

0164DEL P1062

PROJECT: 52000.1.STR07T1B ID: P-5206C

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	52000.1.STR07T1B	1	--

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
2A	ROADWAY TITLE SHEET
3, 3A, 3B	REPORT TEXT
3C	EARTHWORK BALANCE SHEET
4	SITE PLAN
5	PROFILE
6-II	CROSS SECTIONS
12-16	BORE LOG REPORTS
17	TEST SUMMARY
18-36	TEST RESULTS

**KIMBALL ROAD  
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 52000.1.STR07T1B(P-5206C) F.A. PROJ. FRA-FR-HSR-0006-10-01-00  
COUNTY ROWAN

PROJECT DESCRIPTION NCRRNS MAINLINE REID TO NORTH  
KANNAPOLIS RAILROAD ROADBED (MP 337.0 TO MP 348.3)

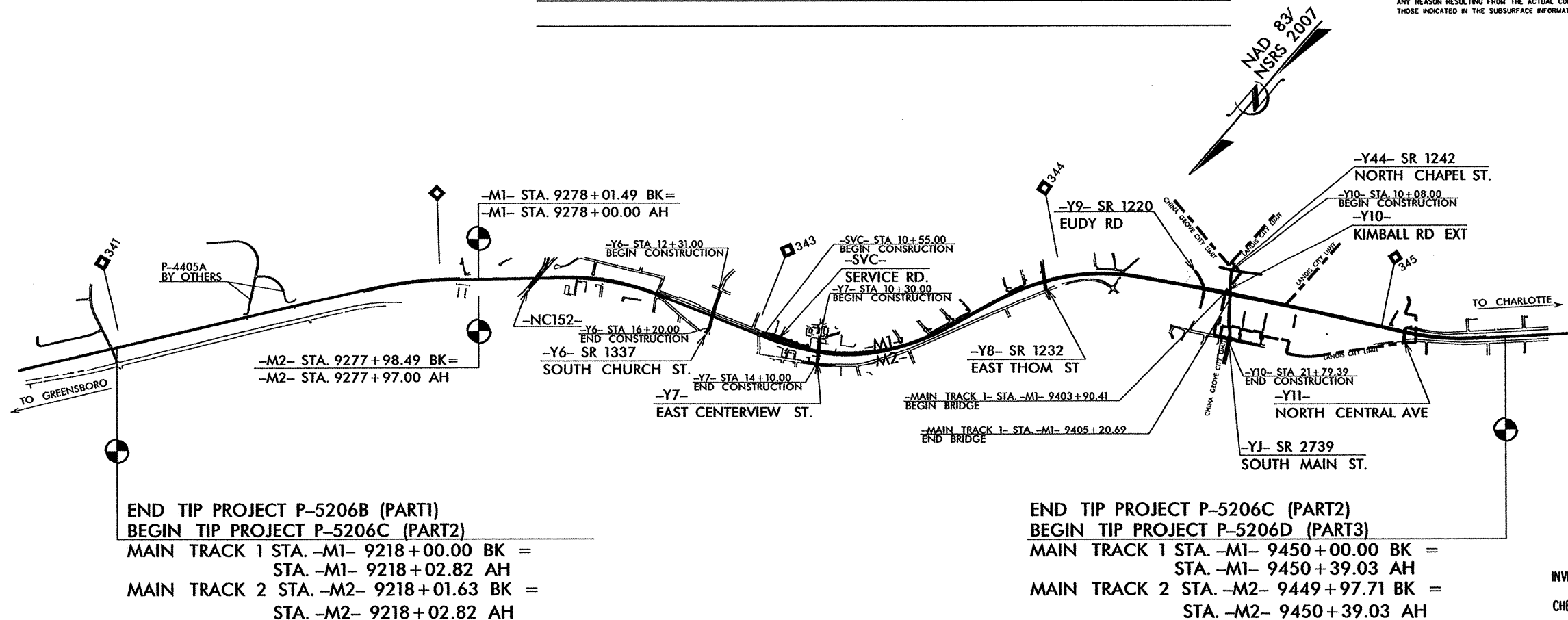
SITE DESCRIPTION KIMBALL ROAD EXTENSION,  
INVENTORY REPORT

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 (ON-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.



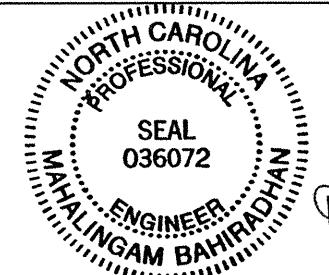
END TIP PROJECT P-5206B (PART1)  
BEGIN TIP PROJECT P-5206C (PART2)  
MAIN TRACK 1 STA. -M1- 9218+00.00 BK =  
STA. -M1- 9218+02.82 AH  
MAIN TRACK 2 STA. -M2- 9218+01.63 BK =  
STA. -M2- 9218+02.82 AH

END TIP PROJECT P-5206C (PART2)  
BEGIN TIP PROJECT P-5206D (PART3)  
MAIN TRACK 1 STA. -M1- 9450+00.00 BK =  
STA. -M1- 9450+39.03 AH  
MAIN TRACK 2 STA. -M2- 9449+97.71 BK =  
STA. -M2- 9450+39.03 AH

PERSONNEL

P. ORE
J. SEWELL
S. KITTS
J. WHITT
S. BUCHANAN
M. BAHIRADHAN
TERRACON

INVESTIGATED BY TERRACON  
CHECKED BY M. BAHIRADHAN  
SUBMITTED BY SCHNABEL ENG.  
DATE MAY 2013



*M. Bahiradhan*  
05/02/2013

DRAWN BY: S. KITTS

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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

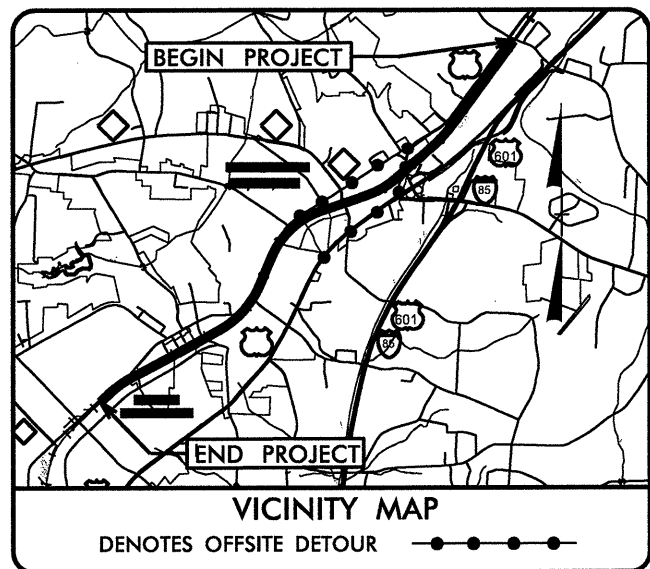
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Main content table with multiple columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSIBILITY, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, PLASTICITY, COLOR.

0164DEL P1062

TIP PROJECT: P-5206C

CONTRACT: C203207



STATE OF NORTH CAROLINA  
NCDOT RAIL DIVISION

**ROWAN COUNTY**

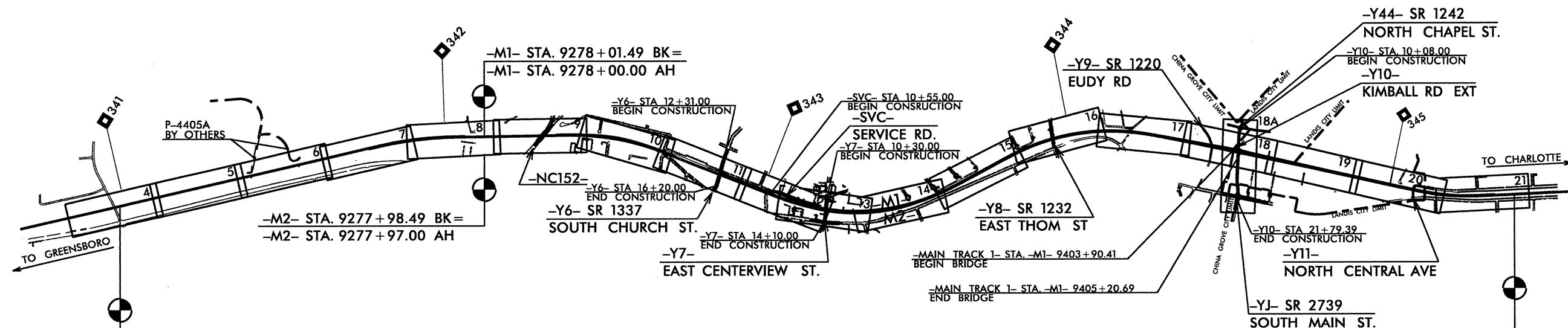
LOCATION: NRRNS MAINLINE RAILROAD ROADBED FROM SOUTH OF MT. HOPE CHURCH RD (SR 1505, MP 340.9) TO NORTH OF RYDER AVE (SR 1210, MP 345.4)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE CURB AND GUTTER, AND SIGNALS



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5206C	2A	--
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
52000.1.STR07T1B		PE, UTL PE	
52000.1.STR08T3		PE, UTL PE	
43219.2.STR08P5206		ROW	
52000.3.STR02T4D	FRA-FR-HSR-0006-10-01-00	UTL CONST, CONST	

PART 2 OF 3

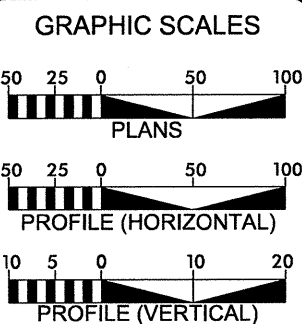


END TIP PROJECT P-5206B (PART1)  
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MAIN TRACK 2 STA. -M2- 9449+97.71 BK =  
STA. -M2- 9450+39.03 AH

PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION

SUBMITTAL: 90% PLANS  
DATE: JANUARY 25, 2013



PROJECT LENGTH	
LENGTH OF RAIL TIP PROJECT	= 4.368 MILES
LENGTH OF STRUCTURE TIP PROJECT	= 0.025 MILES
TOTAL LENGTH OF TIP PROJECT	= 4.393 MILES

Prepared In the Office of:  
**TGS ENGINEERS**  
804-C N. LAFAYETTE STREET  
SHELEBY, NC 28150  
PH: (704) 476 0003  
CORP. LICENSE NO.: C-0275

2012 STANDARD SPECIFICATIONS

AUGUST 31, 2012

LETTING DATE:  
JULY 16, 2013

LEONARD FLETCHER, PE, PLS  
RAIL PROJECT ENGINEER

JIMMY TERRY, PE  
RAIL DESIGN ENGINEER

DAVID PETTY, PE  
HYDRAULIC ENGINEER

RAY ELLIOTT, PE  
STRUCTURE ENGINEER

MATTHEW B. SIMMONS, PE  
NCDOT PROJECT MANAGER

RAIL ENGINEER  
SIGNATURE: \_\_\_\_\_ P.E.

ROADWAY ENGINEER  
SIGNATURE: \_\_\_\_\_ P.E.

HYDRAULICS ENGINEER  
SIGNATURE: \_\_\_\_\_ P.E.

NCDOT RAIL DIVISION CONTACT:  
MATTHEW B. SIMMONS, PE

NC DEPARTMENT OF TRANSPORTATION  
RAIL DIVISION  
PLANNING AND DEVELOPMENT

02-MAY-2013 11:39  
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SK:TTT



May 2, 2013

Mr. Jimmy Terry, PE  
 TGS Engineers  
 804-C N. Lafayette Street  
 Shelby, North Carolina 28150

WBS Number: 52000.1.STR07T1B  
 TIP Number: P-5206C  
 FA Number: FRA-FR-HSR-0006-10-01-00  
 County: Rowan  
 Description: Reid to Kannapolis – Task Order 1

**Subject: Roadway Inventory Report  
 For Kimball Road Extension  
 Schnabel Engineering Project No. 12821003.00**

Dear Mr. Terry:

**SCHNABEL ENGINEERING SOUTH, PC** (Schnabel) is pleased to submit our geotechnical engineering report for this project. This report includes foundation recommendations and pay items with appendices where other relevant information is presented. This study was performed in accordance with our proposal dated October 17, 2011.

**1.0 PROJECT DESCRIPTION**

The project consists of extending Kimball Road from South Main Street to North Chapel Street, approximately 2,100 feet southeast. We understand construction for the extension will consist of new pavements with cuts up to 25 feet deep and fills up to 5 feet in height to achieve the proposed alignment grades. The alignment will pass under existing railroad tracks running parallel to South Main Street. The railroad tracks will be supported by a new bridge spanning Kimball Road. Recommendations for the new rail bridge will be provided in a separate report. Project information was provided by TGS Engineers. The following survey line was investigated:

Line -Y10- Station 10+00 to Station 21+17

**2.0 AREAS OF SPECIAL INTEREST**

Following areas consisted of loose/soft fill soils.

<u>Station</u>	<u>Offset</u>
18+50 to 21+17	Lt. & Rt.

Following areas consisted of highly plastic soil.

<u>Station</u>	<u>Offset</u>
10+00 to 18+50	Lt. & Rt

Following areas consisted of saturated soils and perched water table within 6 feet from the proposed roadway subgrade.

<u>Station</u>	<u>Offset</u>
14+00 to 17+00	Lt. & Rt.

**3.0 PHYSIOGRAPHY AND GEOLOGY**

The project site is located within the Piedmont geological province. The site is underlain by artificial fills, residual soils, and rock. Based on local geology maps and rock cores recovered nearby, we believe the parent bedrock is composed of intrusive granite and metamorphosed granitic rock (Geologic Map of North Carolina, 1991).

The project site slopes to the southeast from EL 830 feet at South Main Street to EL 806 feet at North Chapel Street, draining to a stream south of North Chapel Street. The site cover is a mix of wooded areas, residential housing, and commercial buildings. The site cover near the railroad track was mostly wooded, while the sites near South Main Street and North Chapel Street vary from residential and commercial property to open fields or lots. Below grade utilities, including electric, water, and sewer are present in the vicinity of the site, servicing the nearby buildings.

The existing rail track is supported by an artificial fill embankment. Other artificial fills were observed throughout the project site. Natural residual soils were observed below the artificial fill soils. This information was obtained during our site visits and field investigation.

**4.0 SOIL PROPERTIES**

We characterized the subsurface strata based on the subsurface data and the laboratory test results.. We have divided the soil into strata as described below.

**Ground Cover**

Topsoil thicknesses of 0 to 4 inches were encountered in several of the borings. Approximately 4 inches of asphalt pavement over 2 inches of stone base was observed at the surface of boring R-7, performed through the outside shoulder of existing South Main Street.

**Artificial Fill Soils**

Artificial fill soils were encountered in most test borings from below the ground surface or topsoil to depths ranging from 3.5 to 13.5 feet. These fills were likely placed during previous site grading and construction. The deepest fills were observed between Stations 13+00 and 15+00, in the vicinity of the proposed rail bridge along the existing rail track. The artificial fill soils observed at this project site typically consisted of orange and brown clayey sands (A-2), and sandy silty clays (A-6, A-7-5, A-7-6) with varying amounts of rock fragments, gravel, asphalt, organics, and mica. The existing fill had variable densities and consistencies, with Standard Penetration Test (N) values ranging from 4 to 28 blows per foot (bpf) indicating the fill may have been placed in an uncontrolled manner. The soil samples tested within this stratum have the following properties:

Liquid Limits	=	51 to 67
Plasticity Indices	=	25 to 31
Moisture Content	=	4.2 to 28.2%
Maximum Dry Density (MDD)	=	98.5 to 111.3 pcf per AASHTO T-99

Opt. Moisture Content (OMC)	=	15.9 to 21.2% per AASHTO T-99
CBR Value	=	9.9 at 95% of MDD per AASHTO T-99
w/ Swell	=	0.5% to 0.9% per AASHTO T-193

**Residual Soils**

Residual soils were encountered in all of the test borings from below the artificial fills to boring termination depths of 10 to 30 feet below the ground surface. Residual materials are derived from the chemical and physical weathering of the underlying parent bedrock. The residual soils observed at this project site typically consisted of orange, brown, and gray Silty, Clayey Sands, (A-2), Sandy Silty Clays and Sandy Silts (A-7-5, A-7-6, A-4) with varying amounts of rock fragments, organics, and mica. N values ranged from 3 bpf to 36 bpf, indicating the granular soils were loose to medium dense and the fine-grained soils had medium stiff to very stiff consistencies, generally increasing with depth. The soil samples tested within this stratum have the following properties:

Liquid Limits	=	61 to 73
Plasticity Indices	=	36 to 39
Moisture Content	=	9.9 to 57.2%
Maximum Dry Density (MDD)	=	91.2 to 103.9 pcf per AASHTO T-99
Opt. Moisture Content (OMC)	=	19.5 to 28.7% per AASHTO T-99
CBR Value	=	5.1 to 5.6 at 95% of MDD per AASHTO T-99
w/ Swell	=	1.2% to 2.5% per AASHTO T-193

**5.0 GROUNDWATER PROPERTIES**

Groundwater was observed in two test borings, R-4 and R-10, at depths of 14 and 17.3 feet below existing grade (EL 802.5 feet and EL 810 feet), respectively. The test boring logs also describe the moisture condition of our split spoon samples, indicating whether the soil appeared to be saturated, wet, moist, or dry. Based on the proposed alignment grades, the groundwater table was observed within 6.4 feet of the proposed pavement subgrade, while saturated soils were observed up to 0.5 feet above the proposed pavement subgrade.

Temporary stand-pipes were installed to depths of 30 feet below the existing ground surface in borings R-3 and R-10 to monitor the stabilized groundwater levels. The stand-pipe in boring R-3 was checked several times over a period of a few weeks in July and August 2012, and was dry each time. The stand-pipe in boring R-10 was checked several times in September 2012 where groundwater was observed at depths of 17.3 feet (EL 802.5 feet) each time. Table 1 summarizes our groundwater observations at each boring.

Perched water may be encountered above these grades during excavation, particularly in the vicinity of the existing track embankment. Perched water was observed in several test borings within artificial fills. Perched water occurs when a low permeability soil retards surface infiltration. Perched water may occur at other locations on site and at higher elevations than those recorded on the logs.

**Table 1: Groundwater Observation Summary**

Test Boring	Station Along Kimball Road (-Y10-)*	Existing Ground Surface Elevation (feet)	Test Boring Termination Elevation (feet)	Proposed Pavement Subgrade Elevation (feet)	Groundwater Elevation (feet)	Water Table Depth Above Proposed Roadway Subgrade (feet)	Comments
R-1	10+00	805.5	795.5	802	Dry	--	--
R-2	12+00	812.0	792.0	808	Dry	--	--
R-3	14+64	823.5	793.5	810	Dry	--	--
R-10	14+90	819.8	789.8	811	802.5	-8.5	--
R-4	16+00	824.0	804.0	816	809.6	-6.4	Saturated below EL 815.5
R-5	18+00	825.5	810.5	823	Dry	--	Saturated below EL 812
R-6	20+00	826.0	811.0	829	Dry	--	Wet below EL 814
R-9	20+99	829.5	819.5	831	Dry	--	--
R-7	21+12	830.0	820.0	831	Dry	--	--
R-8	21+16	N/A	821.5	831	Dry	--	--

\*Note: borings performed from 25 feet left to 72 feet right of the centerline of the proposed alignment

The water level readings are considered a reliable indication of the groundwater depth at the time the observations were made. Fluctuations of the groundwater taken should be anticipated based on variations in precipitation, runoff, flooding, evaporation, leaking utilities, season of the year, and other similar factors.

**6.0 EARTHWORK BALANCE SHEET**

The Earthwork Balance Sheet (Sheet 3C) included in this report was provided by TGS Engineers to be included in this report. We recommend that TGS Engineers verify the quantities presented in this earthwork balance sheet considering the recommended quantities presented in the recommendations report submitted under a separate cover.

**7.0 LIMITATIONS**

We based the analyses and recommendations submitted in this report on the information revealed by our exploration. We attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

We prepared this report to aid in the evaluation of this site and to assist in the design of the project. We intend it for use concerning this specific project. We based our recommendations on information on the site and proposed construction as described in this report. Substantial changes in locations or grades should be brought to our attention so we can modify

our recommendations as needed. We would appreciate an opportunity to review the plans and specifications as they pertain to the recommendations contained in this report, and to submit our comments to you based on this review.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report, or any other instrument of service.

We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Sincerely,  
**SCHNABEL ENGINEERING SOUTH, PC**

Mahalingam Bahiradhan (Bahi), PE  
Senior Engineer

Jeff Sewell, PE  
Senior Associate

## Earthwork Balance Sheet

PROJECT: P-5206C

COUNTY: Rowan

Volumes in Cubic Yards  
DATE: 9/27/2013

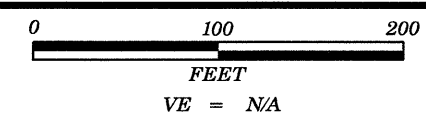
COMPILED BY: SGM

30  
SHEET \_\_\_ OF \_\_\_ SHEETS

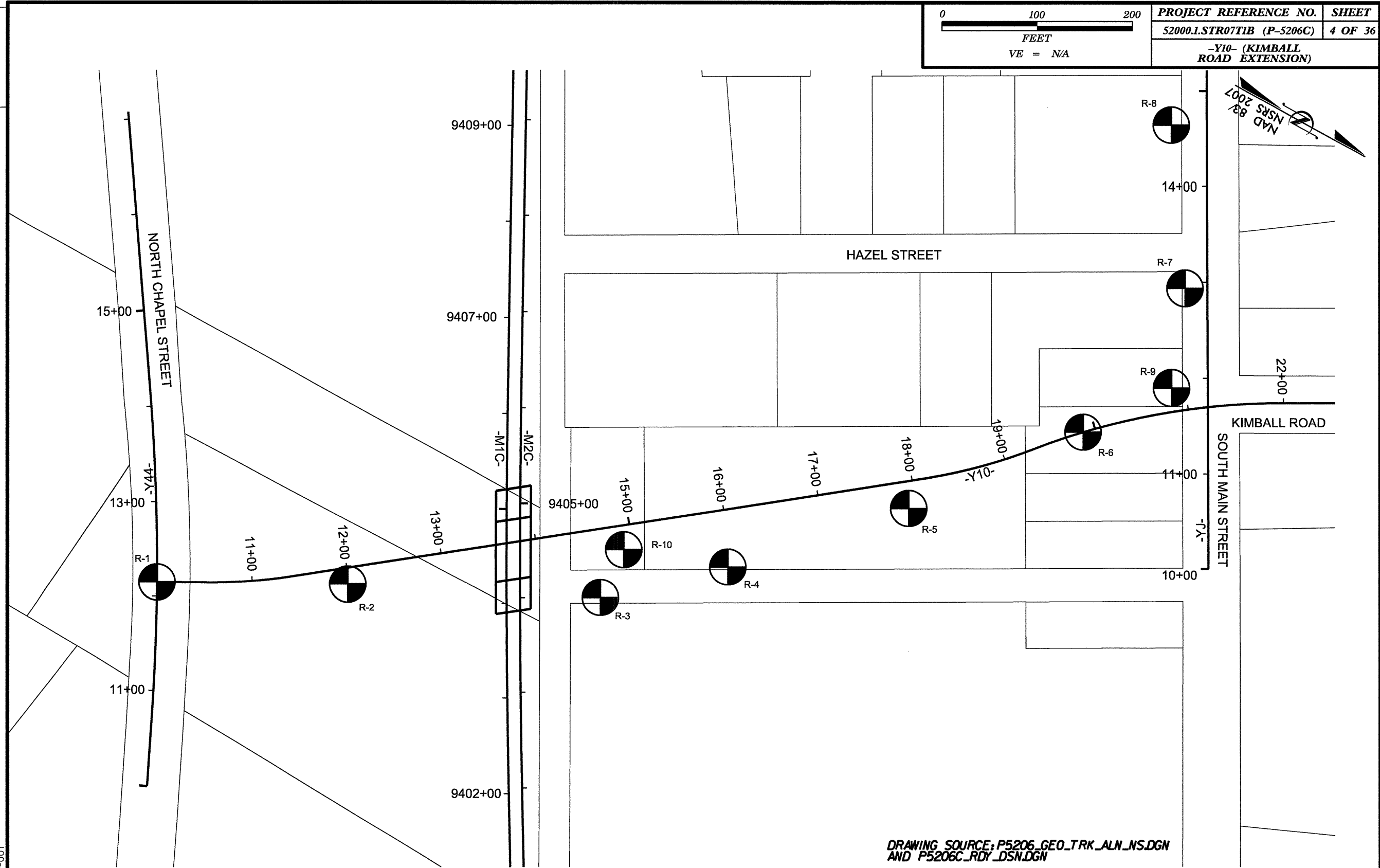
STATION	STATION	EXCAVATION				EMBANKMENT				BORROW	WASTE						
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH		EMBANK. +20%	ROCK	SUITABLE	UNSUIT.	TOTAL		
-M2- 9218+02.82	-M2- 9248+00.00	4,960				4,960				7,058	7,058	8,470	3,510				
	<b>SUBTOTAL 1</b>	4,960				4,960				7,058	7,058	8,470	3,510				
-M2- 9248+00.00	-M2- 9277+98.49	5,904				5,904				1,054	1,054	1,265		3,479	1,160		4,639
	<b>SUBTOTAL 2</b>	5,904				5,904				1,054	1,054	1,265		3,479	1,160		4,639
-M2- 9277+97.00	-M2- 9308+00.00	9,367				9,367				5,702	5,702	6,842		1,894	631		2,525
	<b>SUBTOTAL 3</b>	9,367				9,367				5,702	5,702	6,842		1,894	631		2,525
-M2- 9308+00.00	-M2- 9316+95.86	2,056				2,056				8	7	8		1,536	512		2,048
-Y6- CROSSING																	
-M2- 9316+95.86	-M2- 9335+05.57	4,631				4,631				3,681	3,681	4,417		161	53		214
-Y7- 10+30	-Y7- 14+10	115				115				270	270	324	209				
-M2- 9335+05.57	-M2- 9338+00.00	3,128				3,128								2,346	782		3,128
	<b>SUBTOTAL 4</b>	9,930				9,930				3,959	3,958	4,749	209	4,043	1,347		5,390
-M2- 9338+00.00	-M2- 9368+00.00	15,398				15,398				29,681	29,681	35,617	20,219				
	<b>SUBTOTAL 5</b>	15,398				15,398				29,681	29,681	35,617	20,219				
-M2- 9368+00.00	-M2- 9398+00.00	21,675				21,675				3,987	3,987	4,784		12,668	4,223		16,891
	<b>SUBTOTAL 6</b>	21,675				21,675				3,987	3,987	4,784		12,668	4,223		16,891
-M2- 9398+00.00	-M2- 9403+87	4,449				4,449				5,684	5,684	6,821	2,372				
BRIDGE																	
-Y10- 10+08.00	-Y10- 21+79.39	16,180				16,180				673	673	808		6,186	9,186		15,372
-YJ- 10+96.84	-YJ- 13+12.98	15				15				25	25	30	15				
-M2- 9405+17	-M2- 9428+00.00	7,963				7,963				32,573	32,573	39,088	31,125				
	<b>SUBTOTAL 7</b>	28,607				28,607				38,955	38,955	46,747	33,512	6,186	9,186		15,372
-M2- 9428+00.00	-M2- 9449+97.71	5,900				5,900				1,296	1,296	1,555		3,259	1,086		4,345
	<b>SUBTOTAL 8</b>	5,900				5,900				1,296	1,296	1,555		3,259	1,086		4,345
<b>TOTAL</b>		101,741				101,741				91,692	91,691	110,029	57,450	31,529	17,633		49,162
LOSS DUE TO CLEARING & GRUBBING		-42,000				-42,000							42,000				
EST. SHOULDER MATERIAL									252		210	252	252				
WASTE IN LIEU OF BORROW													-31,529	-31,529			-31,529
<b>PROJECT TOTAL</b>		59,741				59,741				91,944	91,901	110,281	68,173		17,633		17,633
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT													3,409				
<b>GRAND TOTAL</b>		59,741				59,741				91,944	91,901	110,281	71,582		17,633		17,633
<b>SAY</b>		60,400											72,300				

EST. DDE =410 CUBIC YARDS  
 EST. SHALLOW UNDERCUT = 1,600 CUBIC YARDS  
 EST. SHALLOW UNDERCUT BY STATIONS = 1,350 CUBIC YARDS  
 TOTAL SHALLOW UNDERCUT = 2,950 CUBIC YARDS  
 CLASS IV SUBGRADE STABILIZATION = 6,250 TONS  
 PER GEOTECH & DIVISION RECOMMENDATIONS , ESTIMATED 4,700 CUBIC YARDS OF UNDERCUT TO BE USED IN THE DISCRETION OF THE RESIDENT ENGINEER.

0164DEL P1062



<b>PROJECT REFERENCE NO.</b>	<b>SHEET</b>
52000.1.STR07TIB (P-5206C)	4 OF 36
-Y10- (KIMBALL ROAD EXTENSION)	



DRAWING SOURCE: P5206\_GEO.TRK\_ALN\_NS.DGN AND P5206C\_RDY\_DSN.DGN

02-MAY-2013 11:39  
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 SK1115 AT 08-2100-007

NO.	BY	DATE	REVISION

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
**RAIL DIVISION**

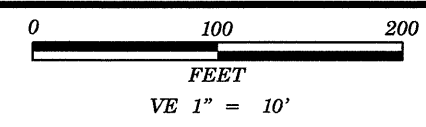
PREPARED BY: **TGS ENGINEERS**  
 975 WALNUT STREET, SUITE 141  
 CARY, NC 27513  
 PH (919) 319 8850  
 CORP. LICENSE NO. C-0275

<b>PROJECT</b> REID TO NORTH KANNAPOLIS		<b>MILE POST</b>	
<b>TITLE</b>		52000.1.STR07TIB (P-5206C)	
<b>LOCATION</b>		<b>DRAWING</b>	
<b>DGN BY</b> MB	<b>RAILROAD</b> NORTH CAROLINA RR & NORFOLK SOUTHERN RR	<b>SITE PLAN</b>	
<b>DWN BY</b> SLK	<b>VAL SEC</b> V-8/2		
<b>CHK BY</b> MB	<b>DATE</b> MAY 2013		
<b>SCALE</b> 1" = 100'			



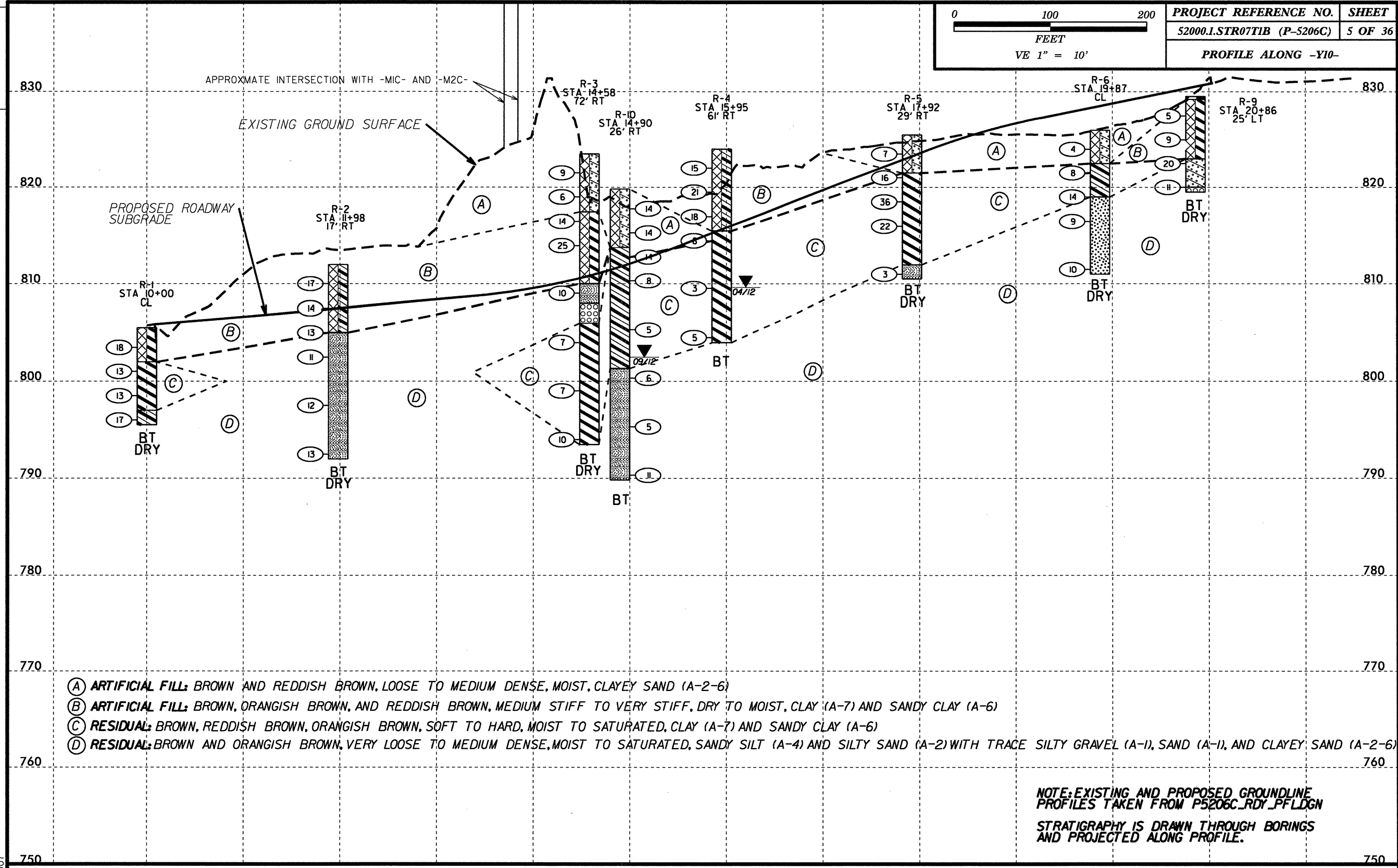
0164DEL P1062

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<b>PROJECT REFERENCE NO.</b>	<b>SHEET</b>
52000.1.STR07TIB (P-5206C)	5 OF 36

PROFILE ALONG -Y10-



- (A) **ARTIFICIAL FILL:** BROWN AND REDDISH BROWN, LOOSE TO MEDIUM DENSE, MOIST, CLAYEY SAND (A-2-6)
- (B) **ARTIFICIAL FILL:** BROWN, ORANGISH BROWN, AND REDDISH BROWN, MEDIUM STIFF TO VERY STIFF, DRY TO MOIST, CLAY (A-7) AND SANDY CLAY (A-6)
- (C) **RESIDUAL:** BROWN, REDDISH BROWN, ORANGISH BROWN, SOFT TO HARD, MOIST TO SATURATED, CLAY (A-7) AND SANDY CLAY (A-6)
- (D) **RESIDUAL:** BROWN AND ORANGISH BROWN, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SANDY SILT (A-4) AND SILTY SAND (A-2) WITH TRACE SILTY GRAVEL (A-1), SAND (A-1), AND CLAYEY SAND (A-2-6)

**NOTE:** EXISTING AND PROPOSED GROUNDLINE PROFILES TAKEN FROM P5206C\_RDY\_PFLDGN  
STRATIGRAPHY IS DRAWN THROUGH BORINGS AND PROJECTED ALONG PROFILE.

10+00    11+00    12+00    13+00    14+00    15+00    16+00    17+00    18+00    19+00    20+00    21+00    22+00

NO.	BY	DATE	REVISION

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

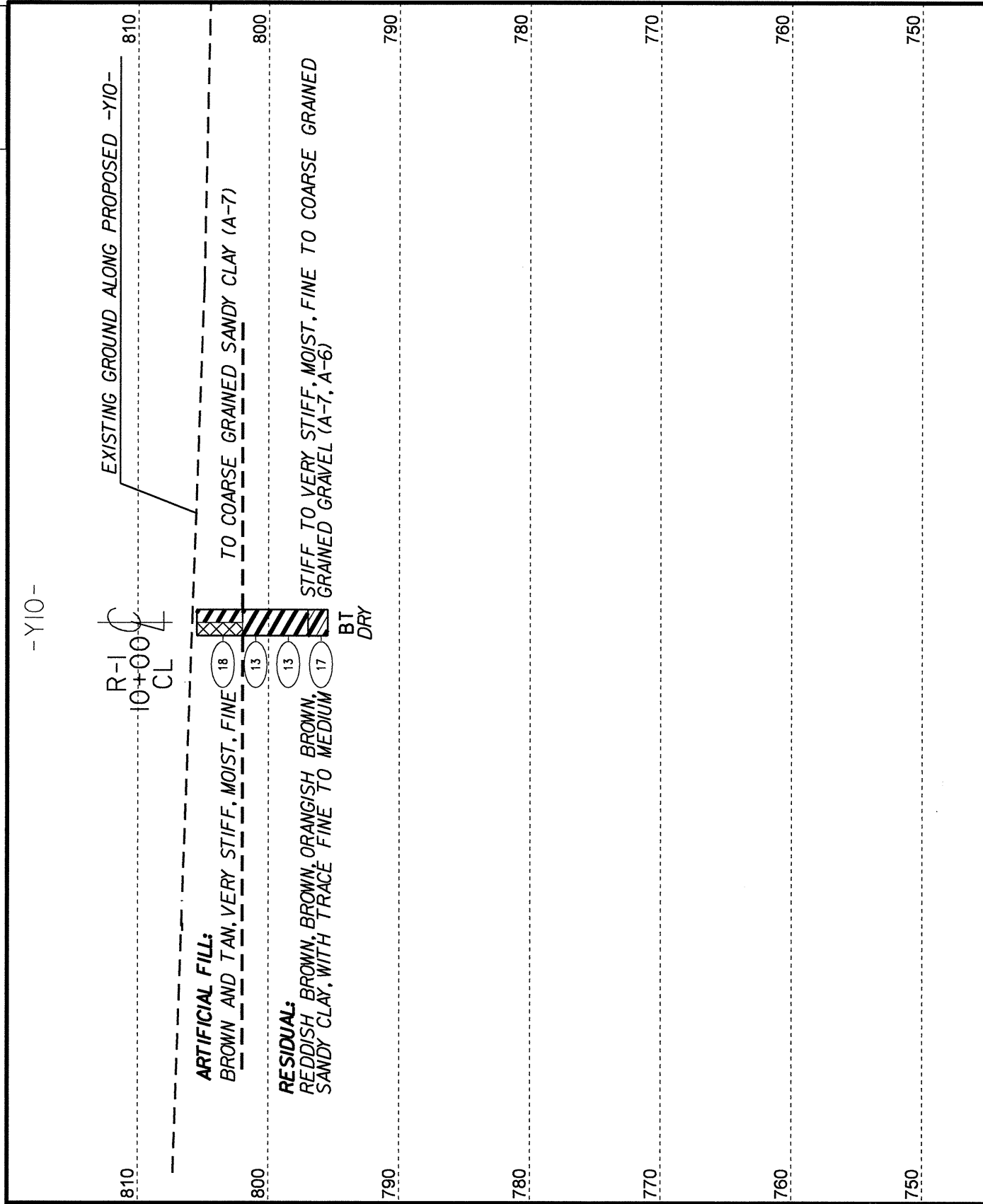
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
**RAIL DIVISION**

PREPARED BY: **TGS ENGINEERS**  
975 WALNUT STREET, SUITE 141  
CARR, NC 27511  
PH (919) 319 8850  
CORP. LICENSE NO. C-0275

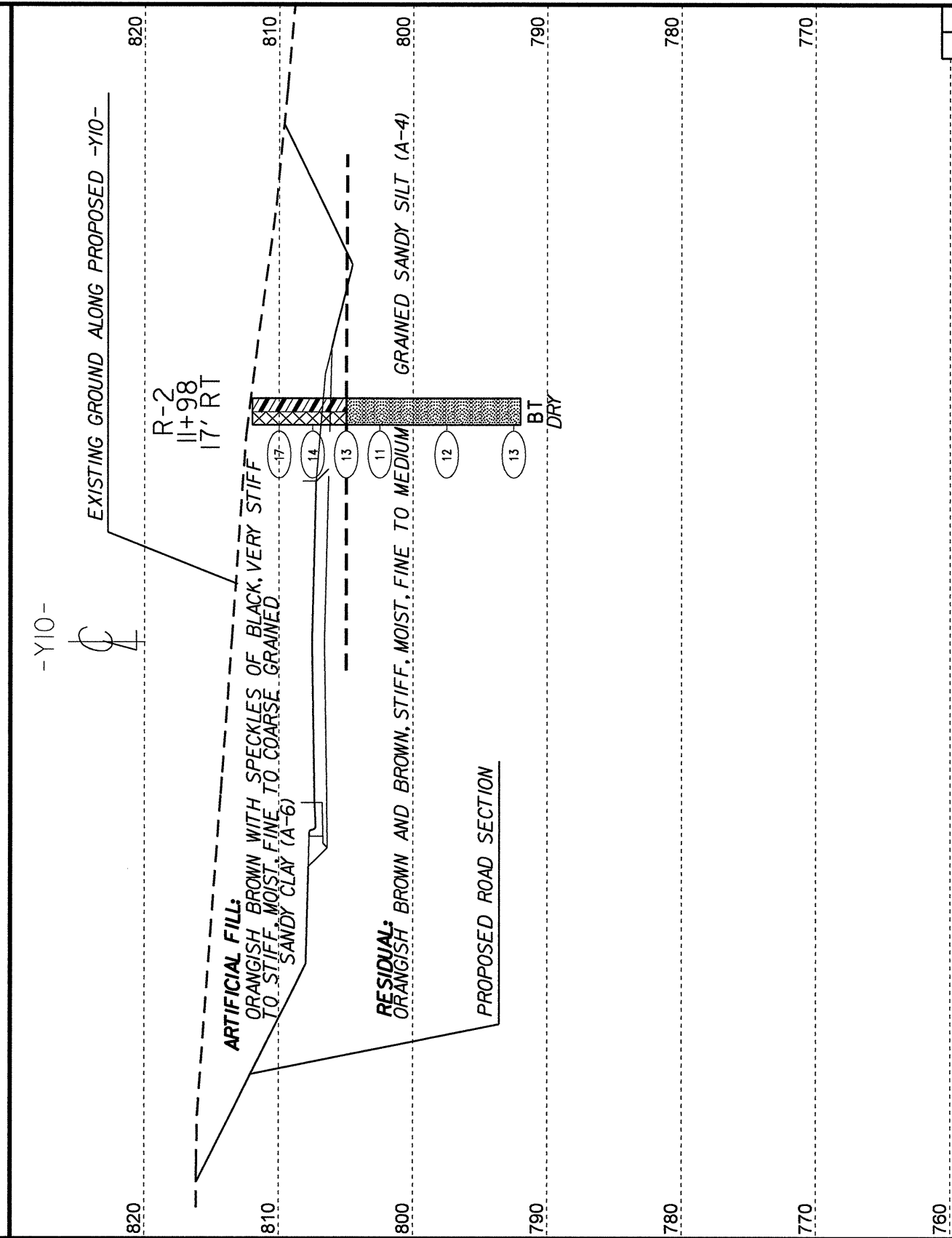
<b>PROJECT</b> REID TO NORTH KANNAPOLIS		<b>MILE POST</b>	
<b>TITLE</b>		52000.1.STR07TIB (P-5206C)	
<b>LOCATION</b>	<b>RAILROAD</b>	<b>DRAWING</b>	
DGN BY MB	NORTH CAROLINA RR & NORFOLK SOUTHERN RR		
DWN BY SLK	VAL SEC V-8/2		
CHK BY MB	DATE MAY 2013	SCALE 1" = 100' Horiz., 1" = 10' Vert.	
<b>PROFILE ALONG -Y10-</b>			

02-MAY-2013 11:40  
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 SK1115

0164DEL P1062



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTION THROUGH STA 10+00



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTION THROUGH STA 12+00

SHEET  
6 OF 36

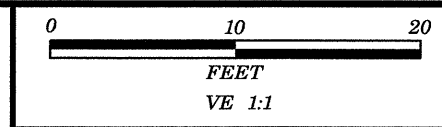
NO.	BY	DATE	REVISION

PREPARED BY: TGS ENGINEERS  
 375 WALNUT STREET, SUITE 141  
 CARY, NC 27513  
 PH (919) 319 8850  
 CORP. LICENSE NO. 1-C-0275

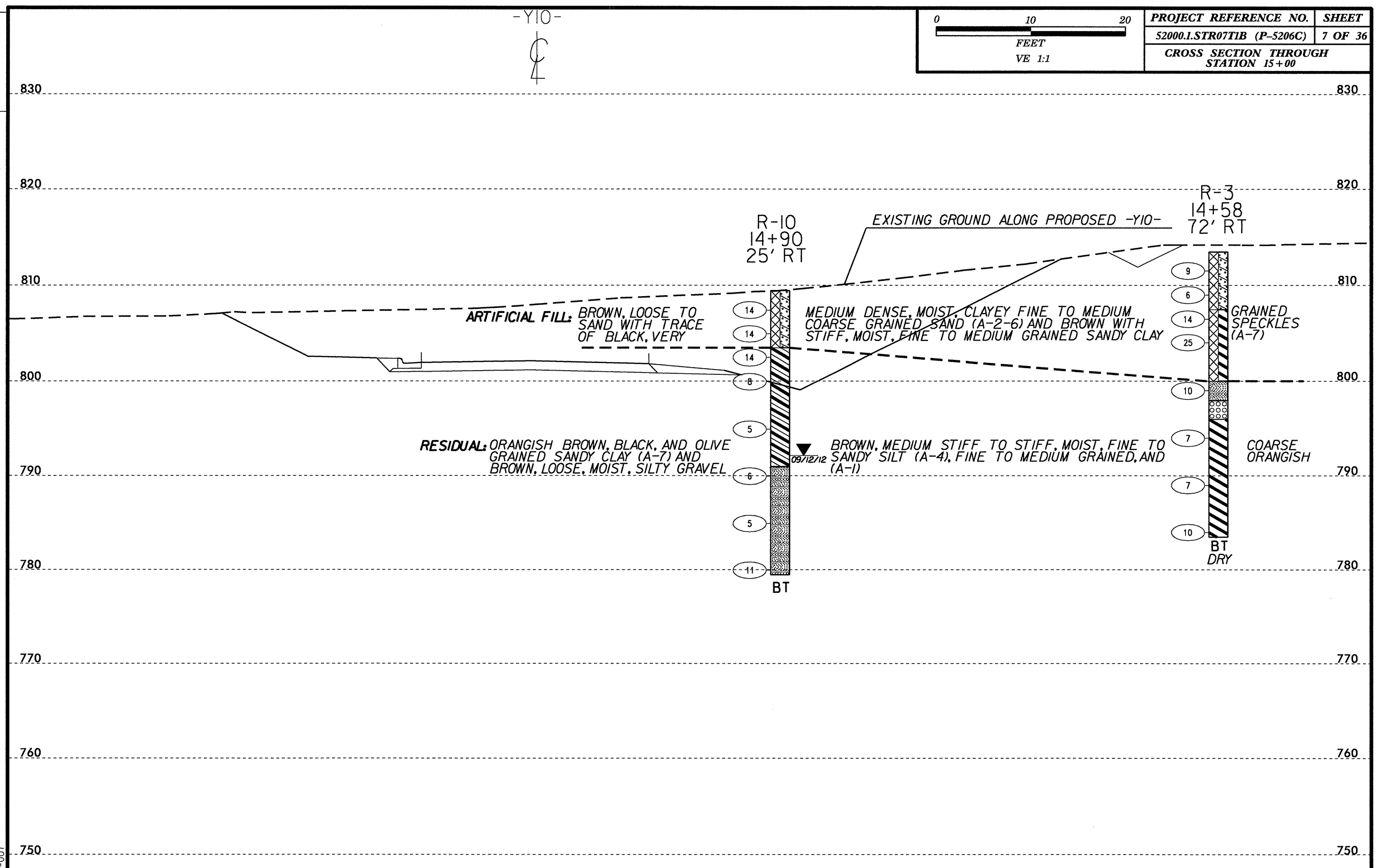
PROJECT		REID TO NORTH KANNAPOLIS	
TITLE		52000.1.STR07T1B (P-5206C)	
LOCATION		NORTH CAROLINA RR & NORFOLK SOUTHERN RR	
DGN BY	MB	RAILROAD	NORTH CAROLINA RR & NORFOLK SOUTHERN RR
DWN BY	SLK	VAL SEC	V-8/2
CHK BY	MB	DATE	MAY 2013
SCALE		1" = 10' Horiz., 1" = 10' Vert.	
DRAWING		CROSS-SECTION ALONG -Y10-	

0164DEL P1062

-Y10-  
C  
4



<b>PROJECT REFERENCE NO.</b>	<b>SHEET</b>
52000.1.STR07T1B (P-5206C)	7 OF 36
<b>CROSS SECTION THROUGH STATION 15+00</b>	



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 SK1115 AT 08-210-007

NO.	BY	DATE	REVISION

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

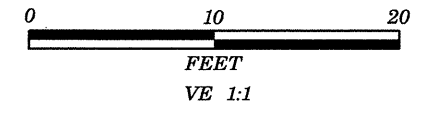
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
  
**RAIL DIVISION**

PREPARED BY: **TGS**  
**TGS ENGINEERS**  
 975 WALNUT STREET, SUITE 141  
 CARY, NC 27513  
 PH (919) 319 8850  
 CORP. LICENSE NO. C-0275

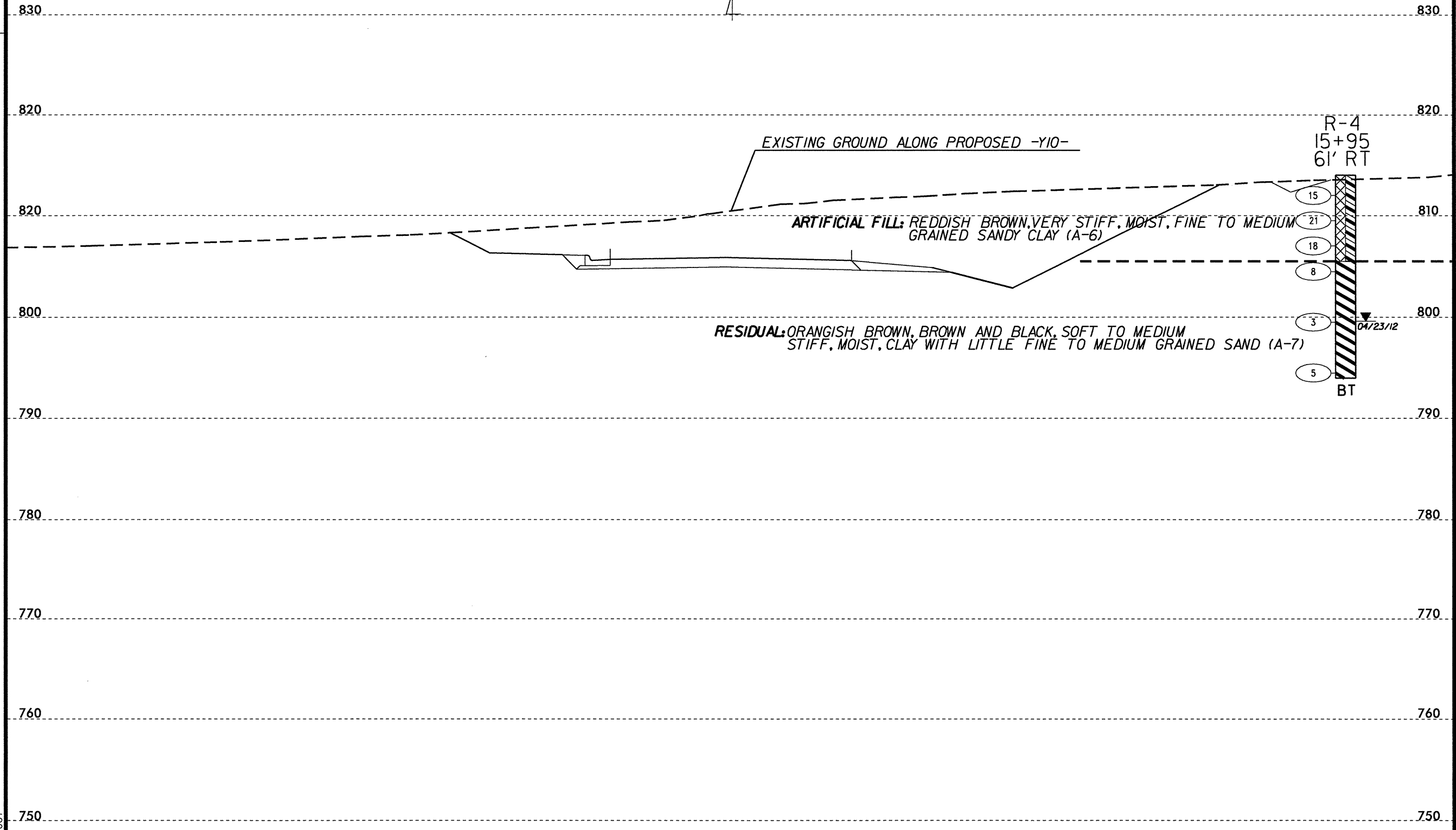
<b>PROJECT</b> REID TO NORTH KANNAPOLIS		<b>LOCATION</b>	
<b>TITLE</b> 52000.1.STR07T1B (P-5206C)		NORTH CAROLINA RR & NORFOLK SOUTHERN RR	
<b>DGN BY</b> MB	<b>RAILROAD</b>	<b>VAL SEC</b> V-8/2	<b>DRAWING</b>
<b>DWN BY</b> SLK		<b>DATE</b> MAY 2013	<b>CROSS-SECTION ALONG -Y10-</b>
<b>CHK BY</b> MB		<b>SCALE</b> 1" = 10' Horiz., 1" = 10' Vert.	

0164DEL P1062

-Y10-  
C



<b>PROJECT REFERENCE NO.</b>	<b>SHEET</b>
52000.1.STR07T1B (P-5206C)	8 OF 36
<b>CROSS SECTION THROUGH STATION 16+00</b>	



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 SKITTS AT 08-210-007

NO.	BY	DATE	REVISION

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
**RAIL DIVISION**

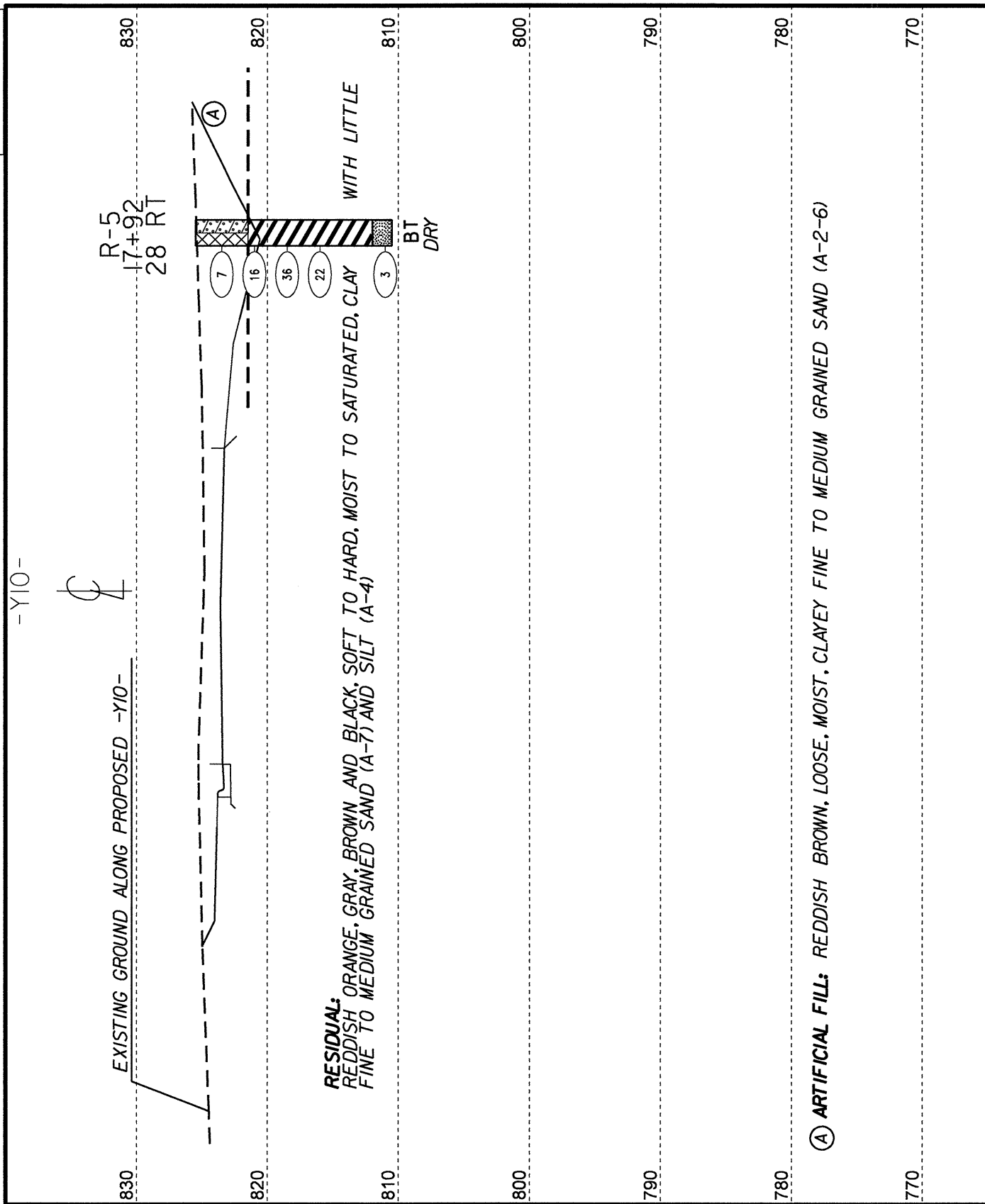
PREPARED BY: **TGS ENGINEERS**  
 575 WALNUT STREET, SUITE 141  
 CARY, NC 27511  
 PH (919) 319 8850  
 CORP. LICENSE NO. 1C-0275

<b>PROJECT</b> REID TO NORTH KANNAPOLIS		<b>MILE POST</b>	
<b>TITLE</b> 52000.1.STR07T1B (P-5206C)		<b>DRAWING</b>	
<b>LOCN BY</b> MB	<b>RAILROAD</b> NORTH CAROLINA RR & NORFOLK SOUTHERN RR	<b>CROSS SECTION ALONG -Y10-</b>	
<b>DWN BY</b> SLK	<b>VAL SEC</b> V-8/2		
<b>CHK BY</b> MB	<b>DATE</b> MAY 2013		
<b>SCALE</b> 1" = 10' Horiz., 1" = 10' Vert.			

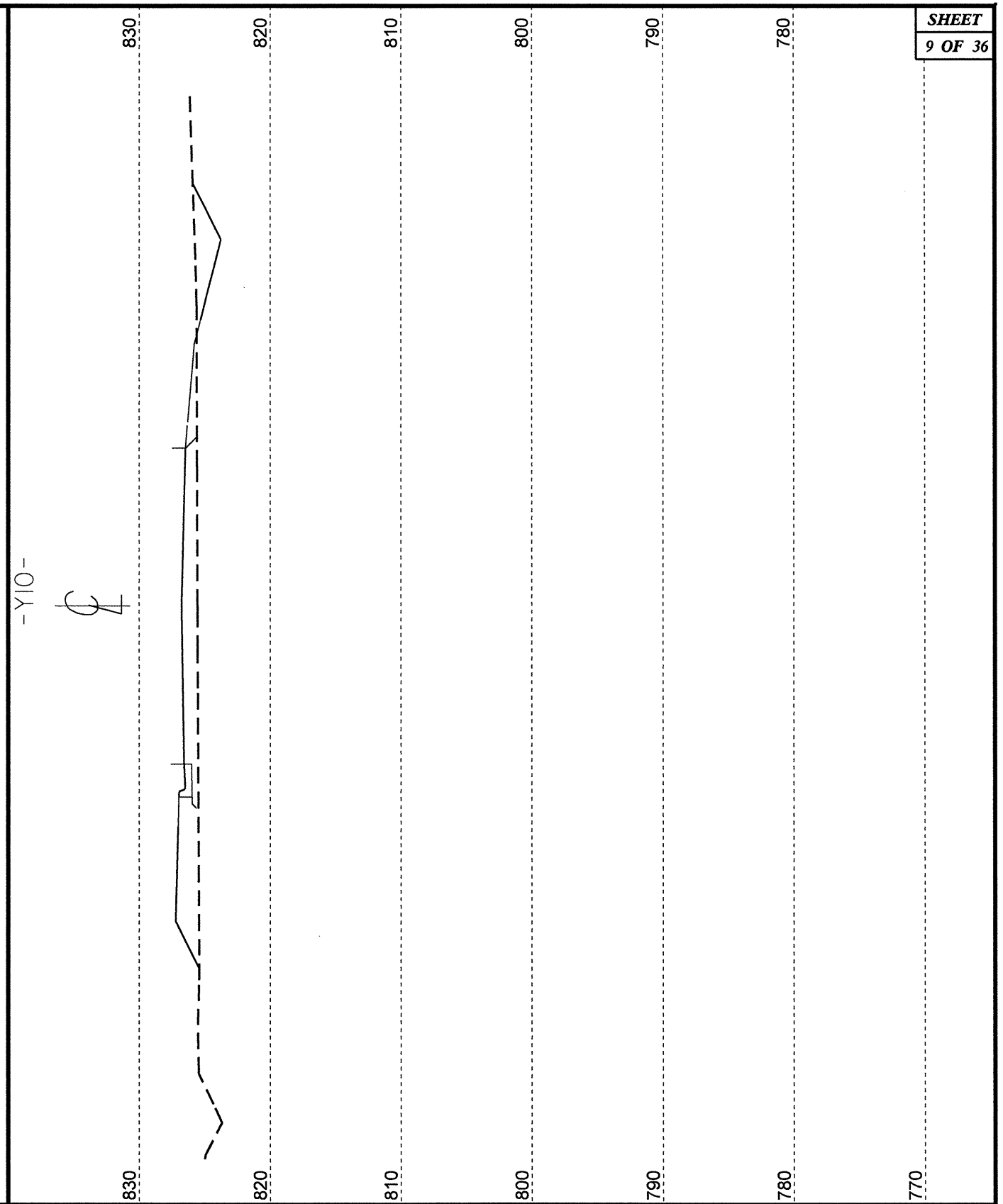
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 SKI+5

PKCN  
 0164DEL P1062

SHEET  
 9 OF 36



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTION THROUGH STA 18+00



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTION THROUGH STA 19+00

NO.	BY	DATE	REVISION

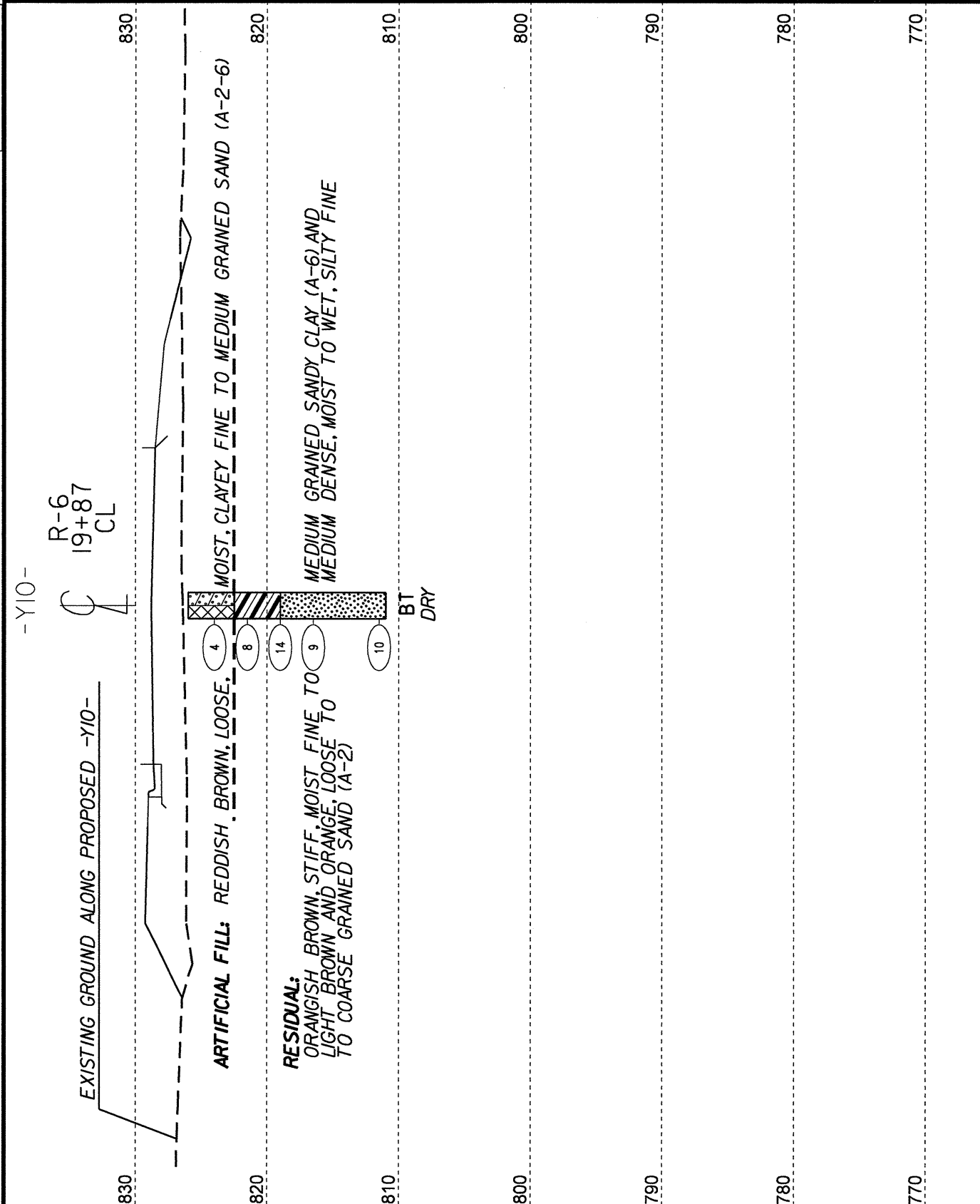
**INCOMPLETE PLANS**  
 DO NOT USE FOR R/W ACQUISITION  
**PRELIMINARY PLANS**  
 DO NOT USE FOR CONSTRUCTION

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
**RAIL DIVISION**  
 PREPARED BY: TGS ENGINEERS  
 975 WALNUT STREET, SUITE 141  
 CARY, NC 27513  
 PH (919) 319 8850  
 CORP. LICENSE NO. 1C-0275

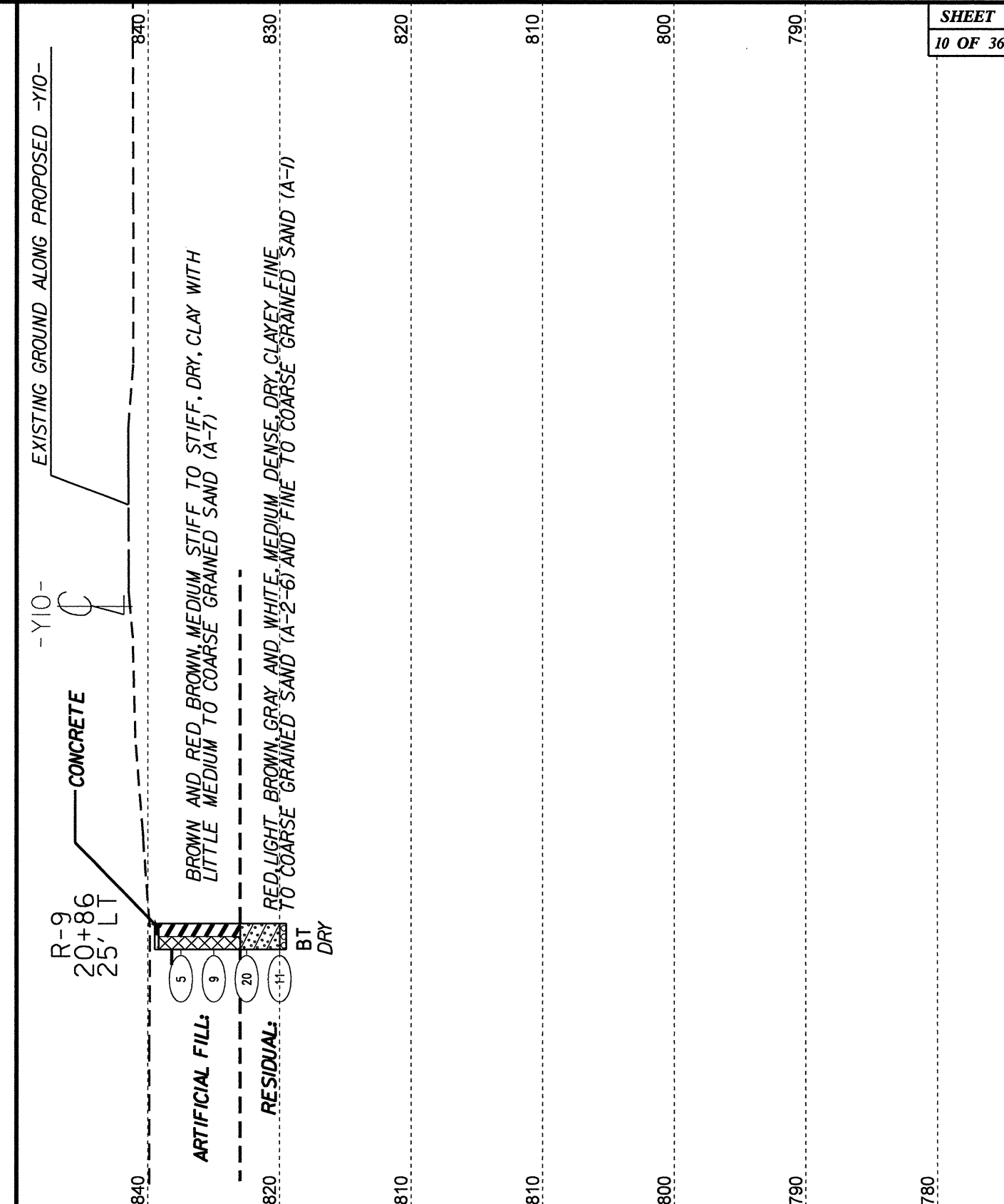
PROJECT TITLE		REID TO NORTH KANNAPOLIS	
LOCATION		52000.1.STR07TIB(P-5206C)	
DGN BY	MB	RAILROAD	NORTH CAROLINA RR & NORFOLK SOUTHERN RR
DWN BY	SLK	VAL SEC	V-B/2
CHK BY	MB	DATE	MAY 2013
SCALE		1" = 10' Horiz., 1" = 10' Vert.	
DRAWING CROSS-SECTION ALONG -Y10-			

02-MAY-2013 11:40  
 GA 2012-50E-JOB-2821003-TGS Engineers NCDOT RailProject\CADD\P5206.GEO\_KIM\_PROFILE\_INV.dgn  
 SK1115

0164DEL P1062



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1

NO.	BY	DATE	REVISION

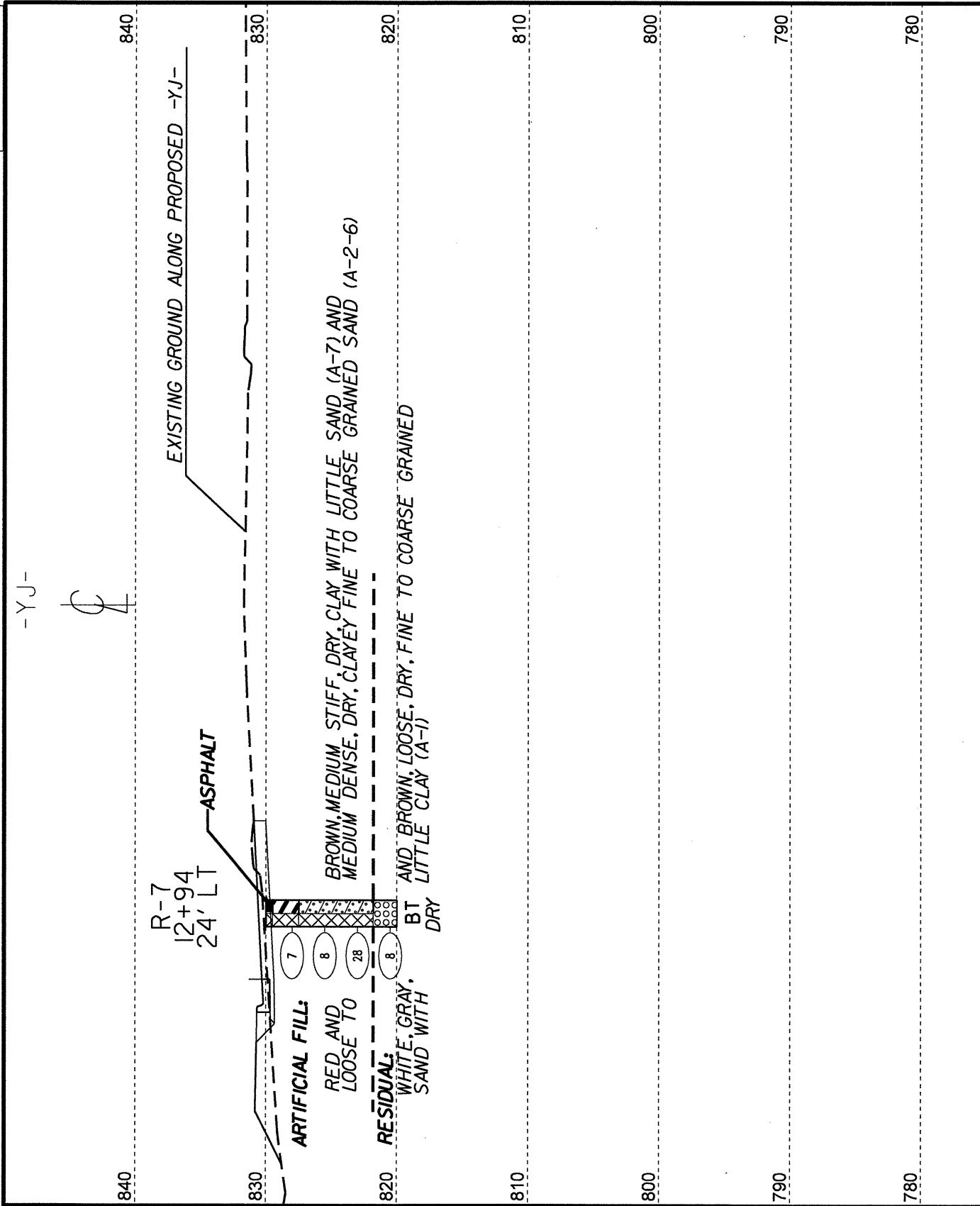
**INCOMPLETE PLANS**  
 DO NOT USE FOR R/W ACQUISITION  
**PRELIMINARY PLANS**  
 DO NOT USE FOR CONSTRUCTION

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
**RAIL DIVISION**

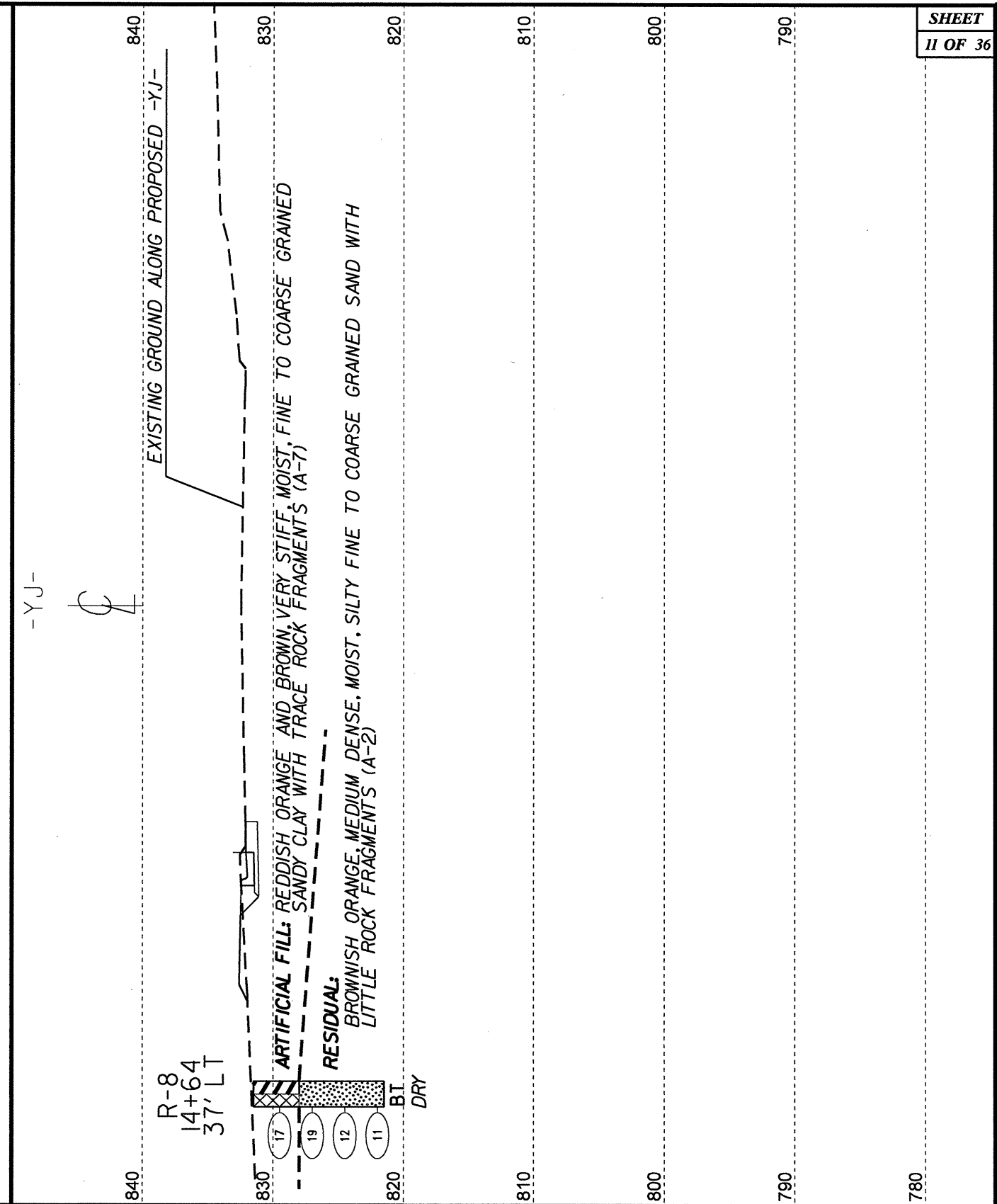
PREPARED BY: TGS ENGINEERS  
 975 WALNUT STREET, SUITE 141  
 CARY, NC 27511  
 PH (919) 319 8850  
 CORP. LICENSE NO. 1-C-0275

PROJECT REID TO NORTH KANNAPOLIS			
TITLE 52000.1.STR07T1B(P-5206C)			
LOCATION NORTH CAROLINA RR & NORFOLK SOUTHERN RR			MILE POST
DGN BY MB	RAILROAD	DRAWING	
DWN BY SLK	VAL SEC V-8/2	CROSS-SECTION ALONG -Y10-	
CHK BY MB	DATE MAY 2013	SCALE 1" = 10' Horiz., 1" = 10' Vert.	

02-MAY-2013 11:40  
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 SK1115 AT 08-210-007



HORIZ. SCALE 0 10 20 (FEET)  
 VE = 1:1



HORIZ. SCALE 0 10 20 (FEET)  
 VE = 1:1

NO.	BY	DATE	REVISION

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
**RAIL DIVISION**

PREPARED BY: TGS ENGINEERS  
 575 WALNUT STREET, SUITE 141  
 CARY, NC 27513  
 PH (919) 319 8850  
 CORP. LICENSE NO. C-0275

PROJECT TITLE		REID TO NORTH KANNAPOLIS	
LOCATION		52000.1.STR07T1B(P-5206C)	
DGN BY	MB	RAILROAD	NORTH CAROLINA RR & NORFOLK SOUTHERN RR
DWN BY	SLK	VAL SEC	V-8/2
CHK BY	MB	DATE	MAY 2013
SCALE		1" = 10' Horiz., 1" = 10' Vert.	
DRAWING		CROSS-SECTION ALONG -YJ-	

DCN 0164DEL P10b2

WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST P. Oree									
SITE DESCRIPTION Kimball Road Extension, Inventory Report							GROUND WTR (ft)								
BORING NO. R-1	STATION 10+00	OFFSET CL	ALIGNMENT -Y10-	0 HR. Dry											
COLLAR ELEV. 805.5 ft	TOTAL DEPTH 10.0 ft	NORTHING 660,695	EASTING 1,526,086	24 HR. FIAD											
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. Duggins		START DATE 04/24/12	COMP. DATE 04/24/12	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					
810															
805	804.5	1.0												805.5	0.0
	802.0	3.5	6	12	6									802.0	3.5
800	799.5	6.0	4	6	7										
	797.0	8.5	4	5	8									797.0	8.5
			5	8	9									795.5	10.0

WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST P. Oree									
SITE DESCRIPTION Kimball Road Extension, Inventory Report							GROUND WTR (ft)								
BORING NO. R-2	STATION 11+98	OFFSET 17 ft RT	ALIGNMENT -Y10-	0 HR. Dry											
COLLAR ELEV. 812.0 ft	TOTAL DEPTH 20.0 ft	NORTHING 660,871	EASTING 1,525,991	24 HR. FIAD											
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. Duggins		START DATE 04/24/12	COMP. DATE 04/24/12	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					
815															
	811.0	1.0	4	6	11									812.0	0.0
	808.5	3.5	4	6	8										
805	806.0	6.0	4	5	8									805.0	7.0
	803.5	8.5	3	4	7										
800															
	798.5	13.5	5	6	6										
795															
	793.5	18.5	3	6	7									792.0	20.0

NCDOT BORE DOUBLE KANNAPOLIS RAIL - KIMBALL ROAD.GPJ NC\_DOT.GDT 2/18/13



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

DCN 0164DEL P10b2	WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST P. Oree							
	SITE DESCRIPTION Kimball Road Extension, Inventory Report								GROUND WTR (ft)					
	BORING NO. R-3		STATION 14+58		OFFSET 72 ft RT		ALIGNMENT -Y10-		0 HR. Dry					
	COLLAR ELEV. 823.5 ft		TOTAL DEPTH 30.0 ft		NORTHING 661,109		EASTING 1,525,874		24 HR. FIAD					
	DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
	DRILLER W. Duggins		START DATE 04/24/12		COMP. DATE 04/24/12		SURFACE WATER DEPTH N/A							
	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT			SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
				0.5ft	0.5ft	0.5ft	0	25	50				75	100
	825											823.5	GROUND SURFACE	0.0
		822.5	1.0	5	5	4							ARTIFICIAL FILL	
820	820.0	3.5	4	3	3							BROWN, CLAYEY FINE TO MEDIUM GRAINED SAND, WITH TRACE ROOTS AND COARSE GRAINED SAND		
	817.5	6.0	3	5	9									
815	815.0	8.5	4	11	14							BROWN WITH SPECKLES OF BLACK, FINE TO MEDIUM GRAINED SANDY CLAY		
810	810.0	13.5	2	4	6							RESIDUAL		
												ORANGISH BROWN, FINE TO MEDIUM GRAINED SANDY SILT, MODERATELY MICACEOUS		
805	805.0	18.5	2	4	3							ORANGISH BROWN, SILTY GRAVEL		
												BROWN, FINE TO MEDIUM GRAINED SANDY CLAY		
800	800.0	23.5	2	3	4							AT 23.5FT: TAN TO BROWN AND LIGHT GRAY, FINE TO COARSE GRAINED SAND, HIGHLY MICACEOUS		
												AT 28.5FT: DARK BROWN		
795	795.0	28.5	2	4	6							Boring Terminated at Elevation 793.5 ft In Sandy Clay		
												Installed temporary piezometer upon completion.		
												Shelby Tube sample from 10ft to 12ft.		
												Bulk sample from 5ft to 10ft.		
												Bulk sample from 15ft to 20ft.		
												Other Samples:		
												ST-1 (10.0 - 12.0)		

WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST P. Oree							
SITE DESCRIPTION Kimball Road Extension, Inventory Report								GROUND WTR (ft)					
BORING NO. R-4		STATION 15+95		OFFSET 61 ft RT		ALIGNMENT -Y10-		0 HR. 14.4					
COLLAR ELEV. 824.0 ft		TOTAL DEPTH 20.0 ft		NORTHING 661,211		EASTING 1,525,781		24 HR. 14.4					
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER W. Duggins		START DATE 04/23/12		COMP. DATE 04/23/12		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT			SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50				75	100
825											824.0	GROUND SURFACE	0.0
	823.0	1.0	4	7	8							ARTIFICIAL FILL	
820	820.5	3.5	5	9	12							REDDISH BROWN, FINE TO MEDIUM GRAINED SANDY CLAY	
	818.0	6.0	4	10	8							AT 3.5FT: FINE TO COARSE SAND WITH TRACE QUARTZ GRAVEL	
815	815.5	8.5	2	3	5							RESIDUAL	
												ORANGISH BROWN TO LIGHT BROWN, CLAY, WITH LITTLE FINE TO MEDIUM GRAINED SAND	
810	810.5	13.5	2	1	2							AT 13.5FT: SPECKLES OF DARK BROWN	
												AT 18.5FT: BROWN WITH BLACK, HIGHLY MICACEOUS	
805	805.5	18.5	1	2	3							Boring Terminated at Elevation 804.0 ft In Clay	
												Bulk sample from 10ft to 15ft.	

NCDOT BORE DOUBLE KANNAPOLIS RAIL - KIMBALL ROAD.GPJ NC\_DOT.GDT 2/18/13

DCN 0164DEL P10b2

WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST P. Oree									
SITE DESCRIPTION Kimball Road Extension, Inventory Report								GROUND WTR (ft)							
BORING NO. R-5		STATION 17+92		OFFSET 29 ft RT		ALIGNMENT -Y10-		0 HR. Dry							
COLLAR ELEV. 825.5 ft		TOTAL DEPTH 15.0 ft		NORTHING 661,346		EASTING 1,525,635		24 HR. FIAD							
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. Duggins		START DATE 04/23/12		COMP. DATE 04/23/12		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
830															
825	824.5	1.0	5	4	3								M	825.5 GROUND SURFACE 0.0	
	822.0	3.5	1	5	11								M	821.5 ARTIFICIAL FILL REDDISH BROWN, CLAYEY FINE TO MEDIUM GRAINED SAND, WITH TRACE ROOTS 4.0	
820	819.5	6.0	8	14	22								M	AT 3.5FT TO 4FT: BLACK, POSSIBLY ASPHALT	
	817.0	8.5	3	9	13								M	RESIDUAL REDDISH ORANGE, CLAY, WITH LITTLE FINE TO MEDIUM GRAINED SAND WITH TRACE SILT	
815	812.0	13.5	2	1	2								M	812.0 AT 6.0FT: REDDISH ORANGE TO GRAY, TRACE COARSE SAND 13.5	
													Sat.	810.5 BROWN WITH BLACK, SILT, MODERATELY MICACEOUS 15.0	
														Boring Terminated at Elevation 810.5 ft In Silt	

WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST P. Oree								
SITE DESCRIPTION Kimball Road Extension, Inventory Report								GROUND WTR (ft)						
BORING NO. R-6		STATION 19+87		OFFSET CL		ALIGNMENT -Y10-		0 HR. Dry						
COLLAR ELEV. 826.0 ft		TOTAL DEPTH 15.0 ft		NORTHING 661,468		EASTING 1,525,477		24 HR. FIAD						
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER W. Duggins		START DATE 04/24/12		COMP. DATE 04/24/12		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)
830														
825	825.0	1.0	2	1	3								M	826.0 GROUND SURFACE 0.0
	822.5	3.5	1	3	5								M	822.5 ARTIFICIAL FILL REDDISH BROWN, CLAYEY FINE TO MEDIUM GRAINED SAND 3.5
820	820.0	6.0	7	9	5								M	RESIDUAL ORANGISH BROWN, FINE TO MEDIUM GRAINED SANDY CLAY 7.0
	817.5	8.5	4	4	5								M	819.0 LIGHT BROWN AND ORANGE, SILTY FINE TO COARSE GRAINED SAND 7.0
815	812.5	13.5	5	5	5								M	AT 13.5FT: INCREASE IN SILT CONTENT
													W	811.0 Boring Terminated at Elevation 811.0 ft In Silty Sand 15.0

DCN 0164DEL P10b2		WBS 52000.1.STR07T1B			TIP P-5206C			COUNTY ROWAN			GEOLOGIST J. Whitt									
SITE DESCRIPTION Kimball Road Extension, Inventory Report												GROUND WTR (ft)								
BORING NO. R-7				STATION 12+94			OFFSET 24 ft LT			ALIGNMENT -YJ-		0 HR. Dry								
COLLAR ELEV. 830.0 ft				TOTAL DEPTH 10.0 ft			NORTHING 661,488			EASTING 1,525,294		24 HR. FIAD								
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER W. Duggins			START DATE 05/04/12			COMP. DATE 05/04/12			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							
			0.5ft	0.5ft	0.5ft	0	25	50	75	100										
830													830.0 GROUND SURFACE 0.0							
	829.0	1.0	3	3	4								829.5 ARTIFICIAL FILL ASPHALT AND ABC STONE 0.5							
	826.5	3.5	2	2	6								827.5 RED AND BROWN, CLAY WITH LITTLE SAND 2.5							
825	824.0	6.0	11	17	11								RED AND BROWN, CLAYEY FINE TO COARSE GRAINED SAND							
	821.5	8.5	9	5	3								821.8 RESIDUAL WHITE, GRAY AND BROWN, FINE TO COARSE GRAINED SAND, WITH LITTLE CLAY 8.2							
820													820.0 Boring Terminated at Elevation 820.0 ft In Sand 10.0							
Boring Terminated at Elevation 820.0 ft In Sand																				
WBS 52000.1.STR07T1B												TIP P-5206C			COUNTY ROWAN			GEOLOGIST P. Oree		
SITE DESCRIPTION Kimball Road Extension, Inventory Report												GROUND WTR (ft)								
BORING NO. R-8				STATION 14+64			OFFSET 37 ft LT			ALIGNMENT -YJ-		0 HR. Dry								
COLLAR ELEV. 831.5 ft				TOTAL DEPTH 10.0 ft			NORTHING 661,393			EASTING 1,525,151		24 HR. FIAD								
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER J. Turnage			START DATE 06/04/12			COMP. DATE 06/04/12			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							
			0.5ft	0.5ft	0.5ft	0	25	50	75	100										
835													831.5 GROUND SURFACE 0.0							
	830.5	1.0	3	7	10								ARTIFICIAL FILL REDDISH ORANGE AND BROWN, FINE TO COARSE GRAINED SANDY CLAY, WITH TRACE ROCK FRAGMENTS, MODERATELY MICACEOUS							
830	828.0	3.5	5	8	11								828.0 SS-1 S-BULK M 3.5							
	825.5	6.0	4	5	7								RESIDUAL BROWNISH ORANGE, SILTY FINE TO COARSE GRAINED SAND, WITH LITTLE ROCK FRAGMENTS, HIGHLY MICACEOUS							
825	823.0	8.5	4	5	6								821.5 Boring Terminated at Elevation 821.5 ft In Silty Sand 10.0							
Boring Terminated at Elevation 821.5 ft In Silty Sand																				
Bulk sample from 0ft to 5ft.																				

NCDOT BORE DOUBLE KANNAPOLIS RAIL - KIMBALL ROAD.GPJ NC\_DOT\_GDT 2/18/13

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

DCN 0164DEL P10b2

WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST J. Whitt								
SITE DESCRIPTION Kimball Road Extension, Inventory Report							GROUND WTR (ft)							
BORING NO. R-9		STATION 20+86		OFFSET 25 ft LT		ALIGNMENT -Y10-								
COLLAR ELEV. 829.5 ft		TOTAL DEPTH 10.0 ft		NORTHING 661,526		EASTING 1,525,391								
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. Duggins		START DATE 05/04/12		COMP. DATE 05/04/12		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
830														GROUND SURFACE 829.5
	828.5	1.0	10	2	3									ARTIFICIAL FILL CONCRETE
	826.0	3.5	2	3	6									BROWN AND RED BROWN, CLAY WITH LITTLE MEDIUM TO COARSE GRAINED SAND
825	823.5	6.0	7	9	11									RESIDUAL RED AND LIGHT BROWN, CLAYEY FINE TO COARSE GRAINED SAND
820	821.0	8.5	4	5	6									GRAY AND WHITE, FINE TO COARSE GRAINED SAND
														Boring Terminated at Elevation 819.5 ft In Sand

WBS 52000.1.STR07T1B		TIP P-5206C		COUNTY ROWAN		GEOLOGIST P. Oree								
SITE DESCRIPTION Kimball Road Extension, Inventory Report							GROUND WTR (ft)							
BORING NO. R-10		STATION 14+90		OFFSET 26 ft RT		ALIGNMENT -Y10-								
COLLAR ELEV. 819.8 ft		TOTAL DEPTH 30.0 ft		NORTHING 661,106		EASTING 1,525,818								
DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. Duggins		START DATE 09/12/12		COMP. DATE 09/12/12		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
820														GROUND SURFACE 819.8
	818.8	1.0	4	6	8									ARTIFICIAL FILL BROWN WITH SPECKLES OF BLACK, CLAYEY FINE TO MEDIUM GRAINED SAND WITH TRACE ROOTS
	816.3	3.5	5	7	7									AT 3.5FT: SLIGHTLY MICACEOUS
815	813.8	6.0	4	6	8									RESIDUAL ORANGISH BROWN, FINE TO MEDIUM GRAINED SANDY CLAY, MODERATELY MICACEOUS
	811.3	8.5	3	3	5									AT 8.5FT: INCREASE IN MOISTURE AT 13.5FT: ORANGISH BROWN AND BLACK
810	806.3	13.5	2	2	3									
805	801.3	18.5	2	2	4									OLIVE BROWN, FINE TO MEDIUM GRAINED SANDY SILT, HIGHLY MICACEOUS
	796.3	23.5	1	2	3									AT 28.5FT: OLIVE WITH BROWN AND TAN
795	791.3	28.5	2	4	7									
790														Boring Terminated at Elevation 789.8 ft In Sandy Silt
														Installed temporary piezometer upon completion.

**TEST SUMMARY**  
**NCRR/NS MAINLINE REID TO NORTH KANNAPOLIS RAILROAD ROADBED (MP 337.0 TO MP 348.3)**  
**KIMBALL ROAD EXTENSION**

<b>SOIL TEST RESULTS</b>														
BORING NO.	SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL (ft)	AASHTO CLASS.	% PASSING (SIEVES)			LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	STANDARD PROCTOR (pcf)	OPTIMUM MOISTURE CONTENT (%)
						10	40	200						
R-1	BULK 1	10+00	CL	0.0-5.0	A-7-6	88	70	49	51	25	4.2	--	111.3	15.9
R-1	SS-1	10+00	CL	1.0-2.5	--	--	--	--	--	--	68	NT	--	--
R-3	SS-3	14+58	72 ft RT	6.0-7.5	--	--	--	--	--	--	17.7	NT	--	--
R-3	BULK 2	14+58	72 ft RT	15.0-20.0	A-7-6	95	79	59	61	36	9.9	--	103.9	19.5
R-3	SS-6	14+58	72 ft RT	18.5-20.0	--	--	--	--	--	--	30.1	NT	--	--
R-4	BULK 1	15+95	61 ft RT	10.0-15.0	A-7-5	99	92	79	73	39	15.8	--	91.2	28.7
R-4	SS-5	15+95	61 ft RT	13.5-15.0	--	--	--	--	--	--	57.2	NT	--	--
R-5	SS-3	17+92	29 ft RT	6.0-7.5	A-7-5	97	84	66	75	44	22.1	--	--	--
R-8	BULK 1	14+64	37 ft LT	0.0-5.0	A-7-5	92	74	62	67	31	--	--	98.5	21.2
R-8	SS-1	14+64	37 ft LT	1.0-2.5	--	--	--	--	--	--	28.2	NT	--	--
R-8	SS-2	14+64	37 ft LT	3.5-5.0	--	--	--	--	--	--	22.2	NT	--	--

NOTE: NT = NOT TESTED

<b>DIRECT SHEAR TEST RESULTS</b>															
BORING NO.	SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL (ft)	AASHTO CLASS.	% PASSING (SIEVES)			LIQUID LIMIT	PLASTICITY INDEX	INITIAL AREA (in <sup>2</sup> )	INITIAL LENGTH (in)	SPECIFIC GRAVITY	AT MAXIMUM SHEAR STRESS	
						10	40	200						FRICTION (deg)	COHESION (psf)
R-3	UNDISTURBED SAMPLE	14+58	72 ft RT	10.0-12.0	A-6	--	--	57	36	13	4.2	--	111.3	23.0	1,208

DCN  
0164DEL P10b2

**REPORT ON SOIL TEST RESULTS**

<b>PROJECT:</b>	P-5206C Reid to North Kannapolis			<b>COUNTY:</b>	Rowan
<b>DATE SAMPLED:</b>	April 2012	<b>DATE RECEIVED:</b>	May 31, 2012	<b>DATE REPORTED:</b>	June 18, 2012
<b>SAMPLED FROM:</b>	N/A		<b>SAMPLED BY:</b>	N/A	
<b>SUBMITTED BY:</b>	Schnabel Engineering			<b>STANDARD SPECIFICATION</b>	
<b>LABORATORY:</b>	Terracon Consultants, Inc. - Raleigh				

**TEST RESULTS**

Boring No.	R-1	R-3	R-4	R-5				
Sample No.	Bulk 1	Bulk 2	Bulk 1	SS-3				
Retained #4 Sieve %	1	1	0	0				
Passing #10 Sieve %	88	95	99	97				
Passing #40 Sieve %	70	79	92	84				
Passing #200 Sieve %	49	59	79	66				

**MINUS #10 FRACTION**

Soil Mortar - 100%	-	-	-	-				
Coarse Sand -Ret. #60	27.5	23.8	10.6	19.5				
Fine Sand - Ret. #270	21.0	17.7	14.2	15.3				
Silt 0.05-0.005 mm %	12.4	12.5	20.7	9.7				
Clay < 0.005 mm %	39.1	46.0	54.5	55.5				
Passing # 40 Sieve %	-	-	-	-				
Passing # 200 Sieve %	-	-	-	-				

Liquid Limit	51	61	73	75				
Plastic Index	25	36	39	44				
AASHTO Classification	A-7-6 (9)	A-7-6 (19)	A-7-5 (35)	A-7-5 (29)				
Select Granular Class								
Type								
Natural Moisture %	4.2	9.9	15.8	22.1				
Depth (ft) From:	0	15	10	6				
To:	5	20	15	7.5				

Remarks:

*Stephanie E. Hardison*  
Certification No. 114-01-1203

DCN  
0164DEL P10b2

PROJECT NUMBER: 70125038

PROJECT NAME: P-5206C Reid to North Kannapolis

DATE RECEIVED: May 31, 2012

**MOISTURE CONTENT AND ORGANIC CONTENT**

BORING NUMBER	R-1	R-3	R-3	R-4
SAMPLE NUMBER	SS-1	SS-3	SS-6	SS-5
DEPTH	1.0'-2.5'	6.0'-7.5'	18.5'-20.0'	13.5'-15.0'
MOISTURE CONTENT (%)	<b>6.8</b>	<b>17.7</b>	<b>30.1</b>	<b>57.2</b>
ORGANIC CONTENT (%)	<b>NT</b>	<b>NT</b>	<b>NT</b>	<b>NT</b>

ADDITIONAL COMMENTS: NT = Not Tested

*Stephanie E. Hardison*  
Certification No. 114-01-1203

DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

Report Number: 70125038.0001  
Service Date: 06/01/12  
Report Date: 06/11/12

SHEET NO. 20 OF 36

**Terracon**  
5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

**Client**

Schnabel Engineering South, P.C.  
Attn: Tillman Marshall  
11-A Oak Branch Drive  
Greensboro, NC 27407

**Project**

P-5206C Reid to North Kannapolis  
Kimball Road and Main Street  
Kannapolis, NC

Project No. 70125038

**SAMPLE INFORMATION**

Sample Number:	Bulk Sample 1	Proctor Method:	AASHTO T99 - Method B
Boring Number:	R-1	Maximum Dry Density (pcf):	111.3
Sample Location:	N/A	Optimum Moisture:	15.9
Depth:	0-5'	Liquid Limit:	51
Material Description:	A-7-6 (9)	Plasticity Index:	25

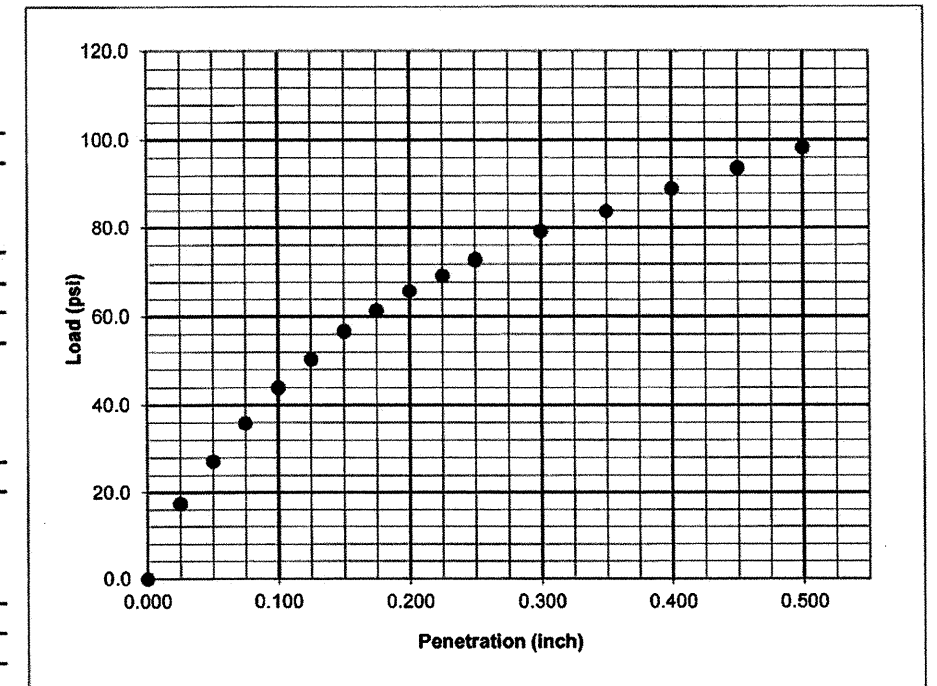
**CBR TEST DATA**

CBR Value at 0.100 inch 4.4  
CBR Value at 0.200 inch 4.4

Surcharge Weight (lbs) 10  
Soaking Condition Soaked  
Length of Soaking (hours) 96  
Swell (%) 0.9

**DENSITY DATA**  
Dry Density Before Soaking (pcf) 100.1  
Compaction of Proctor (%) 89.9

**MOISTURE DATA**  
Before Compaction (%) 14.5  
After Compaction (%) 14.9  
Top 1" After Soaking (%) 21.3  
Average After Soaking (%) 20.8



**Comments:**

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Hardison  
Reported To: Raymond "Levi" Denton  
Contractor:

**Report Distribution**

Laboratory Testing by: Stephanie E. Hardison  
Stephanie Hardison  
Certification No. 114-01-1203

Reviewed by: Raymond "Levi" Denton  
Raymond "Levi" Denton  
Geotechnical Department Manager

**Test Methods:** ASTM D1883

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.



DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

SHEET NO. 21 OF 36  
**Terracon**  
5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

Report Number: 70125038.0001  
Service Date: 06/01/12  
Report Date: 06/11/12

<b>Client</b> Schnabel Engineering South, P.C. Attn: Tillman Marshall 11-A Oak Branch Drive Greensboro, NC 27407	<b>Project</b> P-5206C Reid to North Kannapolis Kimball Road and Main Street Kannapolis, NC  Project No. 70125038
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**SAMPLE INFORMATION**

Sample Number: Bulk Sample 1	Proctor Method: AASHTO T99 - Method B
Boring Number: R-1	Maximum Dry Density (pcf): 111.3
Sample Location: N/A	Optimum Moisture: 15.9
Depth: 0-5'	Liquid Limit: 51
Material Description: A-7-6 (9)	Plasticity Index: 25

**CBR TEST DATA**

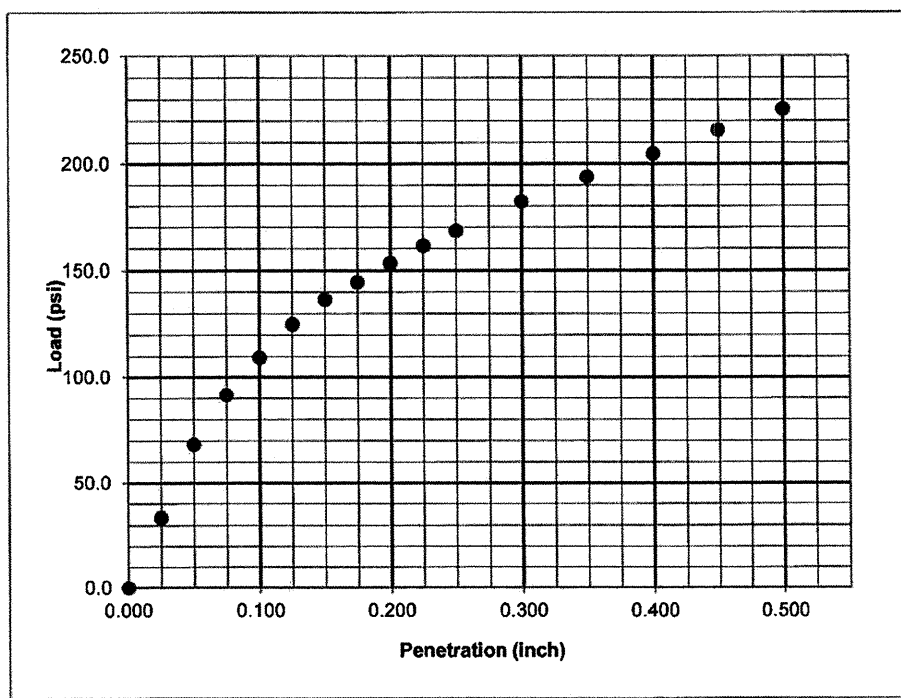
CBR Value at 0.100 inch	10.9
CBR Value at 0.200 inch	10.2
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	0.5

**DENSITY DATA**

Dry Density Before Soaking (pcf)	106.9
Compaction of Proctor (%)	96.0

**MOISTURE DATA**

Before Compaction (%)	16.1
After Compaction (%)	16.4
Top 1" After Soaking (%)	18.1
Average After Soaking (%)	19.0



**Comments:**  
**Services:** Obtain soil sample and test for California Bearing Ratio

**Terracon Rep:** Stephanie Hardison  
**Reported To:** Raymond "Levi" Denton  
**Contractor:**  
**Report Distribution**

**Laboratory Testing by:** *Stephanie E. Hardison*  
Stephanie Hardison  
Certification No. 114-01-1203

**Reviewed by:** *Raymond "Levi" Denton*  
Raymond "Levi" Denton  
Geotechnical Department Manager

**Test Methods:** ASTM D1883  
The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

Report Number: 70125038.0001  
Service Date: 06/01/12  
Report Date: 06/11/12

SHEET NO. 22 OF 36  
**Terracon**  
5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

Client	Project
Schnabel Engineering South, P.C. Attn: Tillman Marshall 11-A Oak Branch Drive Greensboro, NC 27407	P-5206C Reid to North Kannapolis Kimball Road and Main Street Kannapolis, NC
Project No. 70125038	

**SAMPLE INFORMATION**

Sample Number:	Bulk Sample 1	Proctor Method:	AASHTO T99 - Method B
Boring Number:	R-1	Maximum Dry Density (pcf):	111.3
Sample Location:	N/A	Optimum Moisture:	15.9
Depth:	0-5'	Liquid Limit:	51
Material Description:	A-7-6 (9)	Plasticity Index:	25

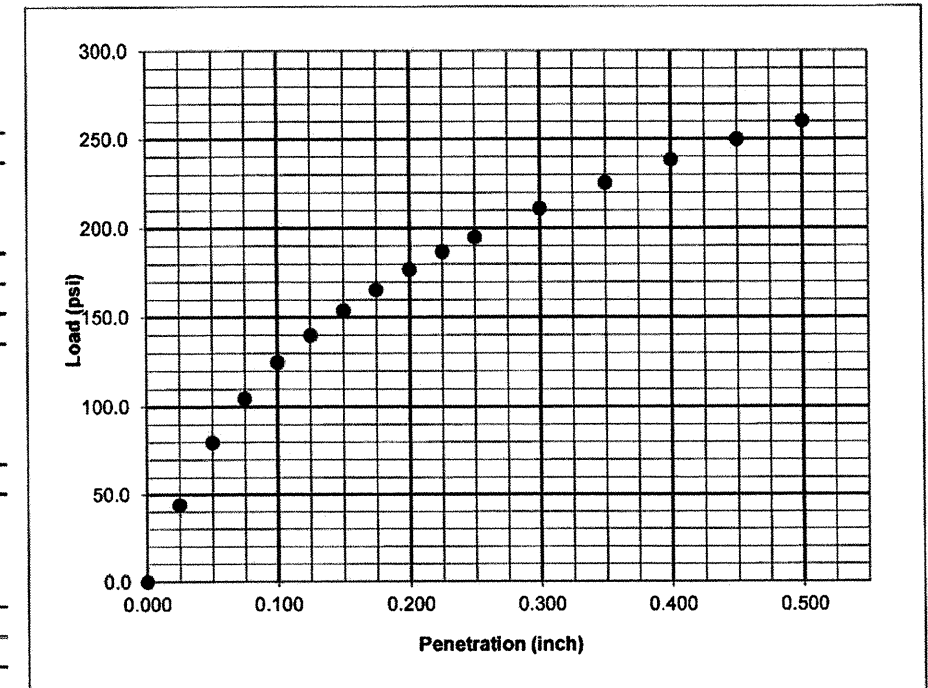
**CBR TEST DATA**

CBR Value at 0.100 inch 12.5  
CBR Value at 0.200 inch 11.8

Surcharge Weight (lbs) 10  
Soaking Condition Soaked  
Length of Soaking (hours) 96  
Swell (%) 0.5

**DENSITY DATA**  
Dry Density Before Soaking (pcf) 108.7  
Compaction of Proctor (%) 97.6

**MOISTURE DATA**  
Before Compaction (%) 15.6  
After Compaction (%) 15.7  
Top 1" After Soaking (%) 18.2  
Average After Soaking (%) 17.9



**Comments:**

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Hardison  
Reported To: Raymond "Levi" Denton  
Contractor:

**Report Distribution**

Laboratory Testing by: *Stephanie E. Hardison*  
Stephanie Hardison  
Certification No. 114-01-1203

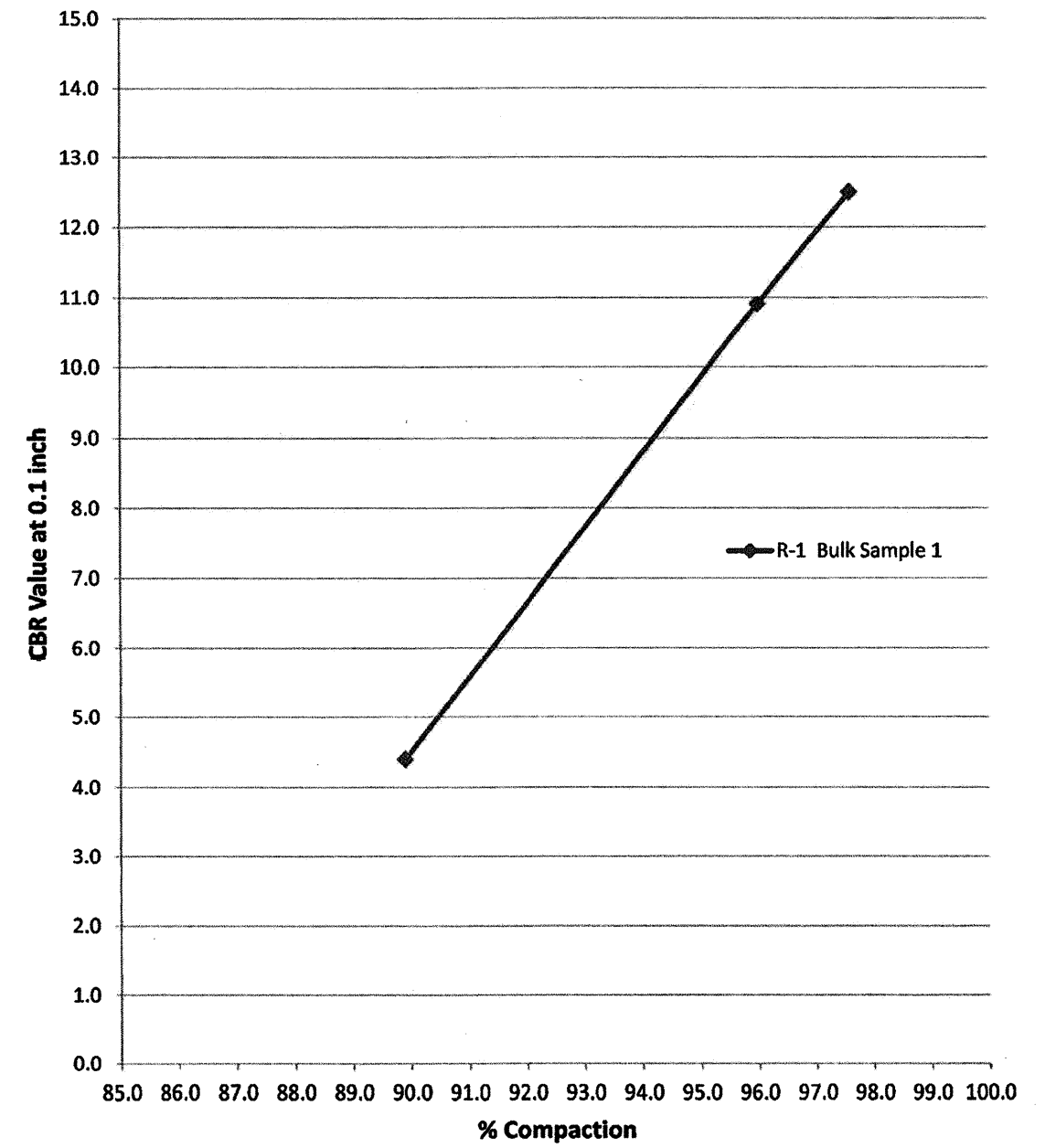
Reviewed by: *Raymond "Levi" Denton*  
Raymond "Levi" Denton  
Geotechnical Department Manager

**Test Methods:** ASTM D1883

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

DCN  
0164DEL P10b2

**R-1 Bulk Sample 1 Depth 0-5'**  
**CALIFORNIA BEARING RATIO**



*Stephanie E. Hardison*  
Certification No. 114-01-1203

DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

Report Number: 70125038.0002  
 Service Date: 06/11/12  
 Report Date: 06/18/12

SHEET NO. 24 OF 36  
**Terracon**  
 5240 Green's Dairy Road  
 Raleigh, NC 27616  
 919-873-2211

<b>Client</b> Schnabel Engineering South, P.C. Attn: Tillman Marshall 11-A Oak Branch Drive Greensboro, NC 27407	<b>Project</b> P-5206C Reid to North Kannapolis Kimball Road and Main Street Kannapolis, NC  Project No. 70125038
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**SAMPLE INFORMATION**

Sample Number: <u>Bulk Sample 2</u>	Proctor Method: <u>AASHTO T99 - Method B</u>
Boring Number: <u>R-3</u>	Maximum Dry Density (pcf): <u>103.9</u>
Sample Location: <u>N/A</u>	Optimum Moisture: <u>19.5</u>
Depth: <u>15-20'</u>	Liquid Limit: <u>61</u>
Material Description: <u>A-7-6 (19)</u>	Plasticity Index: <u>36</u>

**CBR TEST DATA**

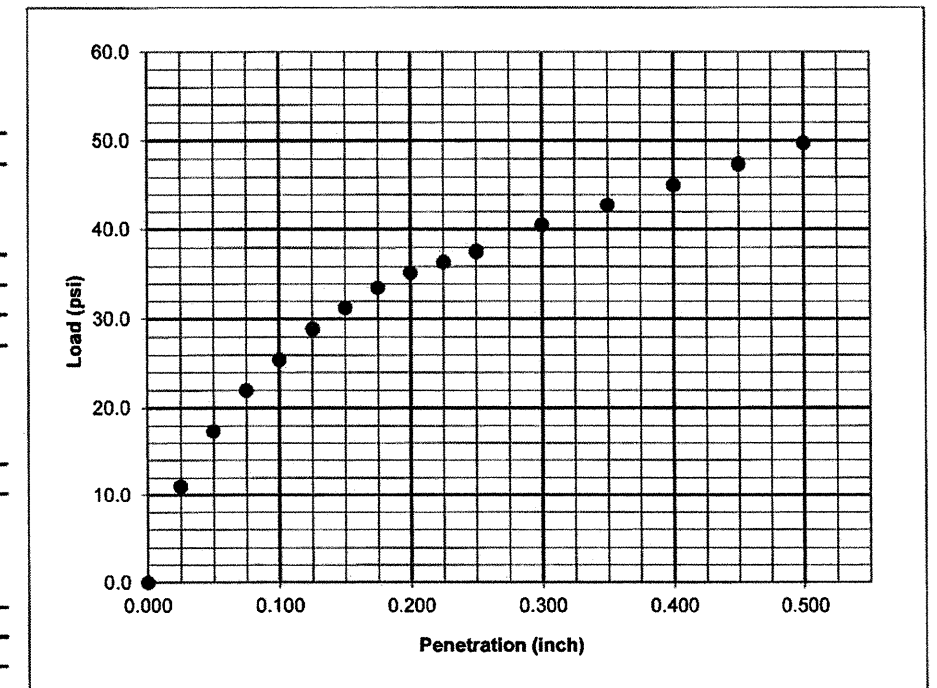
CBR Value at 0.100 inch	<u>2.5</u>
CBR Value at 0.200 inch	<u>2.4</u>
Surcharge Weight (lbs)	<u>10</u>
Soaking Condition	<u>Soaked</u>
Length of Soaking (hours)	<u>96</u>
Swell (%)	<u>2.5</u>

**DENSITY DATA**

Dry Density Before Soaking (pcf)	<u>94.3</u>
Compaction of Proctor (%)	<u>90.7</u>

**MOISTURE DATA**

Before Compaction (%)	<u>18.2</u>
After Compaction (%)	<u>18.1</u>
Top 1" After Soaking (%)	<u>28.1</u>
Average After Soaking (%)	<u>26.1</u>



**Comments:**  
**Services:** Obtain soil sample and test for California Bearing Ratio

**Terracon Rep:** Stephanie Hardison  
**Reported To:** Raymond "Levi" Denton  
**Contractor:**  
**Report Distribution**

**Laboratory Testing by:** Stephanie E. Hardison  
 Stephanie Hardison  
 Certification No. 114-01-1203

**Reviewed by:** Raymond "Levi" Denton  
 Raymond "Levi" Denton  
 Geotechnical Department Manager

**Test Methods:** ASTM D1883  
 The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

Report Number: 70125038.0002  
 Service Date: 06/11/12  
 Report Date: 06/18/12

SHEET NO. 25 OF 36  
**Terracon**  
 5240 Green's Dairy Road  
 Raleigh, NC 27616  
 919-873-2211

Client	Project
Schnabel Engineering South, P.C. Attn: Tillman Marshall 11-A Oak Branch Drive Greensboro, NC 27407	P-5206C Reid to North Kannapolis Kimball Road and Main Street Kannapolis, NC
Project No. 70125038	

**SAMPLE INFORMATION**

Sample Number:	Bulk Sample 2	Proctor Method:	AASHTO T99 - Method B
Boring Number:	R-3	Maximum Dry Density (pcf):	103.9
Sample Location:	N/A	Optimum Moisture:	19.5
Depth:	15-20'	Liquid Limit:	61
Material Description:	A-7-6 (19)	Plasticity Index:	36

**CBR TEST DATA**

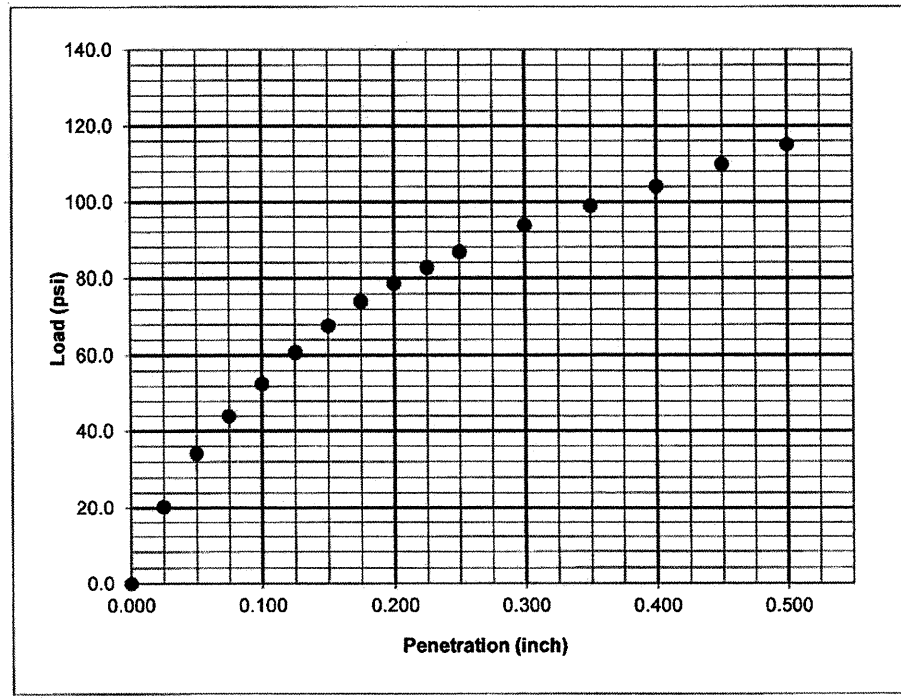
CBR Value at 0.100 inch	5.3
CBR Value at 0.200 inch	5.2
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	1.6

**DENSITY DATA**

Dry Density Before Soaking (pcf)	99.9
Compaction of Proctor (%)	96.2

**MOISTURE DATA**

Before Compaction (%)	20.2
After Compaction (%)	20.2
Top 1" After Soaking (%)	23.9
Average After Soaking (%)	24.5



**Comments:**  
**Services:** Obtain soil sample and test for California Bearing Ratio  
**Terracon Rep:** Stephanie Hardison  
**Reported To:** Raymond "Levi" Denton  
**Contractor:**  
**Report Distribution**

**Laboratory Testing by:** *Stephanie E. Hardison*  
 Stephanie Hardison  
 Certification No. 114-01-1203

**Reviewed by:** *Raymond "Levi" Denton*  
 Raymond "Levi" Denton  
 Geotechnical Department Manager

**Test Methods:** ASTM D1883  
 The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

SHEET NO. 26 OF 36  
**Terracon**  
5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

Report Number: 70125038.0002  
Service Date: 06/11/12  
Report Date: 06/18/12

<b>Client</b> Schnabel Engineering South, P.C. Attn: Tillman Marshall 11-A Oak Branch Drive Greensboro, NC 27407	<b>Project</b> P-5206C Reid to North Kannapolis Kimball Road and Main Street Kannapolis, NC  Project No. 70125038
--	--

**SAMPLE INFORMATION**

Sample Number: Bulk Sample 2	Proctor Method: AASHTO T99 - Method B
Boring Number: R-3	Maximum Dry Density (pcf): 103.9
Sample Location: N/A	Optimum Moisture: 19.5
Depth: 15-20'	Liquid Limit: 61
Material Description: A-7-6 (19)	Plasticity Index: 36

**CBR TEST DATA**

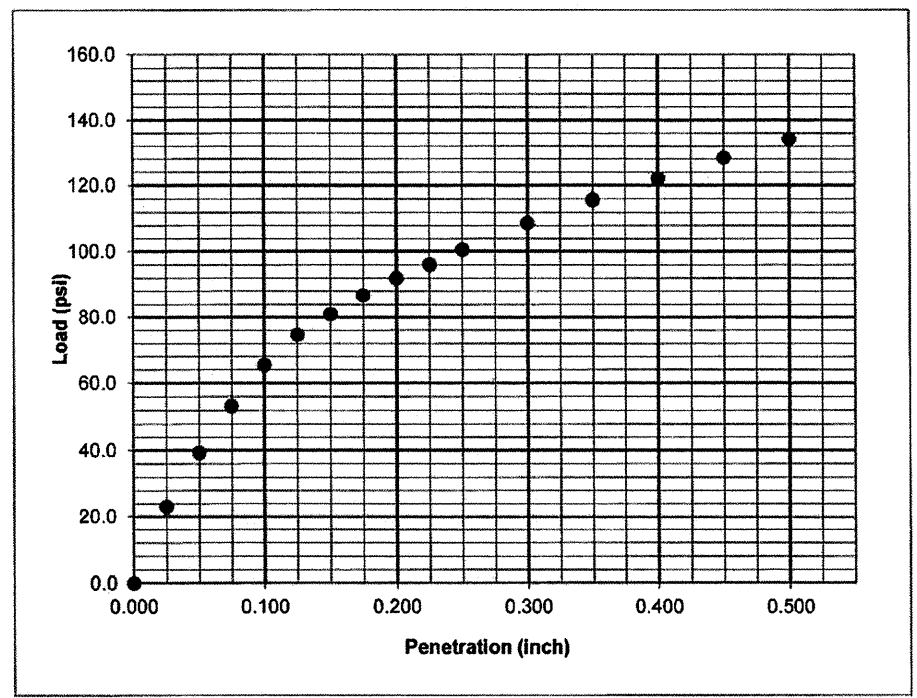
CBR Value at 0.100 inch	6.5
CBR Value at 0.200 inch	6.1
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	1.5

**DENSITY DATA**

Dry Density Before Soaking (pcf)	102.5
Compaction of Proctor (%)	98.7

**MOISTURE DATA**

Before Compaction (%)	19.3
After Compaction (%)	19.5
Top 1" After Soaking (%)	22.7
Average After Soaking (%)	24.4



**Comments:**

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Hardison  
Reported To: Raymond "Levi" Denton  
Contractor:  
Report Distribution

Laboratory Testing by: *Stephanie E. Hardison*  
Stephanie Hardison  
Certification No. 114-01-1203

Reviewed by: *Raymond "Levi" Denton*  
Raymond "Levi" Denton  
Geotechnical Department Manager

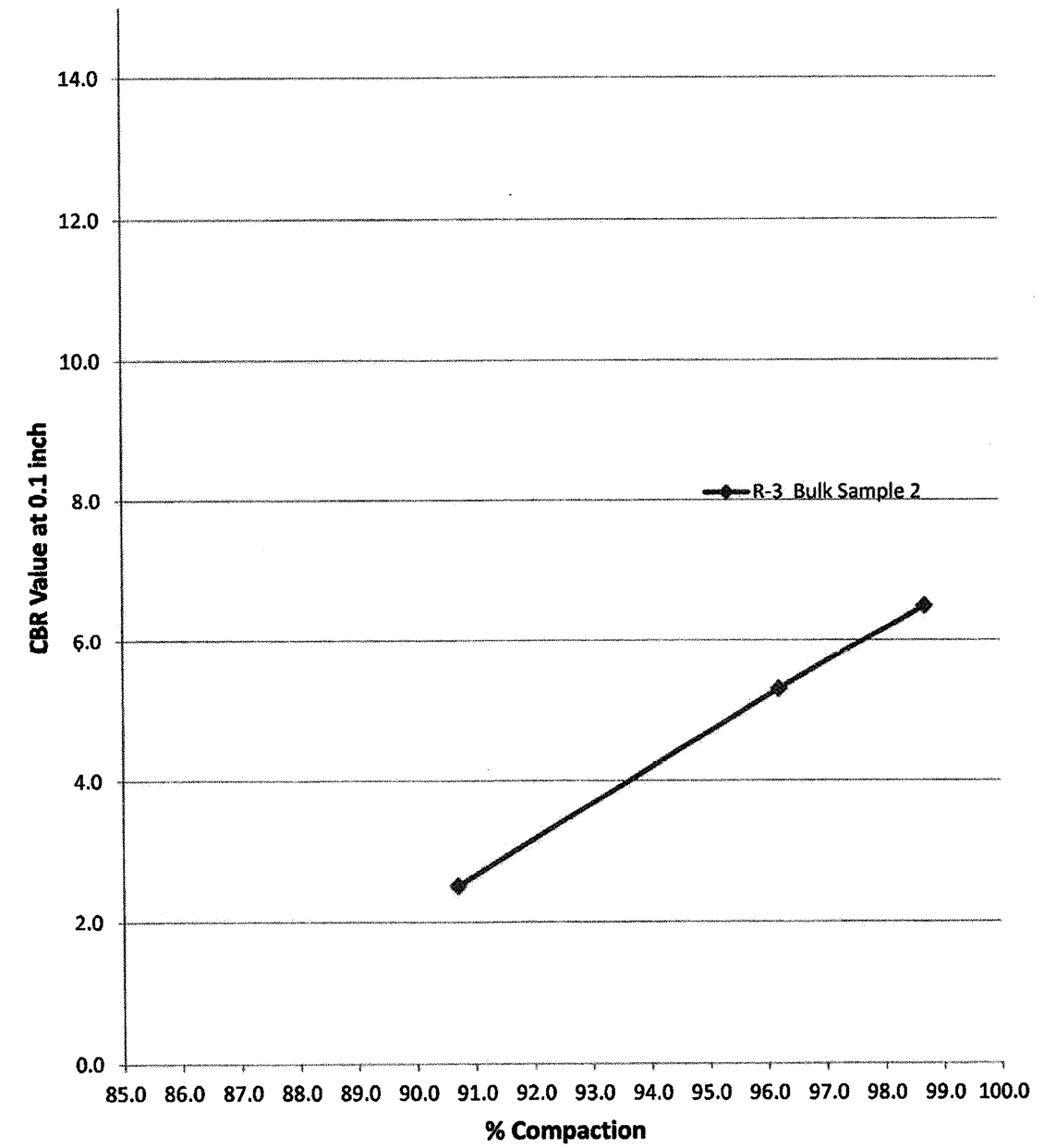
**Test Methods:** ASTM D1883

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

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**R-3 Bulk Sample 2 Depth 15-20'**

**CALIFORNIA BEARING RATIO**



*Stephanie E. Handisan*  
Certification No. 114-01-1203

DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

Report Number: 70125038.0003  
Service Date: 06/11/12  
Report Date: 06/18/12

SHEET NO. 28 OF 36  
**Terracon**  
5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

Client	Project
Schnabel Engineering South, P.C. Attn: Tillman Marshall 11-A Oak Branch Drive Greensboro, NC 27407	P-5206C Reid to North Kannapolis Kimball Road and Main Street Kannapolis, NC
Project No. 70125038	

**SAMPLE INFORMATION**

Sample Number:	Bulk Sample 1	Proctor Method:	AASHTO T99 - Method A
Boring Number:	R-4	Maximum Dry Density (pcf):	91.2
Sample Location:	N/A	Optimum Moisture:	28.7
Depth:	10-15'	Liquid Limit:	73
Material Description:	A-7-5 (35)	Plasticity Index:	39

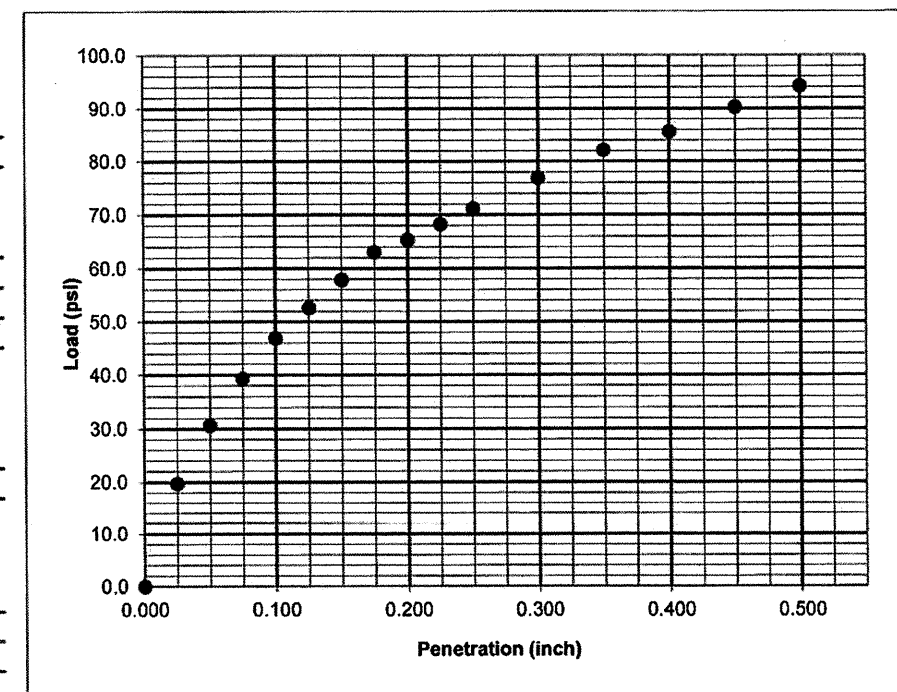
**CBR TEST DATA**

CBR Value at 0.100 inch 4.7  
CBR Value at 0.200 inch 4.4

Surcharge Weight (lbs) 10  
Soaking Condition Soaked  
Length of Soaking (hours) 96  
Swell (%) 2.0

**DENSITY DATA**  
Dry Density Before Soaking (pcf) 84.9  
Compaction of Proctor (%) 93.0

**MOISTURE DATA**  
Before Compaction (%) 28.3  
After Compaction (%) 28.2  
Top 1" After Soaking (%) 36.2  
Average After Soaking (%) 35.2



Comments:  
Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Hardison  
Reported To: Raymond "Levi" Denton  
Contractor:  
Report Distribution

Laboratory Testing by: *Stephanie E. Hardison*  
Stephanie Hardison  
Certification No. 114-01-1203

Reviewed by: *Raymond "Levi" Denton*  
Raymond "Levi" Denton  
Geotechnical Department Manager

Test Methods: ASTM D1883  
The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.



DCN  
0164DEL P10b2

**REPORT FOR CALIFORNIA BEARING RATIO**

Report Number: 70125038.0003  
Service Date: 06/11/12  
Report Date: 06/18/12

SHEET NO. 29 OF 36  
**Terracon**  
5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

**Client**

Schnabel Engineering South, P.C.  
Attn: Tillman Marshall  
11-A Oak Branch Drive  
Greensboro, NC 27407

**Project**

P-5206C Reid to North Kannapolis  
Kimball Road and Main Street  
Kannapolis, NC

Project No. 70125038

**SAMPLE INFORMATION**

Sample Number:	Bulk Sample 1	Proctor Method:	AASHTO T99 - Method A
Boring Number:	R-4	Maximum Dry Density (pcf):	91.2
Sample Location:	N/A	Optimum Moisture:	28.7
Depth:	10-15'	Liquid Limit:	73
Material Description:	A-7-5 (35)	Plasticity Index:	39

**CBR TEST DATA**

CBR Value at 0.100 inch 5.5  
CBR Value at 0.200 inch 5.2

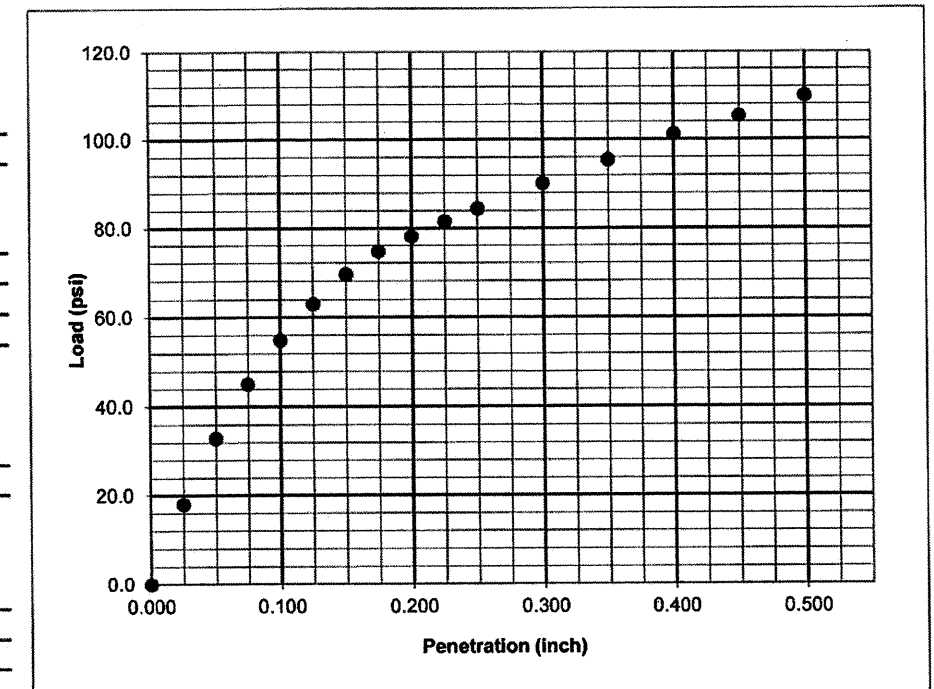
Surcharge Weight (lbs) 10  
Soaking Condition Soaked  
Length of Soaking (hours) 96  
Swell (%) 2.5

**DENSITY DATA**

Dry Density Before Soaking (pcf) 87.4  
Compaction of Proctor (%) 95.9

**MOISTURE DATA**

Before Compaction (%) 27.8  
After Compaction (%) 28.9  
Top 1" After Soaking (%) 33.2  
Average After Soaking (%) 33.3



**Comments:**

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Hardison  
Reported To: Raymond "Levi" Denton  
Contractor:  
Report Distribution

Laboratory Testing by: Stephanie E. Hardison  
Stephanie Hardison  
Certification No. 114-01-1203

Reviewed by: Raymond "Levi" Denton  
Raymond "Levi" Denton  
Geotechnical Department Manager

**Test Methods:** ASTM D1883

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

DCN  
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**REPORT FOR CALIFORNIA BEARING RATIO**

SHEET NO. 30 OF 36  
**Terracon**  
5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

Report Number: 70125038.0003  
Service Date: 06/11/12  
Report Date: 06/18/12

<b>Client</b>	<b>Project</b>
Schnabel Engineering South, P.C. Attn: Tillman Marshall 11-A Oak Branch Drive Greensboro, NC 27407	P-5206C Reid to North Kannapolis Kimball Road and Main Street Kannapolis, NC
	Project No. 70125038

**SAMPLE INFORMATION**

Sample Number:	Bulk Sample 1	Proctor Method:	AASHTO T99 - Method A
Boring Number:	R-4	Maximum Dry Density (pcf):	91.2
Sample Location:	N/A	Optimum Moisture:	28.7
Depth:	10-15'	Liquid Limit:	73
Material Description:	A-7-5 (35)	Plasticity Index:	39

**CBR TEST DATA**

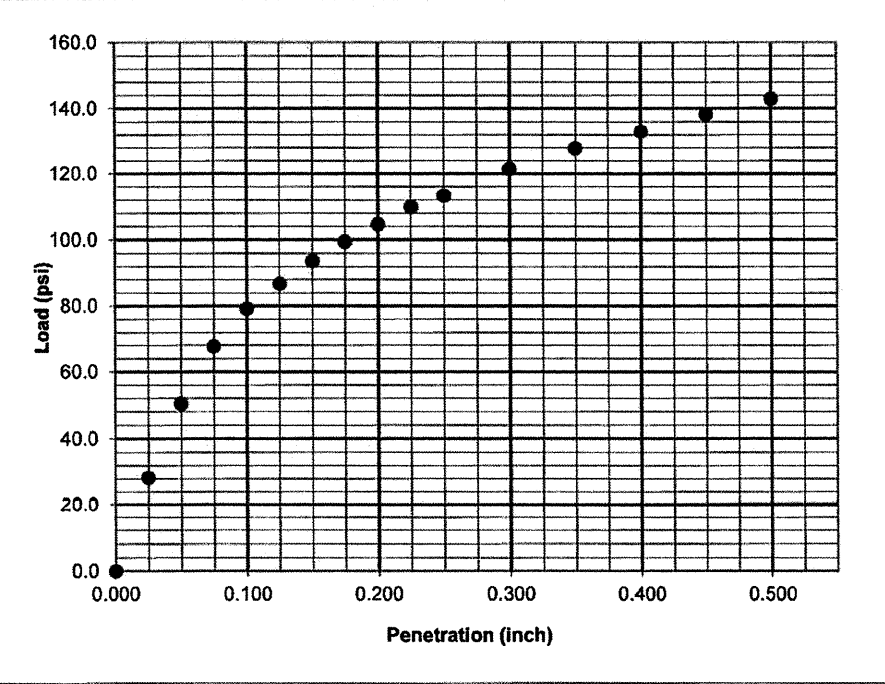
CBR Value at 0.100 inch	7.9
CBR Value at 0.200 inch	7.0
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	1.2

**DENSITY DATA**

Dry Density Before Soaking (pcf)	89.7
Compaction of Proctor (%)	98.3

**MOISTURE DATA**

Before Compaction (%)	29.1
After Compaction (%)	29.4
Top 1" After Soaking (%)	33.7
Average After Soaking (%)	32.3



**Comments:**  
**Services:** Obtain soil sample and test for California Bearing Ratio

**Terracon Rep:** Stephanie Hardison  
**Reported To:** Raymond "Levi" Denton  
**Contractor:**  
**Report Distribution**

**Laboratory Testing by:** *Stephanie E. Hardison*  
Stephanie Hardison  
Certification No. 114-01-1203

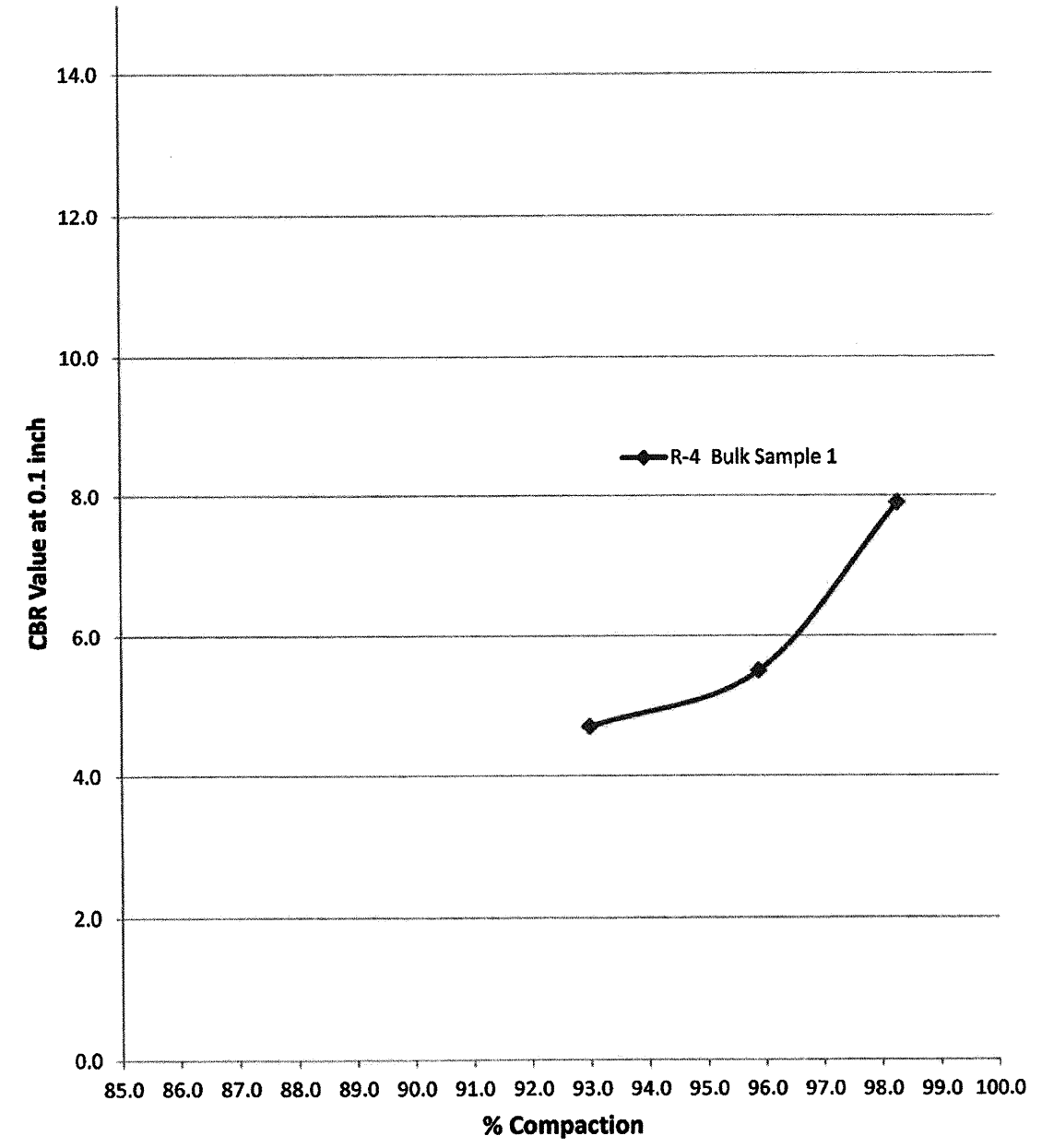
**Reviewed by:** *Raymond "Levi" Denton*  
Raymond "Levi" Denton  
Geotechnical Department Manager

**Test Methods:** ASTM D1883  
The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

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**R-4 Bulk Sample 1 Depth 10-15'**

**CALIFORNIA BEARING RATIO**



*Stephanie E. Hardison*  
Certification No. 114-01-1203

**REPORT ON SOIL TEST RESULTS**

DCN  
0164DEL P10b2

<b>PROJECT:</b>	P-5206C Reid to North Kannapolis			<b>COUNTY:</b>	Rowan
<b>DATE SAMPLED:</b>	N/A	<b>DATE RECEIVED:</b>	N/A	<b>DATE REPORTED:</b>	July 16, 2012
<b>SAMPLED FROM:</b>	N/A	<b>SAMPLED BY:</b>	N/A		
<b>SUBMITTED BY:</b>	Schnabel Engineering			<b>STANDARD SPECIFICATION</b>	
<b>LABORATORY:</b>	Terracon Consultants, Inc. - Raleigh				

**TEST RESULTS**

<b>Boring No.</b>	R-8						
<b>Sample No.</b>	Bulk						
<b>Retained #4 Sieve %</b>	0						
<b>Passing #10 Sieve %</b>	92						
<b>Passing #40 Sieve %</b>	74						
<b>Passing #200 Sieve %</b>	62						

**MINUS #10 FRACTION**

<b>Soil Mortar - 100%</b>	-						
<b>Coarse Sand -Ret. #60</b>	22.9						
<b>Fine Sand - Ret. #270</b>	13.1						
<b>Silt 0.05-0.005 mm %</b>	14.7						
<b>Clay &lt; 0.005 mm %</b>	49.3						
<b>Passing # 40 Sieve %</b>	-						
<b>Passing # 200 Sieve %</b>	-						

<b>Liquid Limit</b>	67						
<b>Plastic Index</b>	31						
<b>AASHTO Classification</b>	A-7-5 (19)						
<b>Select Granular Class</b>							
<b>Type</b>							
<b>Natural Moisture %</b>	-						
<b>Organic Content %</b>	-						
<b>Depth (ft) From:</b>	0						
<b>To:</b>	5.0						

Remarks:

*Stephanie E. Hardison*  
Certification No. 114-01-1203

DCN  
0164DEL P10b2

**STANDARD TEST METHOD FOR MOISTURE CONTENT IN SOILS**

Project Number: 70125038 Project Name: P-5206C (Reid to N. Kannapolis)  
 Date Sampled: N/A Sampled By: N/A  
 Date Tested: 7/9/2012 Tested By: Terracon - Raleigh, NC

Boring Number	Sample Number	Depth	Can ID	Tare Wt.	Wet Wt. of Soil + Tare	Dry Weight of Soil + Tare	Dry Weight of Soil	Wt. of Water	% Moisture
R-8	SS-1	1.0-2.5'	WW	254.0	510.5	454.1	200.1	56.4	28.2%
R-8	SS-2	3.5-5.0'	13	255.0	540.0	488.3	233.3	51.7	22.2%

*Stephanie E. Hardison*  
 Certification No. 114-01-1203

DCN  
0164DEL P10b2

*Stephanie E. Hardison*  
Certification No. 114-01-1203

Source of Material R-8 0-5'  
Description of Material A-7-5 (19)  
Test Method ASTM D698 Method A

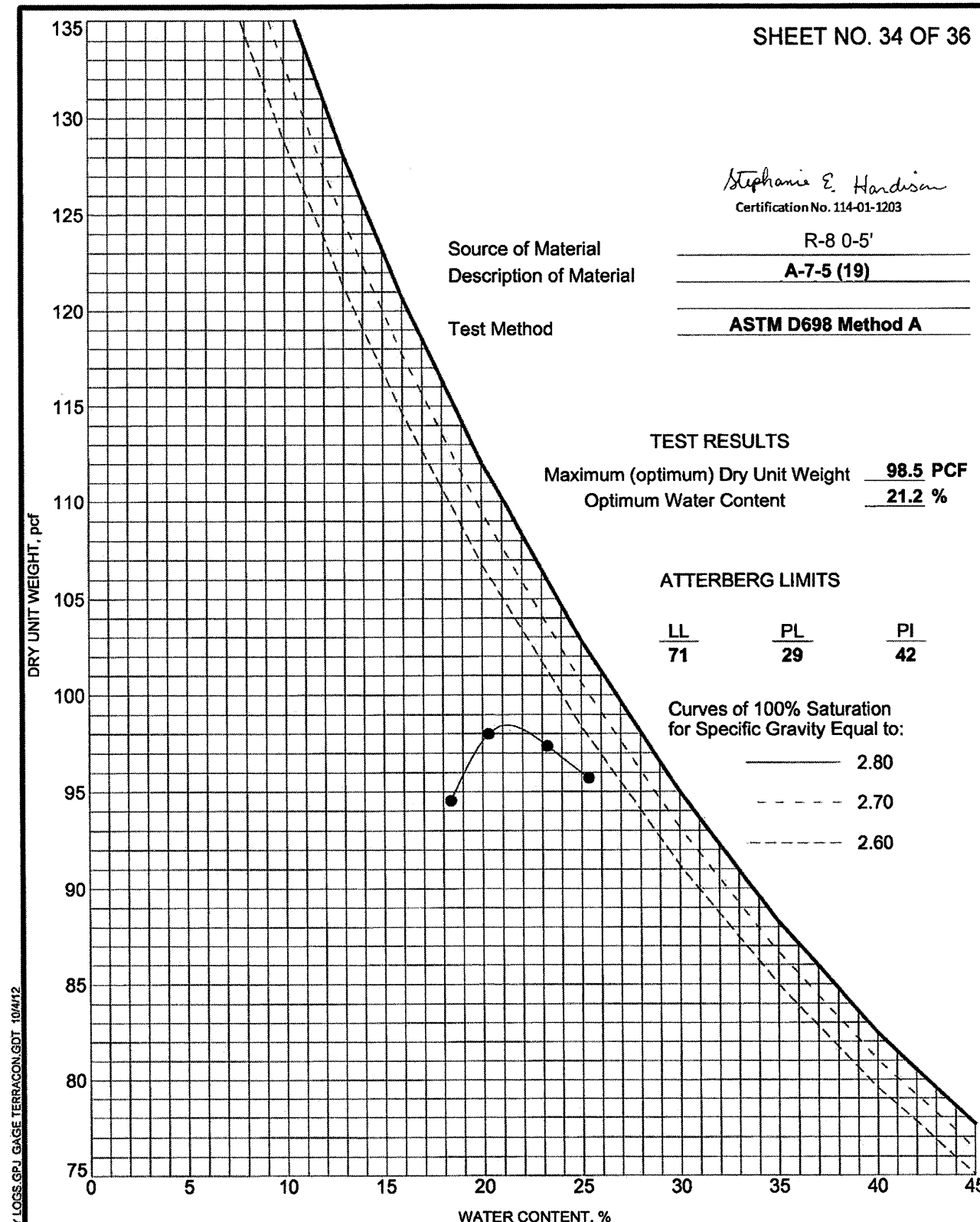
TEST RESULTS  
Maximum (optimum) Dry Unit Weight 98.5 PCF  
Optimum Water Content 21.2 %

ATTERBERG LIMITS  

LL	PL	PI
71	29	42

Curves of 100% Saturation  
for Specific Gravity Equal to:

———— 2.80  
----- 2.70  
----- 2.60



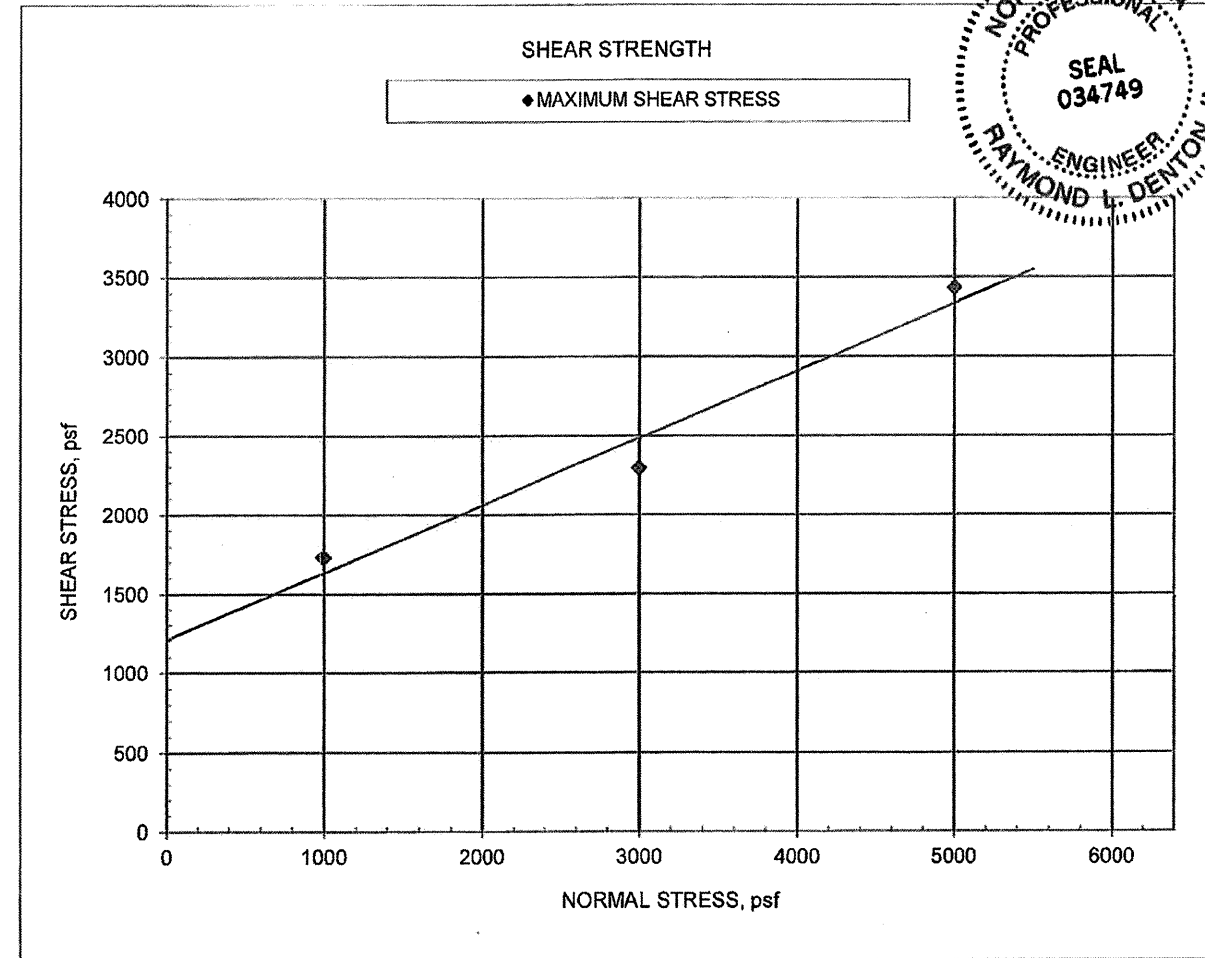
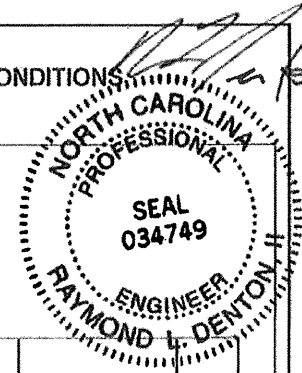
TC COMPACTON DUMMYY LOSS.GPJ GAGE TERRACON.GDT 10/4/12



**MOISTURE-DENSITY RELATIONSHIP**  
Project: P-5206C (Reid to North Kannapolis)  
Site: Kannapolis, North Carolina  
Job #: 70125038  
Date: 10-4-12

DCN  
0164DEL P10b2

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS  
ASTM D3080



	AT MAXIMUM SHEAR STRESS	FRICTION ANGLE		COHESION		NORMAL	NORMAL	NORMAL
		23.0	deg	1208	psf	STRESS, psf	STRESS, psf	STRESS, psf
INITIAL AREA, in <sup>2</sup>	4.909					1000	3000	5000
INITIAL LENGTH, in	1.000					26.8	26.8	26.8
SPECIFIC GRAVITY	2.65					89.2	89.4	89.7
SG ASSUMED	X					83	84	84
#200 WASH, %	57					0.86	0.85	0.85
LIQUID LIMIT	36					34.4	33.1	30.2
PLASTIC LIMIT	23					100.0	100.0	100.0
PLASTICITY INDEX	13					0.8	0.7	0.6
SAMPLE TYPE	UNDISTURBED					1731	2288	3432
DESCRIPTION	A-6 (31)					0.0007	0.0004	0.0005

PROJECT NAME: P5206 Reid to North Kannapolis BORING NO. R-3

LOCATION: Kannapolis, NC SAMPLE NO. S-1

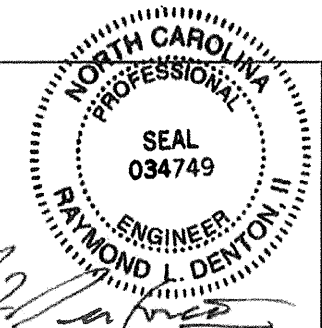
JOB NO.: 70125038 DEPTH, feet 10 TO 12

DATE: 10/7/2011

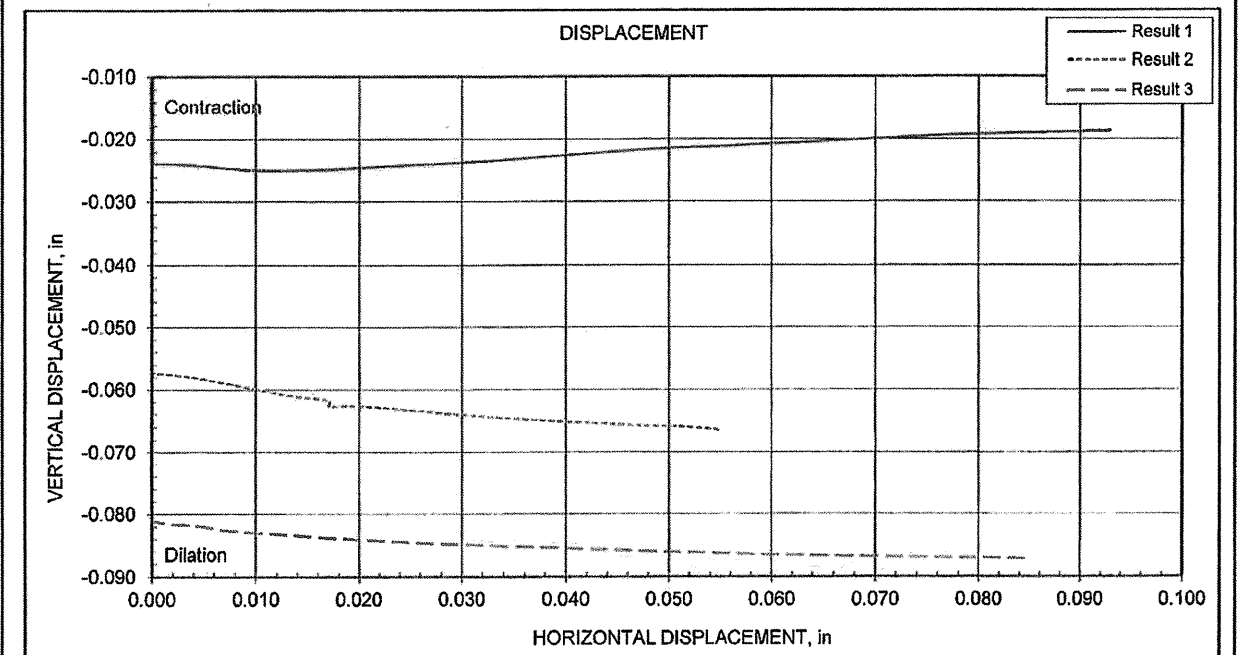
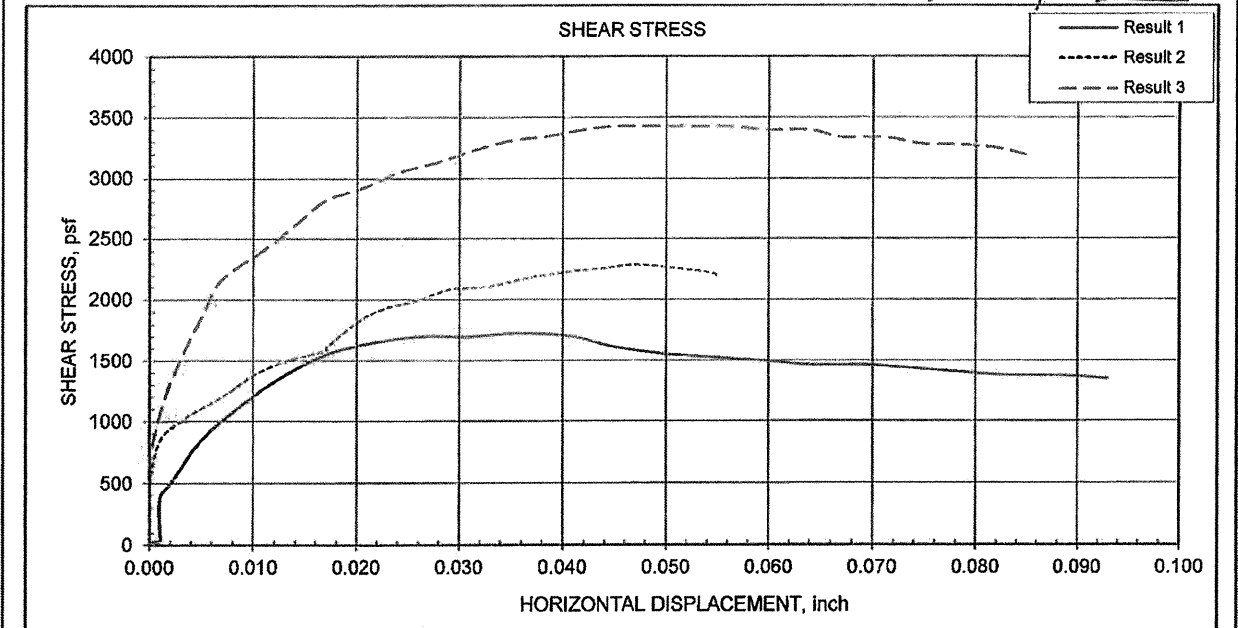
**Terracon**

DCN  
0164DEL P10b2

P5206 Reid to North Kannapolis  
Kannapolis, NC  
70125038  
10/7/2011



BORING NO.       R-3        
SAMPLE NO.       S-1        
DEPTH, feet       10 TO 12      



H:\Projects\2012\70125038\Working Files\Laboratory-Field Data-Boring Logs\Revised 70125038 Direct Shear 10-4-12.xlsx\Report

