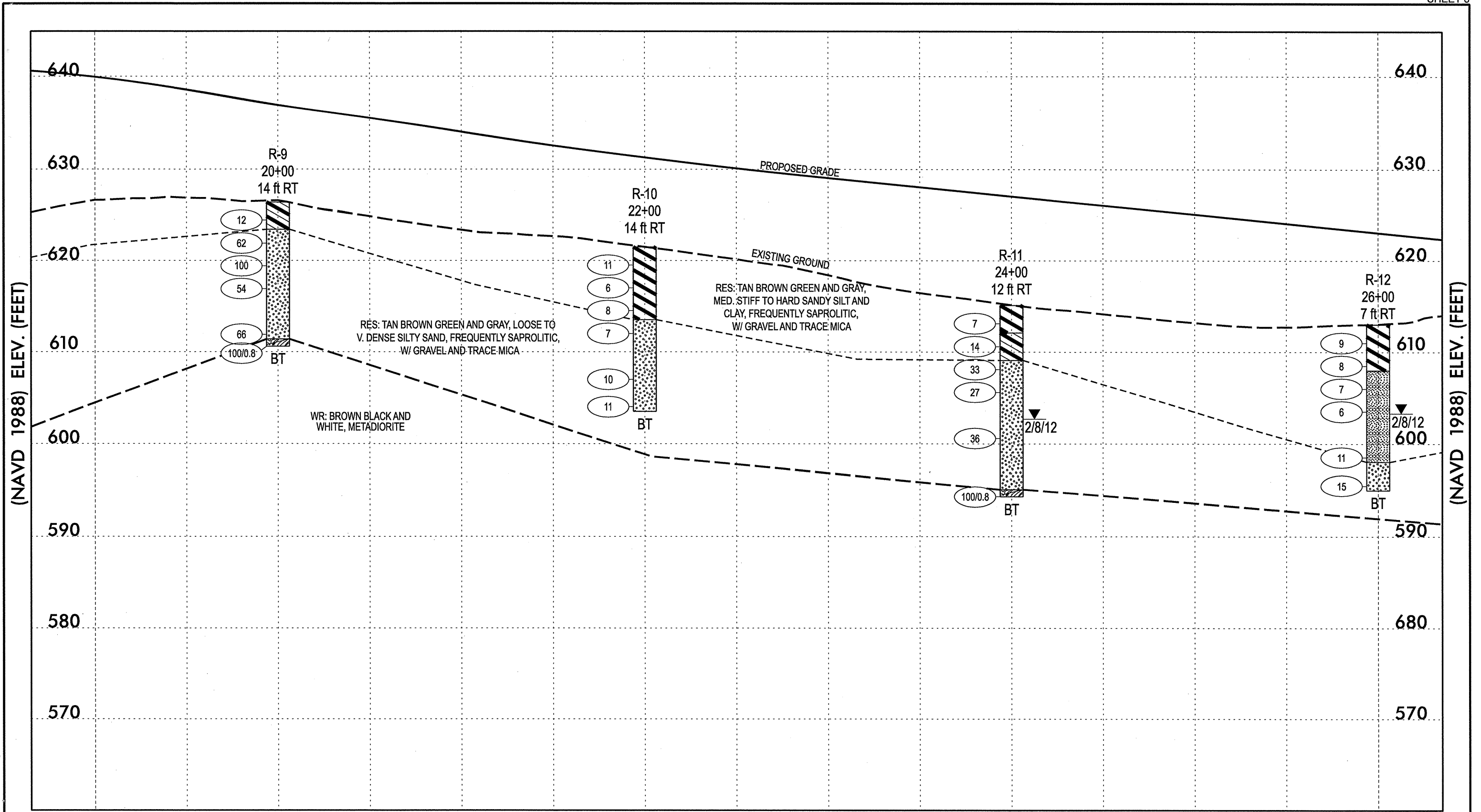


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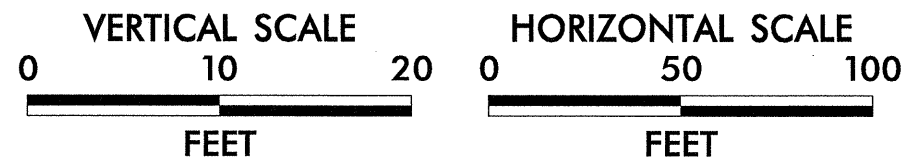
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FAX: 919.871.0803

SUBSURFACE PROFILE ALONG --L--		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 1 OF 6



NOTES:

- GROUNDLINE PROFILE TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

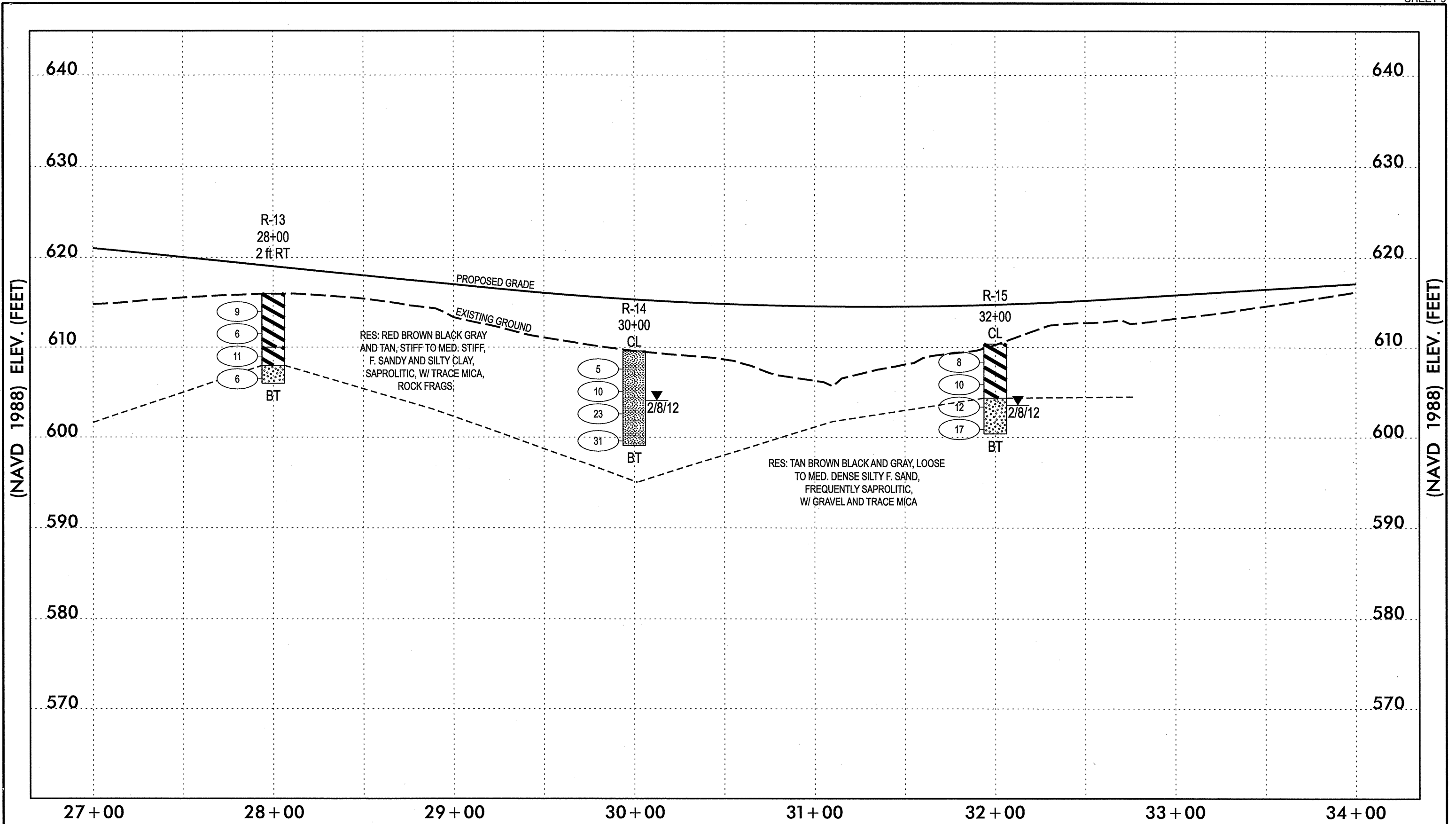


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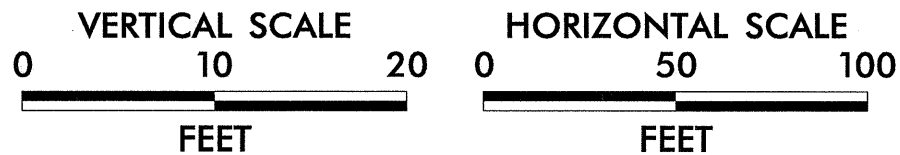
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SUBSURFACE PROFILE ALONG -L-		
ROBERTA ROAD EXTENSION OVER NSNCR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 2 OF 6



NOTES:

- GROUNDLINE PROFILE TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

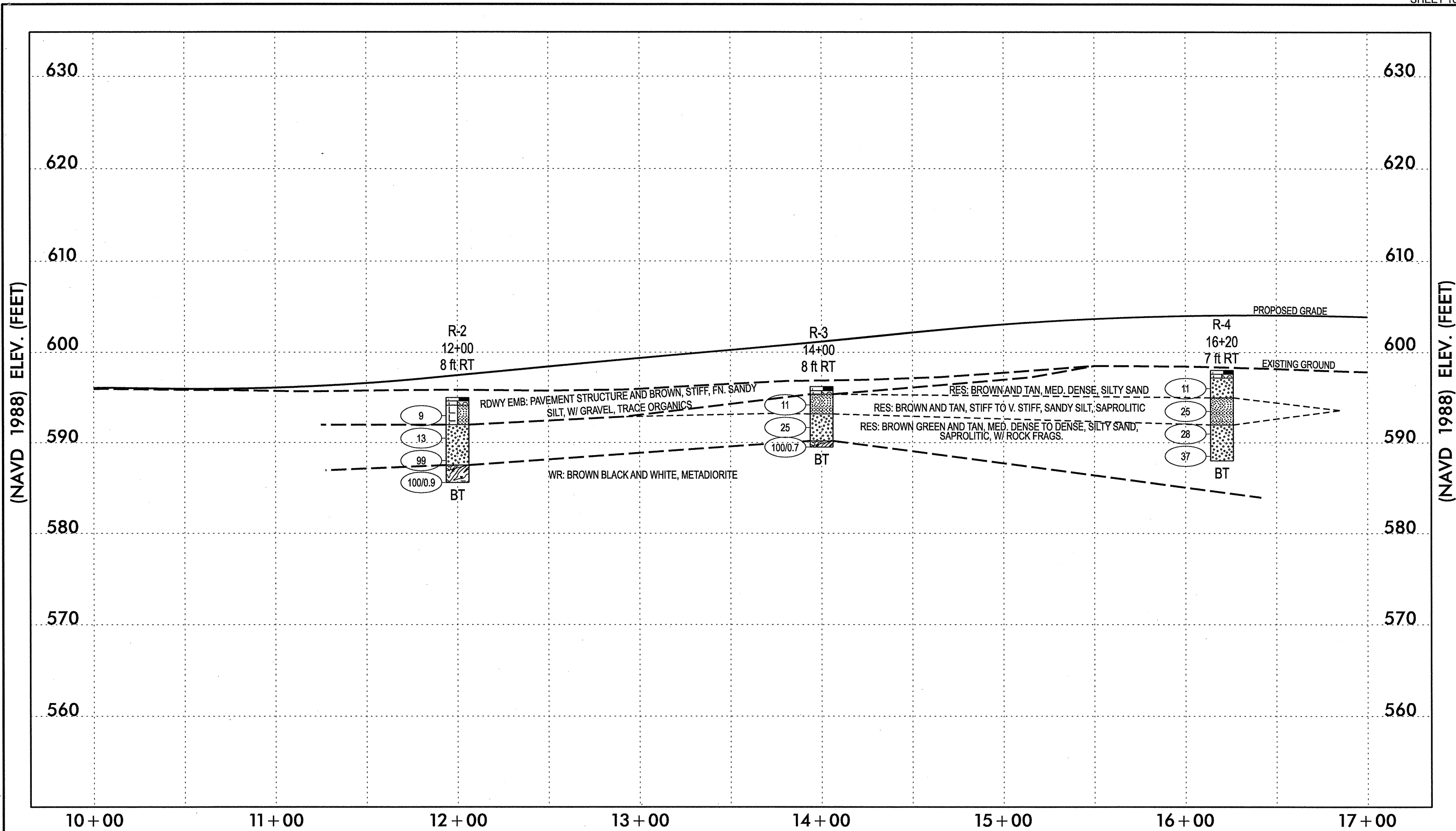


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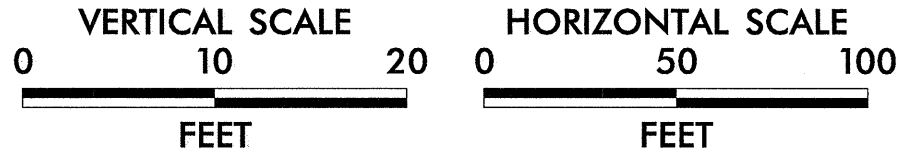
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FAX: 919.871.0803

SUBSURFACE PROFILE ALONG -L-		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 3 OF 6



NOTES:

- GROUNDLINE PROFILE TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE



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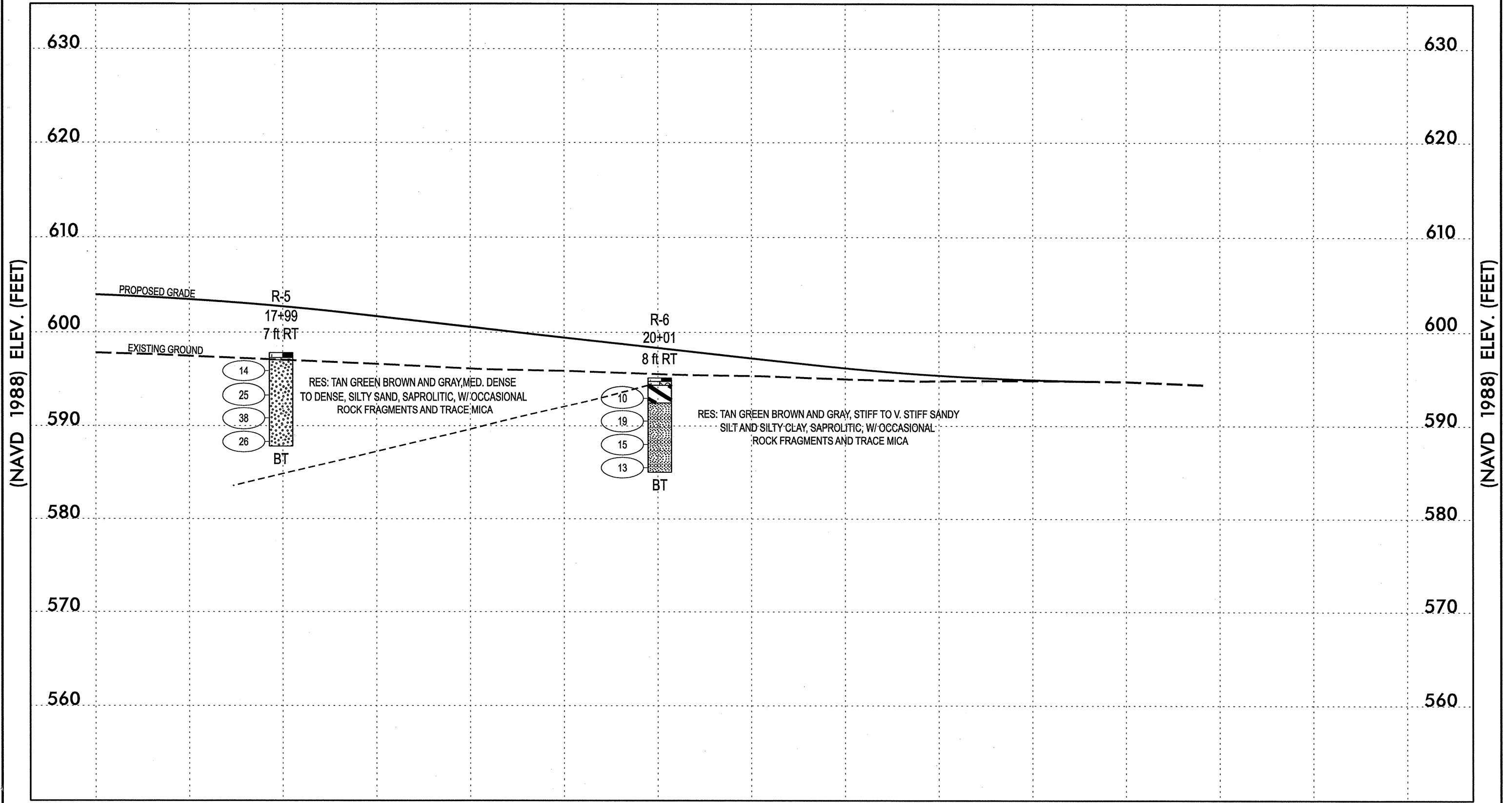
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SUBSURFACE PROFILE ALONG -Y1-

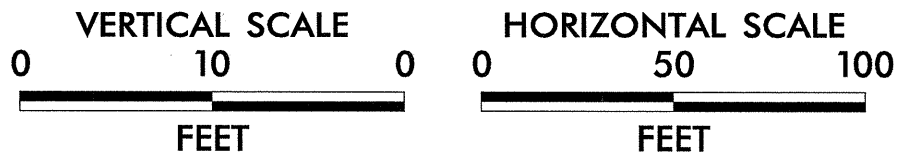
ROBERTA ROAD EXTENSION OVER NS/NCRR
FROM STALLINGS RD. (SR 1161) TO NC 49
CABARRUS COUNTY, NC

DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 4 OF 6
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NOTES:

- GROUNDLINE PROFILE TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

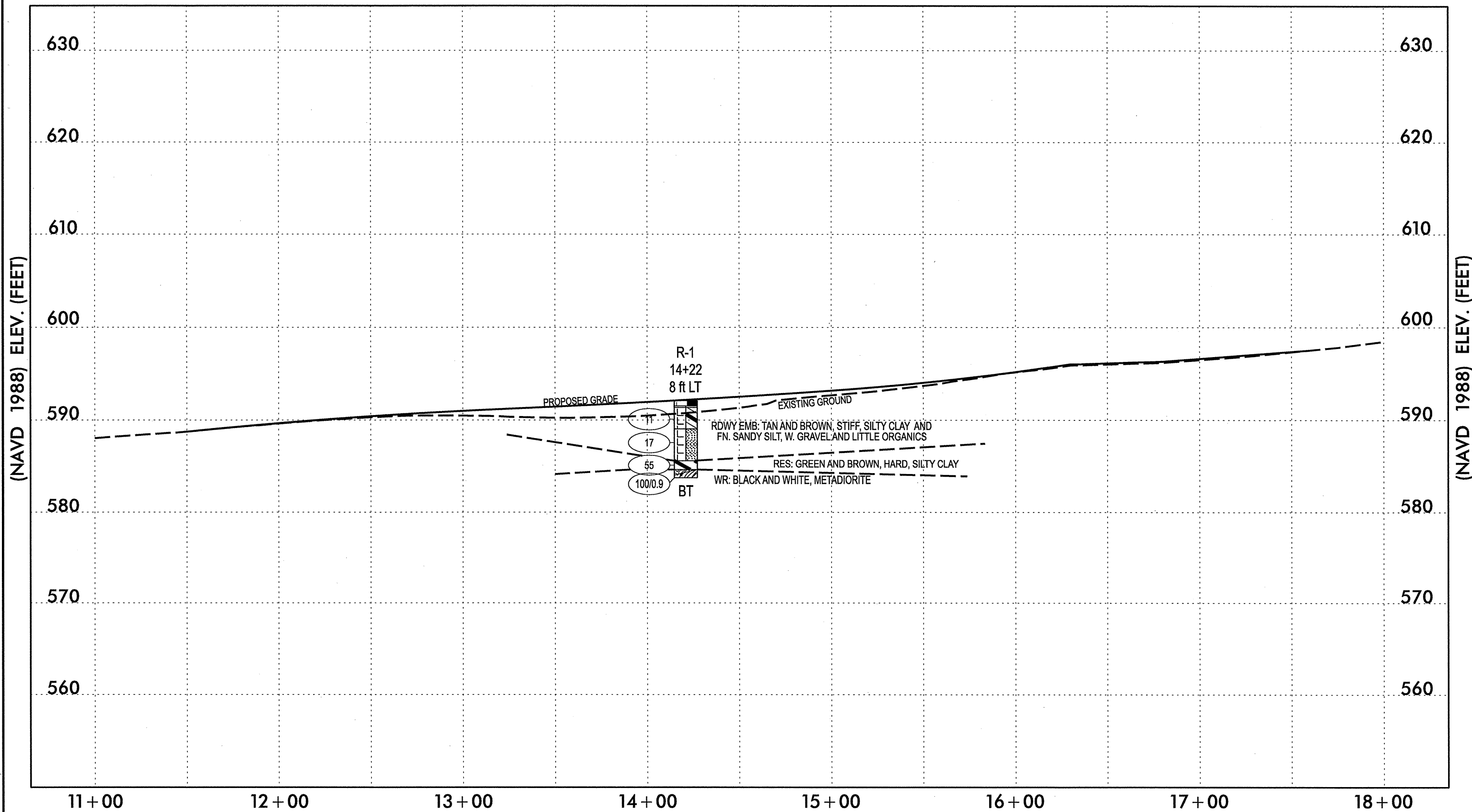


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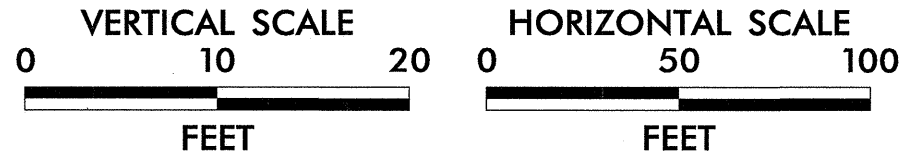

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SUBSURFACE PROFILE ALONG -Y1-		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 5 OF 6



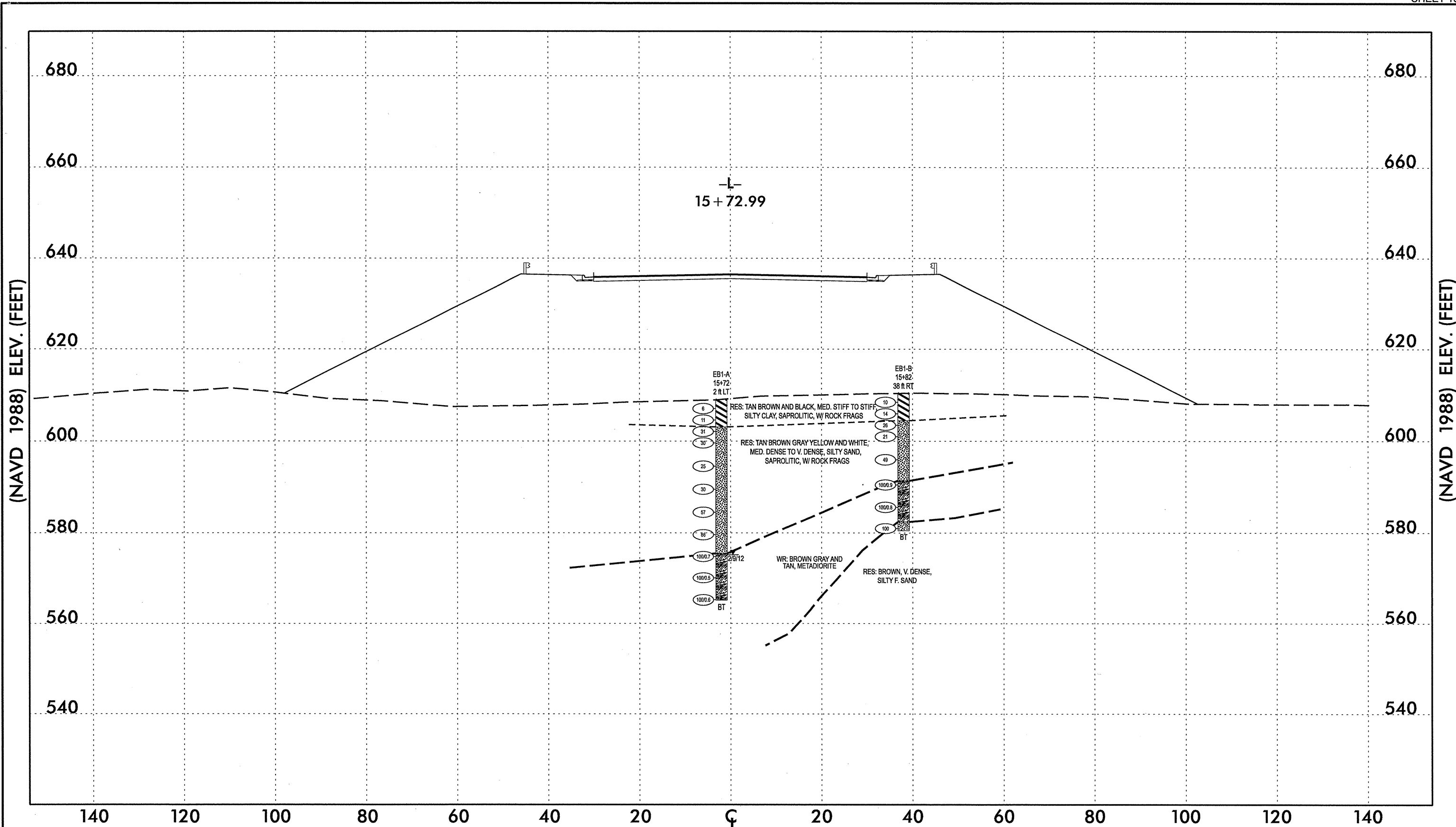
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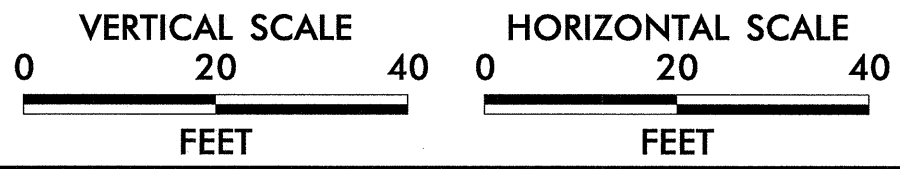

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SUBSURFACE PROFILE ALONG -Y3-		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 6 OF 6



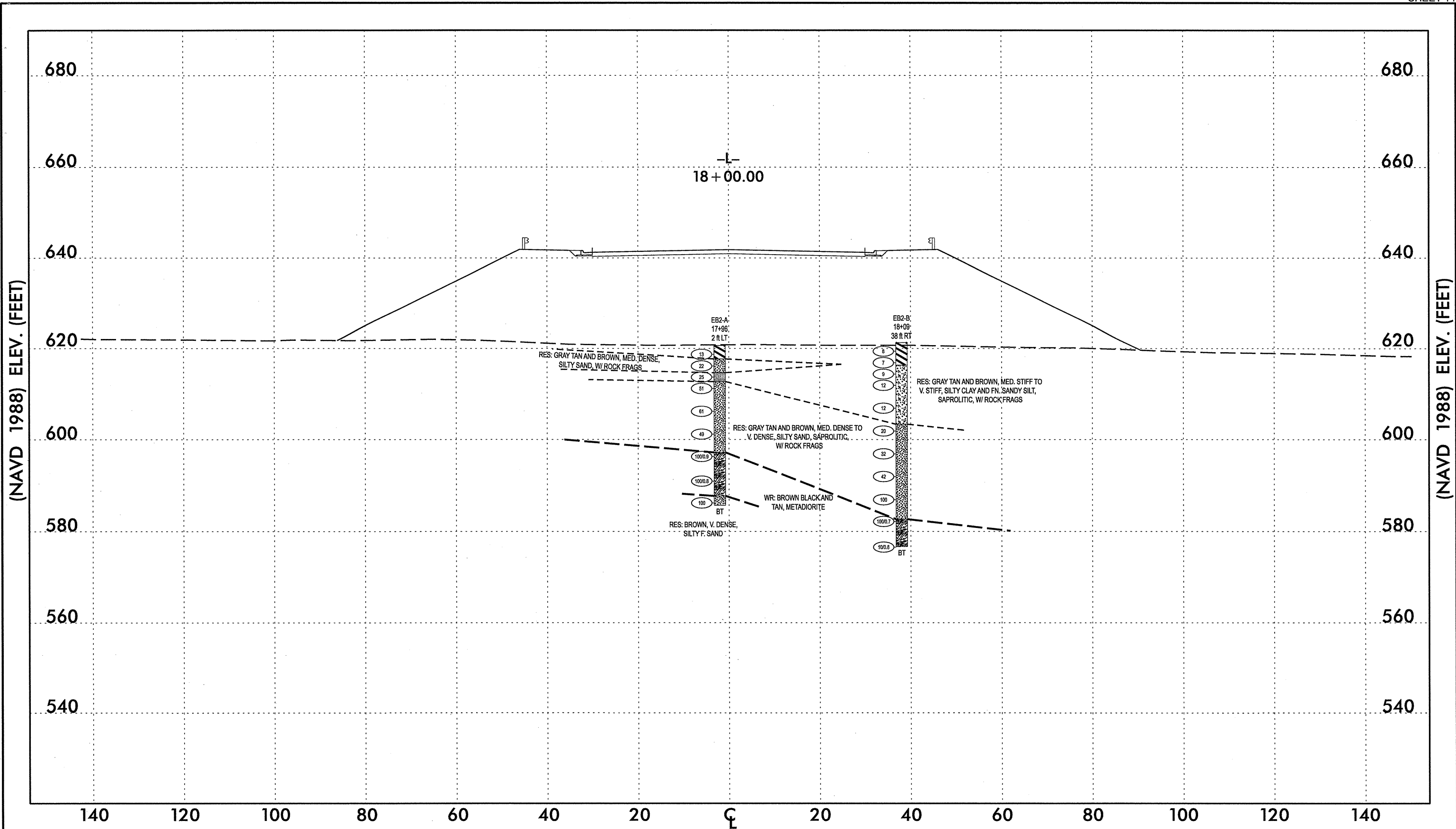
NOTES:

- GROUNDLINE PROFILE OF TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

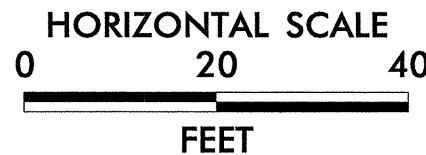
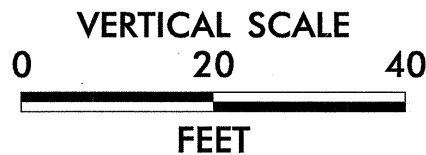



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SUBSURFACE CROSS SECTION END BENT 1		
ROBERTA ROAD EXTENSION OVER NSNCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 1 OF 4

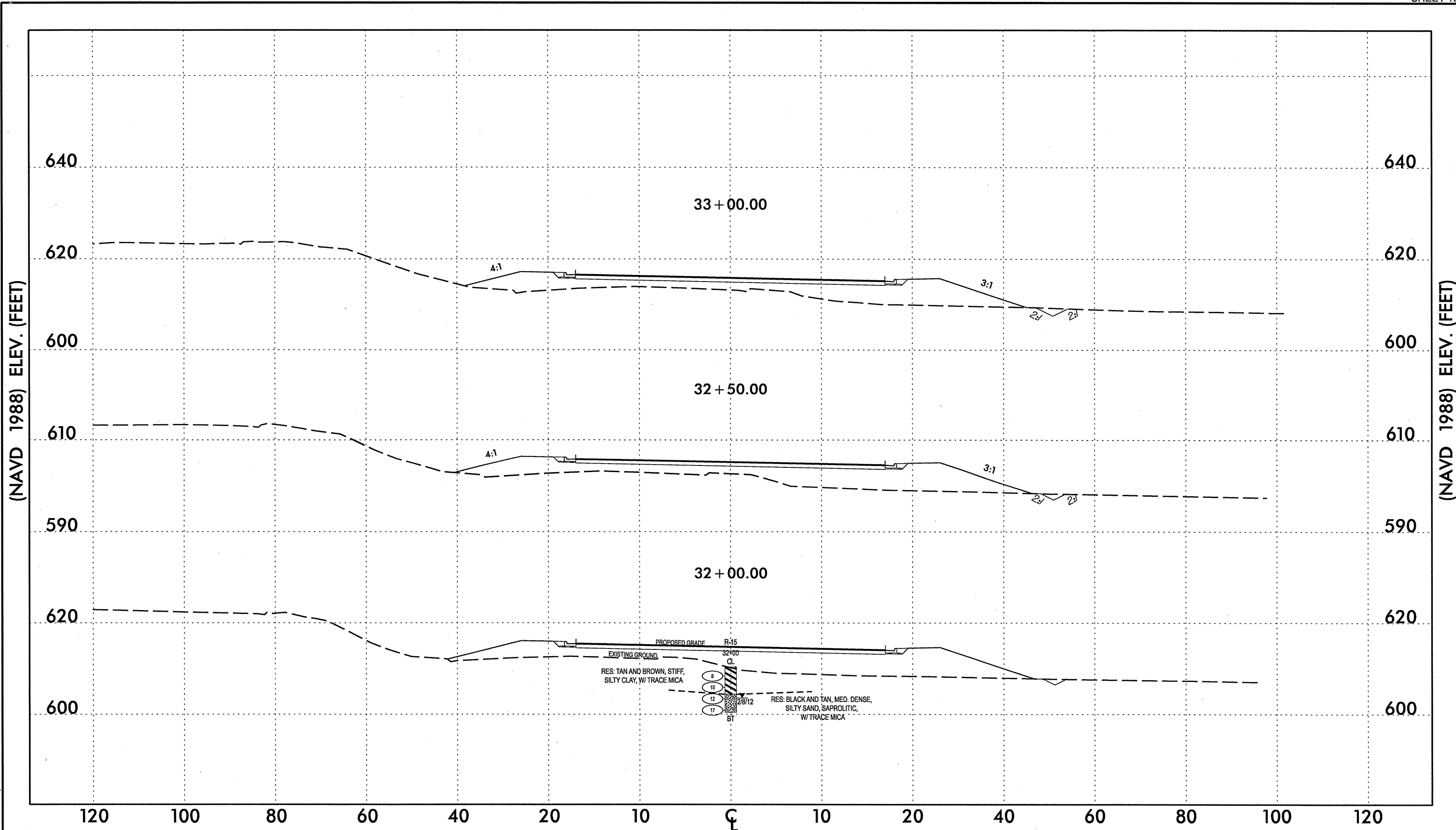


NOTES:
 • GROUNDLINE PROFILE OF TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
 • INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

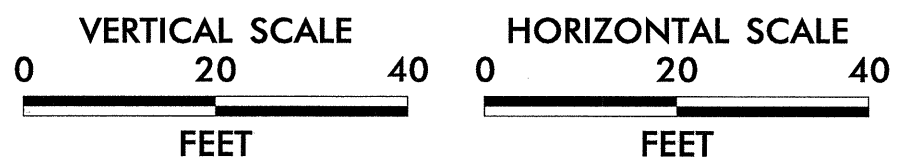


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 RALEIGH, NC 27607
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SUBSURFACE CROSS SECTION END BENT 2		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 2 OF 2

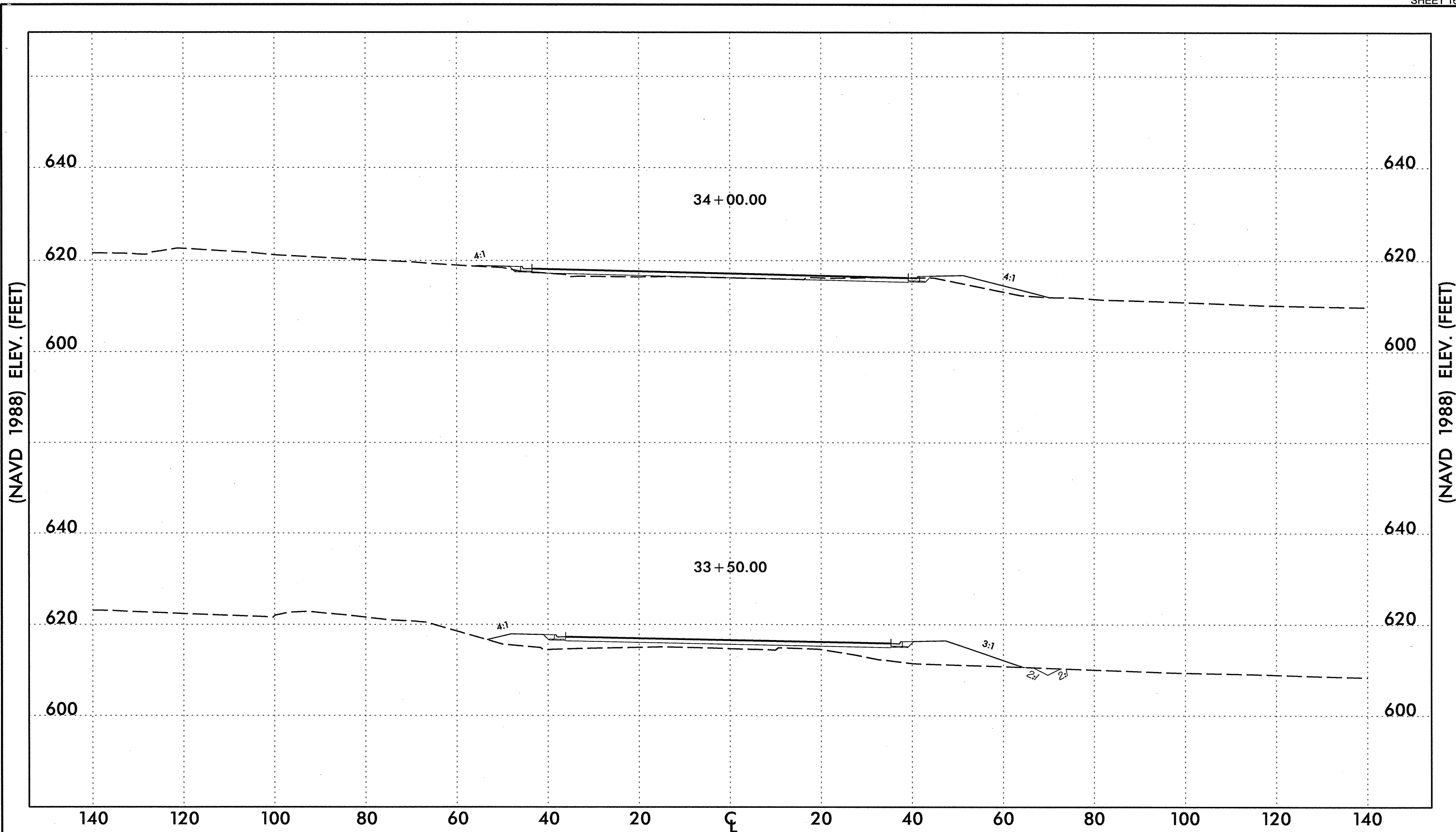


NOTES:
 • GROUNDLINE TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
 • INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

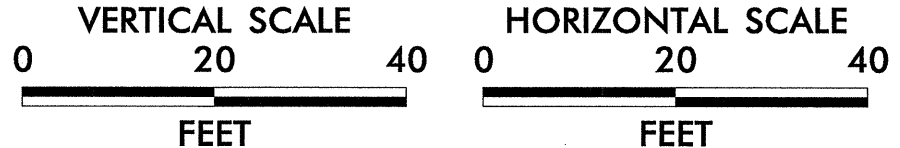


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SUBSURFACE CROSS SECTION -L-		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 1 OF 2

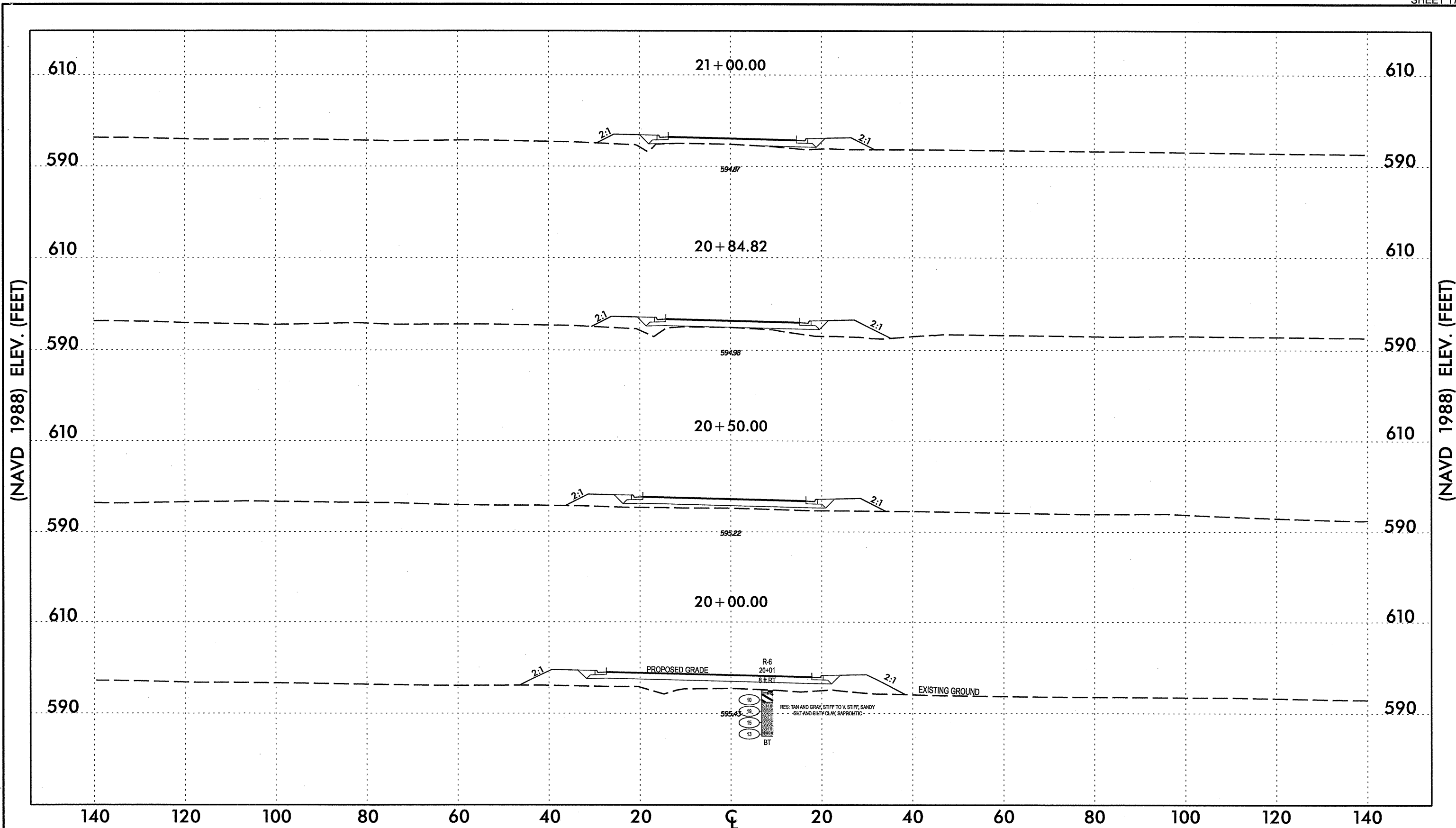


NOTES:
 • GROUNDLINE TAKEN FROM ELECTRONIC DRAWING FILES PROVIDED BY BAKER, DATED JUNE 28, 2012
 • INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.



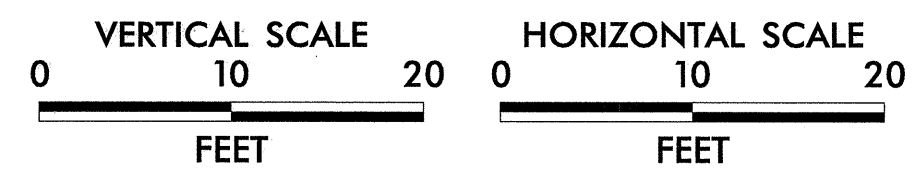
FALCON ENGINEERING
 FALCON ENGINEERING, INC.
 1210 TRINITY ROAD, SUITE 110
 RALEIGH, NC 27607
 PHONE: 919.871.0800
 FAX: 919.871.0803

SUBSURFACE CROSS SECTION -L-		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 2 OF 2



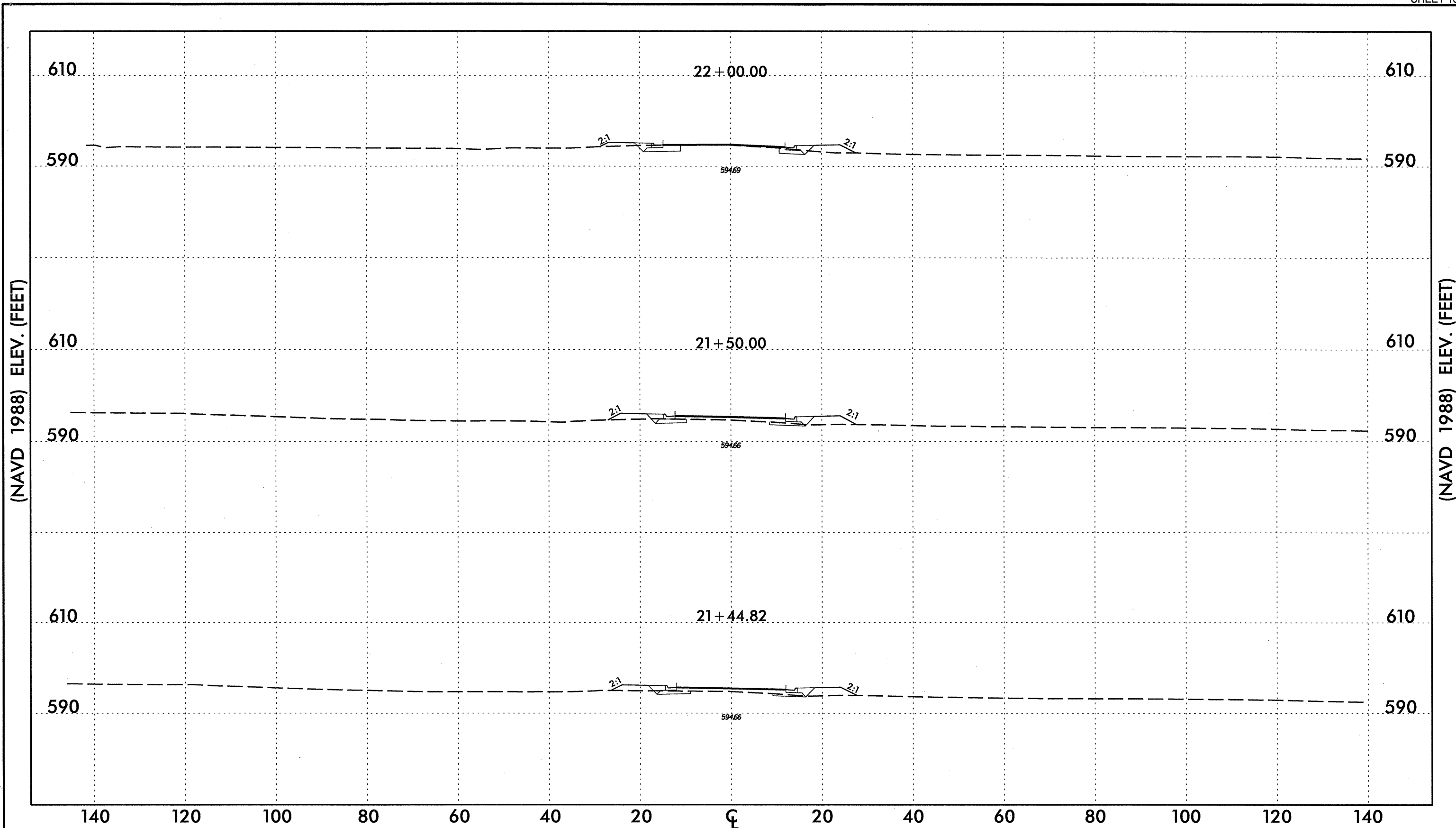
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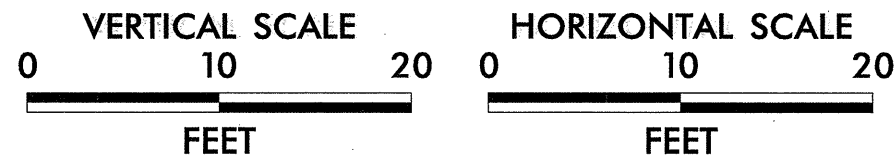


FALCON ENGINEERING, INC.
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SUBSURFACE CROSS SECTION -Y1-		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 1 OF 2

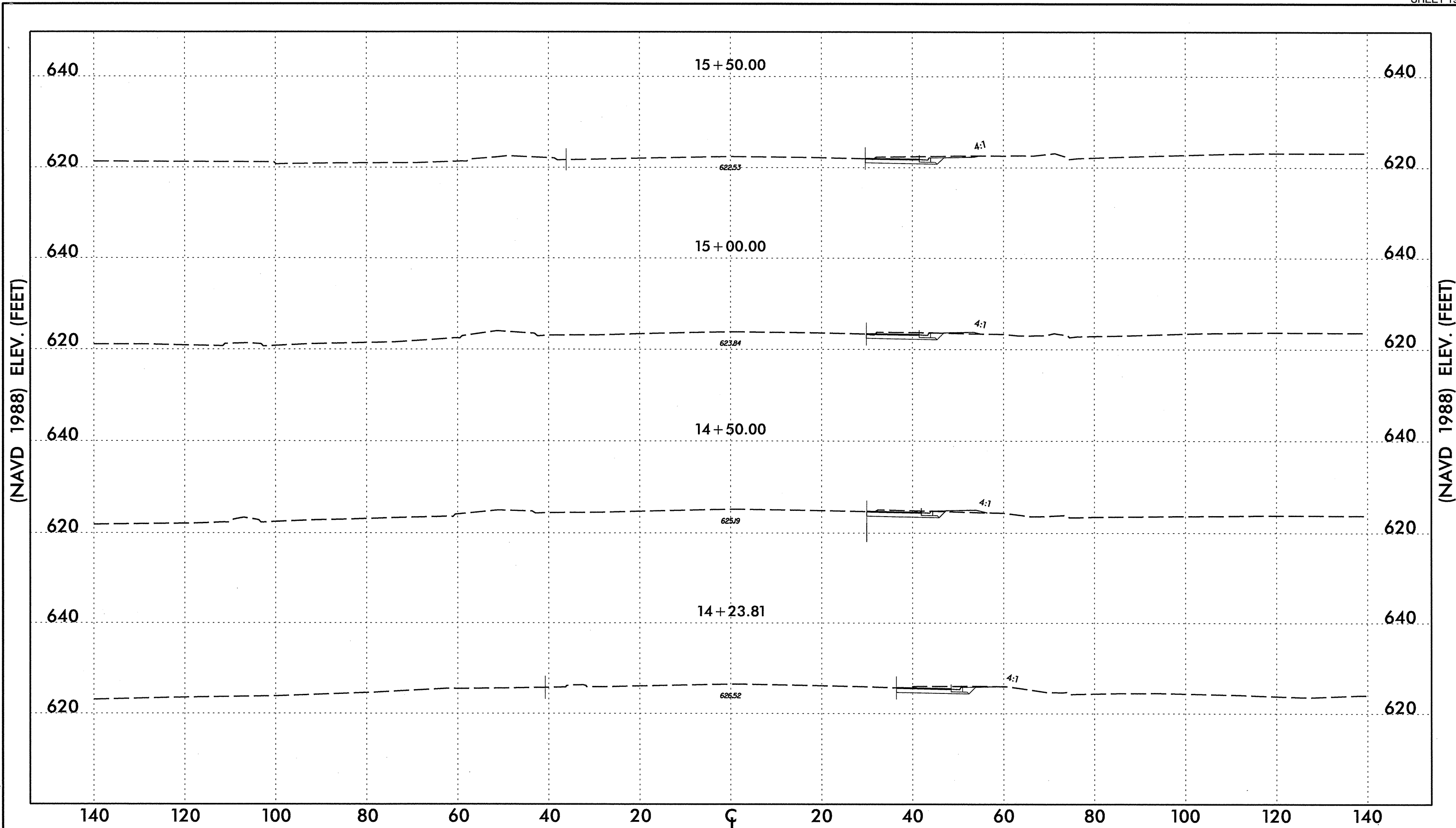


- NOTES:**
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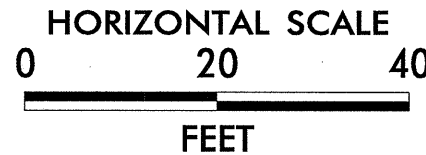
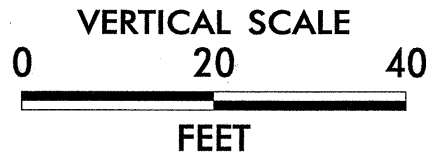
560 CON ENGINEERING, INC.
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SUBSURFACE CROSS SECTION -Y1-		
ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 2 OF 2



NOTES:

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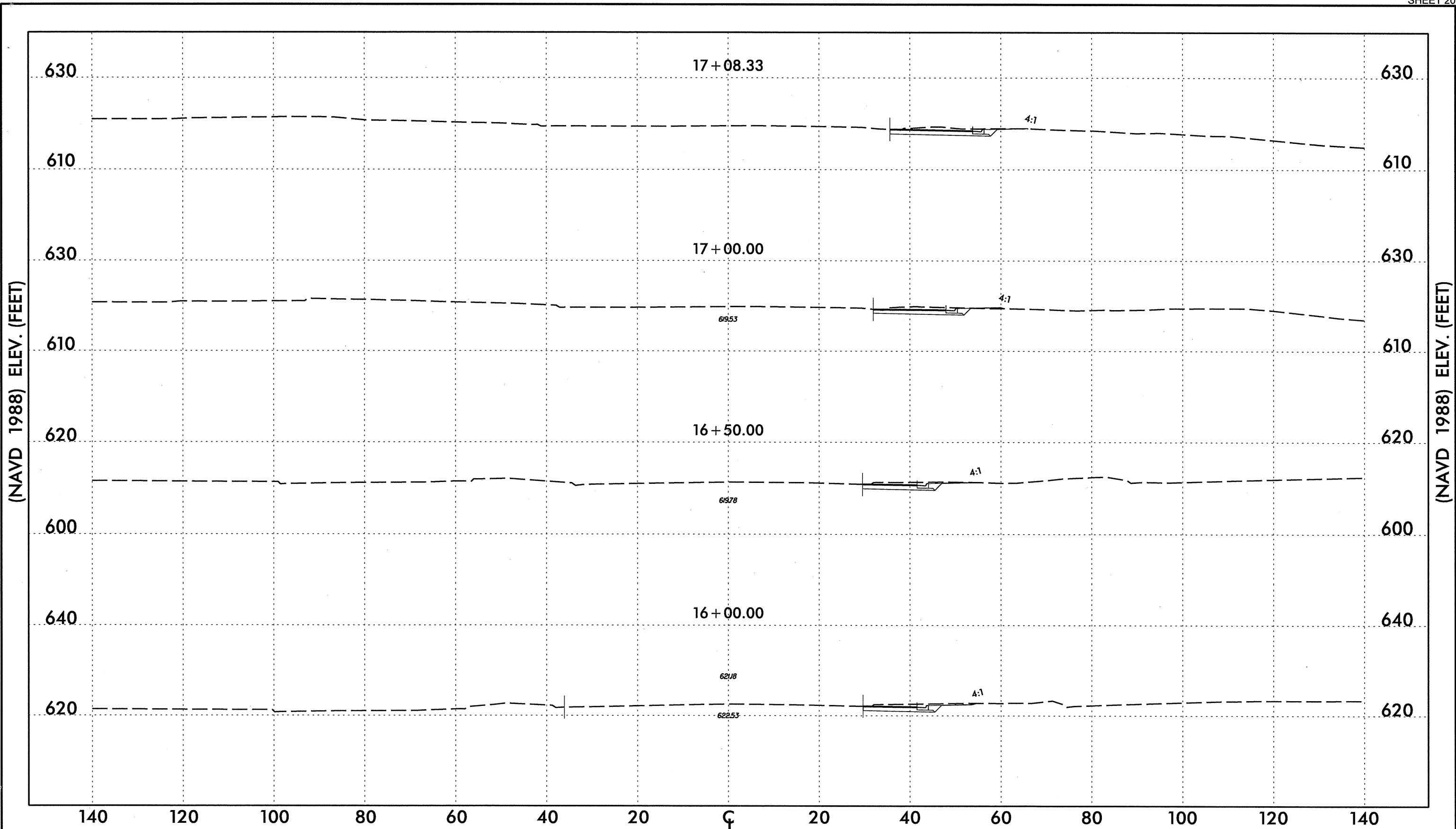


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SUBSURFACE CROSS SECTION -Y4-

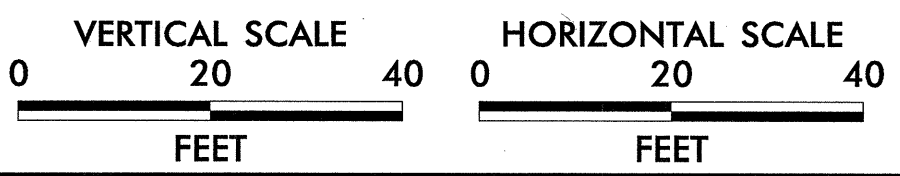

ROBERTA ROAD EXTENSION OVER NS/NCRR
FROM STALLINGS RD. (SR 1161) TO NC 49
CABARRUS COUNTY, NC

DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 1 OF 2
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NOTES:

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FALCON ENGINEERING, INC.
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SUBSURFACE CROSS SECTION -Y4-		
ROBERTA ROAD EXTENSION OVER NSNCR FROM STALLINGS RD. (SR 1161) TO NC 49 CABARRUS COUNTY, NC		
DECEMBER, 2012	PROJECT NO.: G11027.00	SHEET 2 OF 2

FALCON

1210 TRINITY ROAD, SUITE 110, RALEIGH, NORTH CAROLINA 27607

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

ROBERTA RD. EXTENSION OVER NS/NCRR FROM
STALLINGS RD. (SR 1161) TO NC 49

WBS NO.: 50000.1.STR09T1B, TIP NO.: P-5208D

CABARRUS COUNTY, NORTH CAROLINA
FALCON ENGINEERING, INC. PROJECT NO: G11027.00

BORING		SAMPLE	TOTAL SAMPLE			Atterberg Limit Test Results			Natural Moisture Content
AASHTO Classification			PERCENT PASSING						
STATION	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	LL	PL	PI	%
R-6		SS-1							
	A-4		98	88	59	39	31	8	25.0
-Y1- 20+01	8 ft RT	6.0 - 7.5							
R-7		SS-2							
	A-4		95	75	37	34	28	6	21.6
-L- 12+00	14 ft RT	3.5 - 5.0							
R-7		SS-3							
	A-4		99	88	44	26	0	NP	18.9
-L- 12+00	14 ft RT	8.5 - 10.0							
R-8		SS-4							
	A-7-6		96	87	72	74	27	47	30.9
-L- 14+00	14 ft RT	1.0 - 2.5							
R-8		SS-5							
	A-7-5		96	80	42	44	33	11	27.1
-L- 14+00	14 ft RT	6.0 - 7.5							
R-8		SS-6							
	A-2-4		96	79	33	30	0	NP	20.0
-L- 14+00	14 ft RT	13.5 - 15.0							
R-9		SS-7							
	A-6		99	91	49	33	21	12	23.2
-L- 20+00	14 ft RT	1.0 - 2.5							
R-10		SS-8							
	A-7-5		100	99	88	85	40	45	49.4
-L- 22+00	14 ft RT	1.0 - 2.5							
R-10		SS-9							
	A-7-5		100	94	64	53	32	21	43.6
-L- 22+00	14 ft RT	6.0 - 7.5							
R-10		SS-10							
	A-2-4		100	84	35	31	0	NP	20.5
-L- 22+00	14 ft RT	13.5 - 15.0							
R-11		SS-11							
	A-6		95	85	46	35	21	14	21.9
-L- 24+00	14 ft RT	3.5 - 5.0							
R-12		SS-12							
	A-4		100	90	50	37	0	NP	32.4
-L- 26+00	14 ft RT	6.0 - 7.5							
R-12		SS-13							
	A-4		100	91	37	26	0	NP	24.1
-L- 26+00	14 ft RT	13.5 - 15.0							
R-13		SS-14							
	A-7-5		100	97	76	69	41	27	47.8
-L- 28+00	2 ft RT	1.0 - 2.5							
R-13		SS-15							
	A-7-6		77	66	40	43	29	14	27.6
-L- 28+00	2 ft RT	6.0 - 7.5							
R-14		SS-16							
	A-4		76	59	44	26	18	8	18.6
-L- 30+00	CL	1.0 - 2.5							
R-15		SS-17							
	A-7-5		92	87	81	89	31	58	37.8
-L- 32+00	CL	1.0 - 2.5							
R-15		SS-18							
	A-2-4		93	56	29	42	0	NP	32.9
-L- 32+00	CL	6.0 - 7.5							