

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5715	1	24

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	11+10.00 - 32+40.00	4-6	7
-YI-	10+00.00 - 13+50.00	4	8
-DRWYI-	10+32.50 - 13+24.00	6	9

APPENDICES

APPENDIX	TITLE	SHEETS
A	PAVEMENT INVESTIGATION	10-19
B	LABORATORY RESULTS	20,21

**ROADWAY  
SUBSURFACE INVESTIGATION**

COUNTY WAKE  
PROJECT DESCRIPTION NEW HOPE CHURCH ROAD  
GRADE SEPARATION

**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) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

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

PERSONNEL

CAROLINA DRILLING

WEIS, J.M.

LANE, R.W.

INVESTIGATED BY FALCON ENG.

DRAWN BY HILL, M. J.

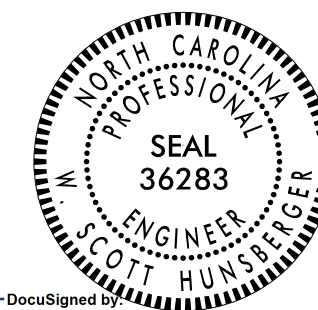
CHECKED BY HUNSBERGER, W. S.

SUBMITTED BY FALCON ENG.

DATE DECEMBER 2018

REFERENCE: P-5715

PROJECT: 46927



DocuSigned by:  
W. Scott Hunsberger

12/20/2018

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED





## Roadway Subsurface Investigation Report - Inventory

**New Hope Church Road Separation**  
**Wake County, North Carolina**  
**WBS: 46927.1.1 TIP: P-5715**  
**Falcon Project No.: G17062.00**

**Prepared for:**

STANTEC  
 801 Jones Franklin Road, Suite 300  
 Raleigh, NC 27606

Submitted by:

Falcon Engineering, Inc.  
 1210 Trinity Road, Suite 110  
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[www.falconengineers.com](http://www.falconengineers.com)

December 20, 2018

**WBS:** 46927.1.1  
**TIP:** P-5715  
**COUNTY:** Wake  
**DESCRIPTION:** New Hope Church Road Grade Separation  
**SUBJECT:** Roadway Subsurface Investigation – Inventory

### PROJECT DESCRIPTION

This project is centered around constructing a new grade separation on New Hope Church Road over CSX Railroad in Wake County. The current at grade crossing will be replaced with a single span bridge at approximately the same location.

Included in this project are a single span bridge over the CSX Railroad with an MSE vertical abutment at End Bent One and sloped spill through abutment at End Bent Two. In addition, the abutment wall at End Bent One extends approximately XXX feet downstation left, and a separate retaining wall accommodates the right side of the End Bent One approach as well as turning down -Y2-. Temporary shoring will be constructed near the centerline of -L- and integrated into the abutment wall to accommodate the phasing of construction while maintaining traffic through the site. Borings for the bridge structure, temporary shoring and retaining walls are not included herein and will be submitted under separate cover.

The investigation was conducted between July 26<sup>th</sup>, and August 8<sup>th</sup>, 2018 in general accordance with the Scope of Services, dated September 4, 2017. 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 eleven (11) Standard Penetration Test (SPT) borings were performed for the proposed roadway alignments. All mechanical borings were drilled using either a CME-55 truck or CME 550 ATV mounted rig equipped with 2 ¼-inch inside diameter hollow-stem augers, and SPT testing was performed with an automatic hammer. Representative soil samples, collected with a split-barrel sampler or hand auger, were selected for laboratory testing to verify visual field classifications. In addition, bulk samples were collected for standard Proctor compaction and California Bearing Ratio (CBR) testing. At ten (10) locations along the existing roadway, existing pavements were cored, measured, and Dual Mass Dynamic Cone Penetrometer (DCP) testing completed on the subgrade to depths of up to three feet to correlate in-situ CBR values. The dual mass DCP used is manufactured by Kessler Soils Engineering Products, Inc. CBR values were estimated using software provided by the manufacturer which utilizes correlations established by the Army Corps of Engineers Waterways Experiment Station.





The following alignments, totaling approximately 0.52 miles were explicitly investigated. Other minor Y-lines and driveways are included on the project but improvements are not anticipated to be significant enough to warrant investigation.

<u>Alignment</u>	<u>Station (ft)</u>
-L- (New Hope Church Road)	11+10 - 32+40
-Y1- (Craftsman Drive)	10+00 - 13+50
-DRWY1-	10+33 - 13+24

## PHYSIOGRAPHY AND GEOLOGY

According to the *Geologic Map of North Carolina* (1985), the site is in the Raleigh Belt Physiographic Province of North Carolina. Specifically, rocks at the site are noted as Injected Gneiss (**CZig**), consisting of biotite gneiss and schist intruded by numerous sills and dikes of granite, pegmatite, and aplite; minor hornblende gneiss.

Existing site topography is relatively flat, sloping gently from west to east. The site lies in northeast Raleigh and is currently an at-grade crossing for a CSX rail line. The existing corridor is populated by primarily commercial and industrial properties, with some residential properties to the southeast and southwest of the site.

## SOIL PROPERTIES

A variety of soils were encountered along the project, including existing roadway embankments, artificial fill, residual soils, weathered rock and crystalline rock.

Artificial Fill soils were encountered at the ground surface beneath thin layers of topsoil associated with prior grading of private properties adjacent to the roadway. These soils consist of up to 12 feet of dry to moist, very loose to loose, clayey sand (A-2-6) and medium stiff to stiff, sandy clay (A-6).

Roadway Embankment soils were encountered at the ground surface adjacent to or beneath existing roadways. These soils consist of 3 to 6 feet of dry to moist, loose to medium dense, silty and clayey sands (A-2-4, A-2-5, A-2-6) and medium stiff to stiff, sandy silts and sandy and silty clays (A-4, A-6, A-7).

Residual soils were encountered at the ground surface, or beneath artificial fill or roadway embankments. These soils consist of dry to moist, loose to very dense, clayey and silty sands (A-2-4 and A-2-6) and soft to very stiff, sandy silt and sandy and silty clays (A-4, A-6, A-7).

Weathered Rock (WR) is a very hard material with properties intermediate of soil and rock. WR is classified as having an N-value of greater than 100 blows per one foot. WR encountered on the project generally consists of black and white gneiss.

Crystalline Rock, also consisting of gneiss, was encountered beneath weathered rock at various locations throughout the site. CR is classified as material that yields auger refusal or SPT refusal (blow count of 60/0.0 or 60/0.1 feet.)

## GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in many cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways, and within residential were backfilled immediately after completion due to safety considerations.

Groundwater was only encountered in a boring in low lying area well below proposed grades.





## AREAS OF SPECIAL GEOTECHNICAL INTEREST

- I. Roadway Embankment associated with the existing roadway was encountered at the following locations:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	11+97
-L-	13+01
-L-	13+98
-L-	23+57
-L-	29+55
-L-	31+14
-Y11-	12+44

- II. Artificial fill was encountered at the following locations:

<u>Alignment</u>	<u>Station (ft)</u>
-DRWY1-	13+03

## ADDITIONAL LABORATORY TESTING

The following bulk sample was obtained:

<u>Sample</u>	<u>Location</u>	<u>Depth (ft)</u>	<u>Test</u>
BS-2	27+52, 37' RT, -L-	3.5-13.5	California Bearing Ratio, Standard Proctor

Classification test results for the bulk sample are included in the subsurface profiles and cross sections and Standard Proctor and California Bearing Ratio (CBR) data is attached in the Appendix.

## CLOSING

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:

W. Scott Hunsberger, PE  
Geotechnical Engineer

Report Reviewed By:

Jeremy R. Hamm, PE  
Geotechnical Engineering Manager



8/17/2017 10:45 AM C:\Projects\2017\17062.00 Stantec P-5715 New Hope Church Road Grade Separation\5715\_GEO\RDWY\CADD\_GEO\TECH\Plan\of\VP5715\_Rdy\_GEO\_04.dgn

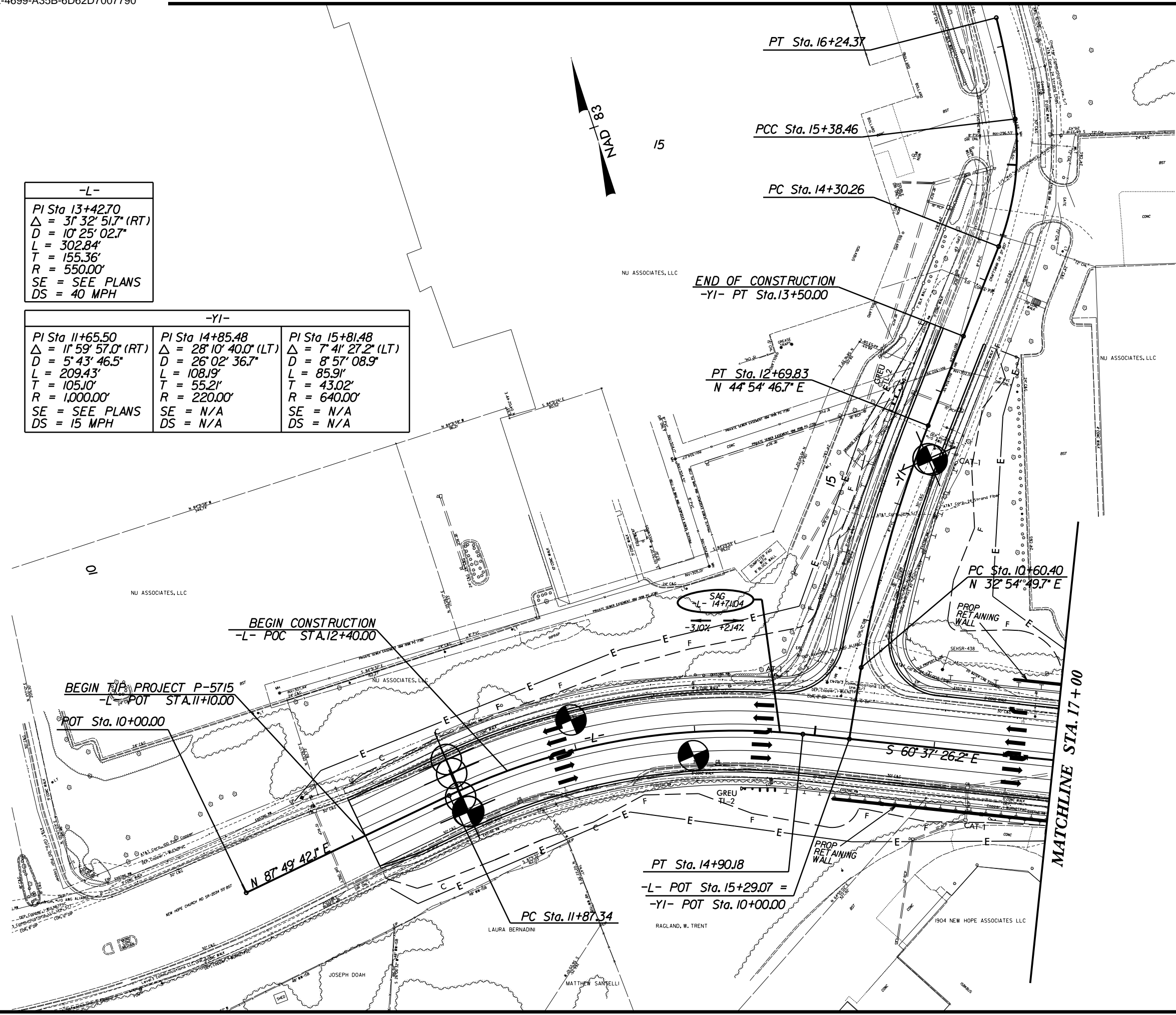
PROJECT REFERENCE NO.	SHEET NO.
P-5715	4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	



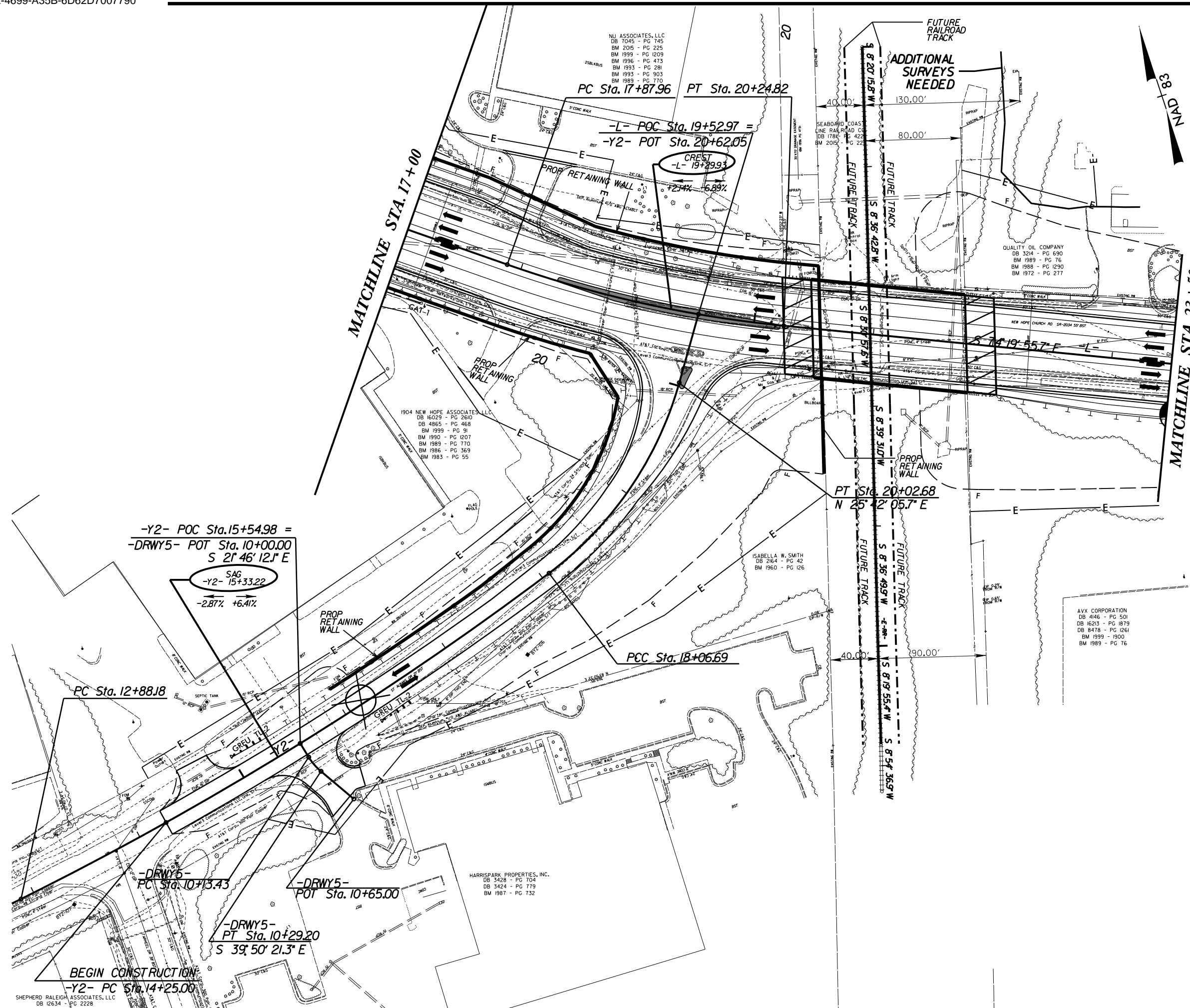
Stantec Consulting Services Inc.  
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-L-
PI Sta 13+42.70 $\Delta = 3^{\circ} 32' 51.7" (RT)$ $D = 10^{\circ} 25' 02.7"$ $L = 302.84'$ $T = 155.36'$ $R = 550.00'$ SE = SEE PLANS DS = 40 MPH

-YI-		
PI Sta 11+65.50 $\Delta = 1^{\circ} 59' 57.0" (RT)$ $D = 5^{\circ} 43' 46.5"$ $L = 209.43'$ $T = 105.10'$ $R = 1,000.00'$ SE = SEE PLANS DS = 15 MPH	PI Sta 14+85.48 $\Delta = 28^{\circ} 10' 40.0" (LT)$ $D = 26^{\circ} 02' 36.7"$ $L = 108.19'$ $T = 55.21'$ $R = 220.00'$ SE = N/A DS = N/A	PI Sta 15+81.48 $\Delta = 7^{\circ} 41' 27.2" (LT)$ $D = 8^{\circ} 57' 08.9"$ $L = 85.91'$ $T = 43.02'$ $R = 640.00'$ SE = N/A DS = N/A



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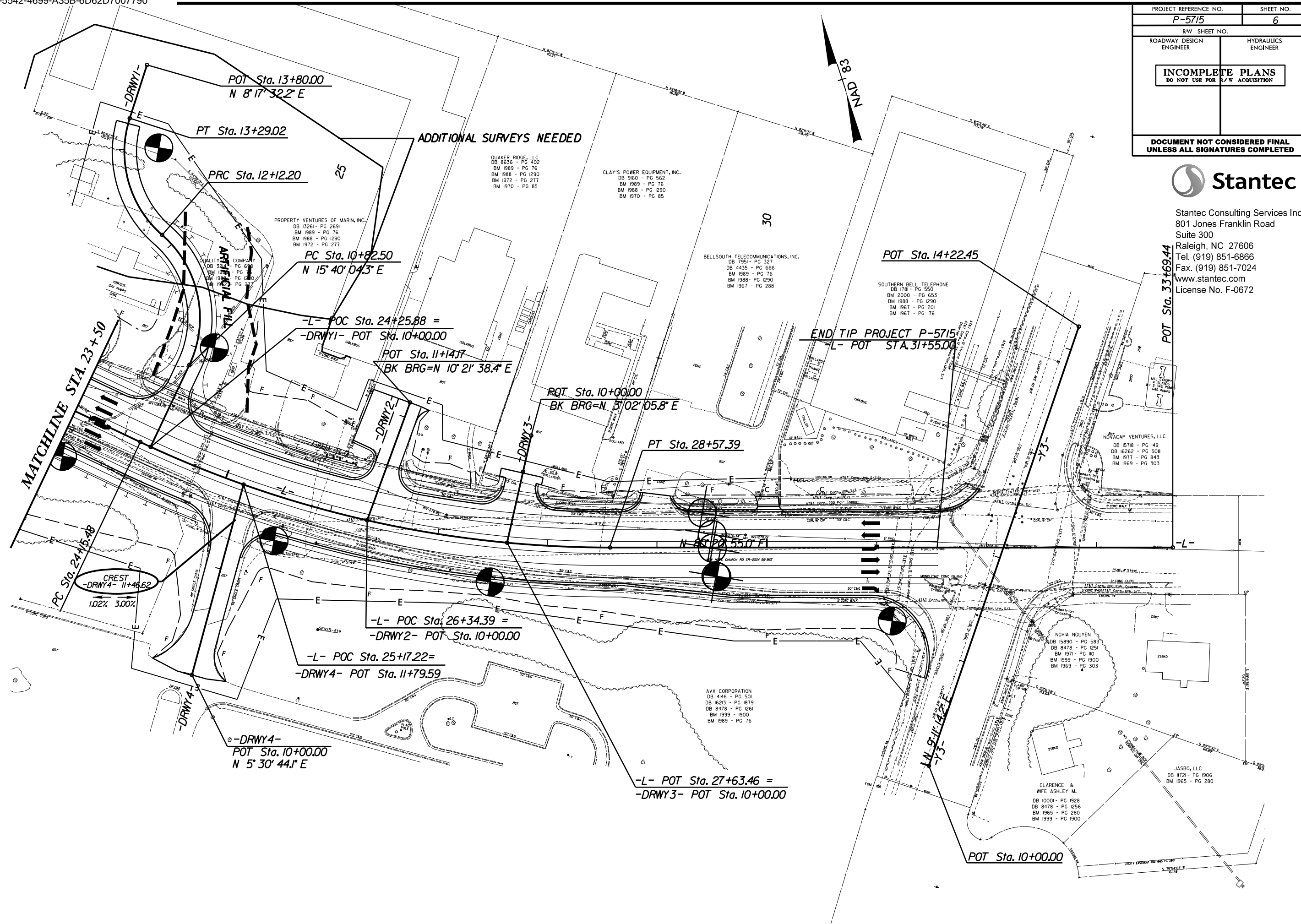


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P-5715		5	
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**Stantec**

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8/17/19



PROJECT REFERENCE NO. <b>P-5715</b>	SHEET NO. <b>6</b>
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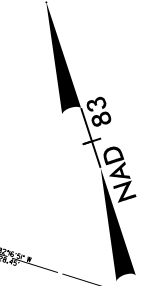
Stantec Consulting Services Inc.  
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Fax. (919) 851-7024  
www.stantec.com  
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POT Sta. 33+69.44

NOVACAP VENTURES, LLC

NGHIA NGUYEN

JASBO, LLC



MATCHLINE STA. 23+50

CREST  
-DRWY4- 11+46.62  
1.02% 3.00%

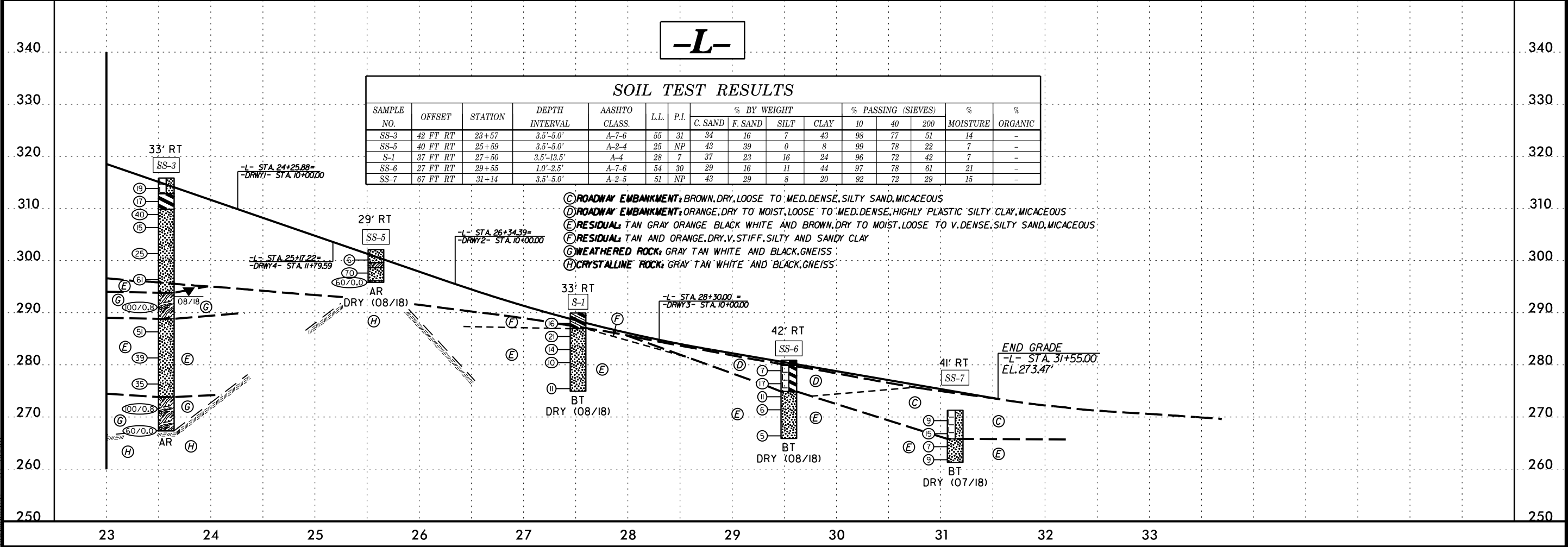
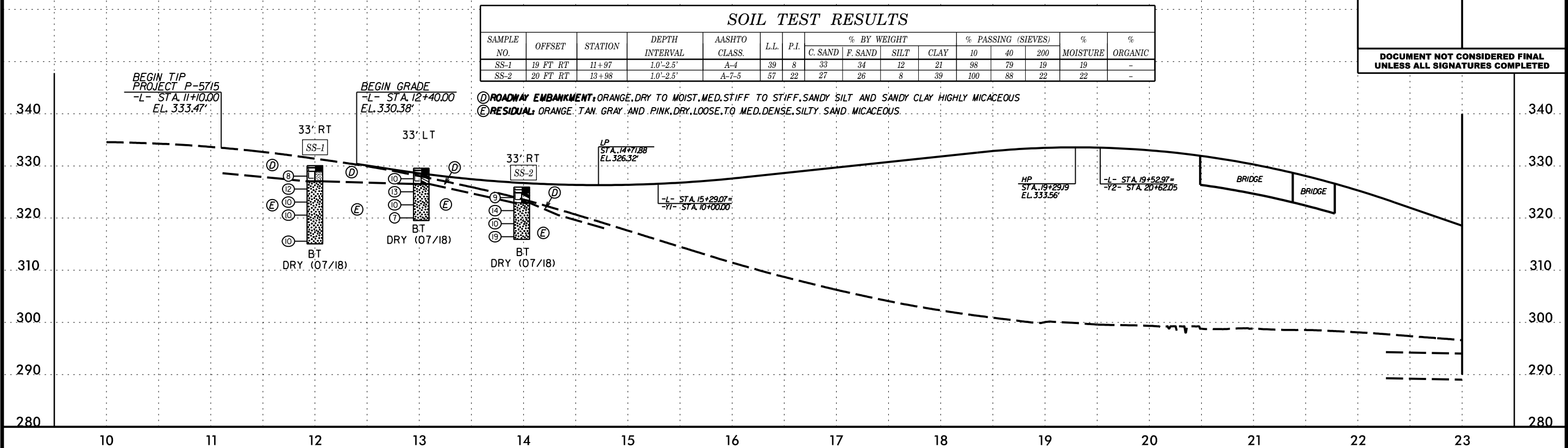
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POT Sta. 10+00.00



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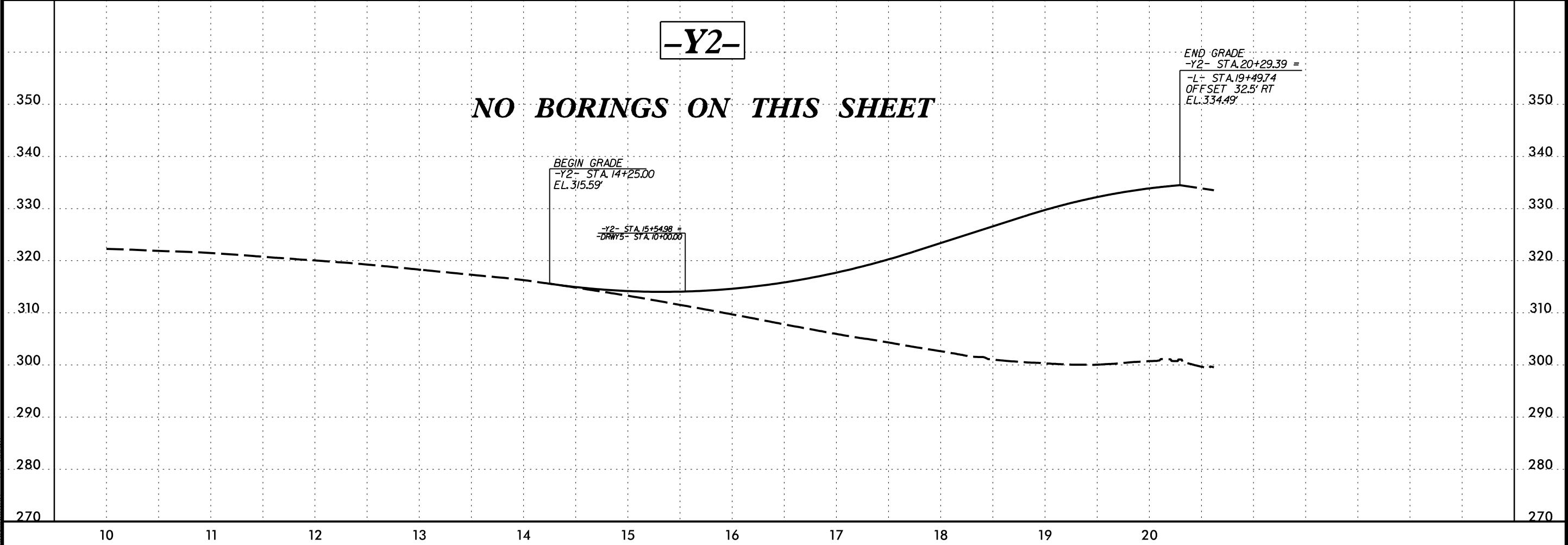
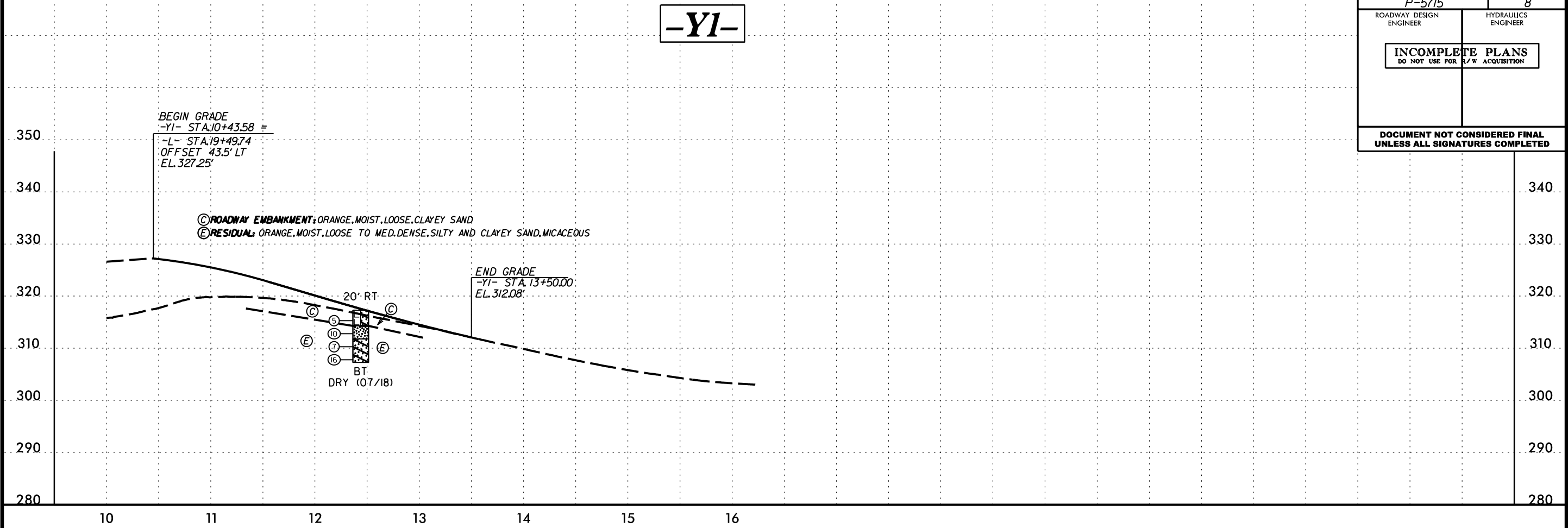
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<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	



- (C) ROADWAY EMBANKMENT: BROWN, DRY, LOOSE TO MED. DENSE, SILTY SAND, MICACEOUS
- (D) ROADWAY EMBANKMENT: ORANGE, DRY TO MOIST, LOOSE TO MED. DENSE, HIGHLY PLASTIC SILTY CLAY, MICACEOUS
- (E) RESIDUAL: TAN GRAY ORANGE BLACK WHITE AND BROWN, DRY TO MOIST, LOOSE TO V. DENSE, SILTY SAND, MICACEOUS
- (F) RESIDUAL: TAN AND ORANGE, DRY, V. STIFF, SILTY AND SANDY CLAY
- (G) WEATHERED ROCK: GRAY TAN WHITE AND BLACK, GNEISS
- (H) CRYSTALLINE ROCK: GRAY TAN WHITE AND BLACK, GNEISS

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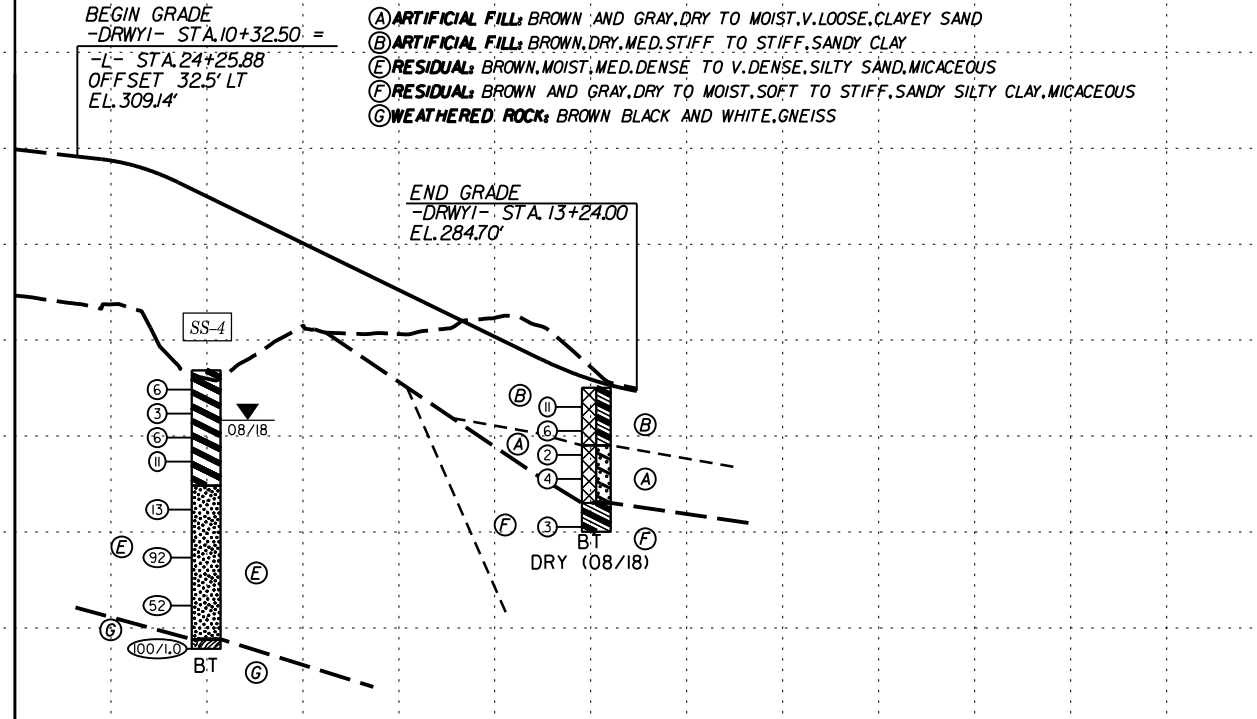


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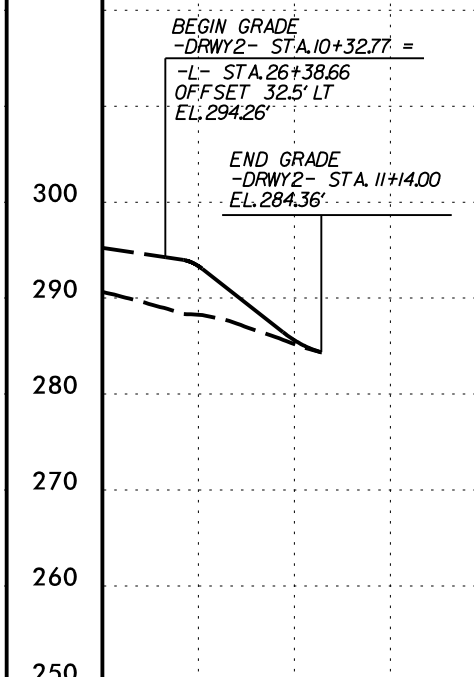
## SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	16 FT RT	11+03	6.0'-7.5'	A-7-6	43	23	32	20	9	39	96	77	49	20	-



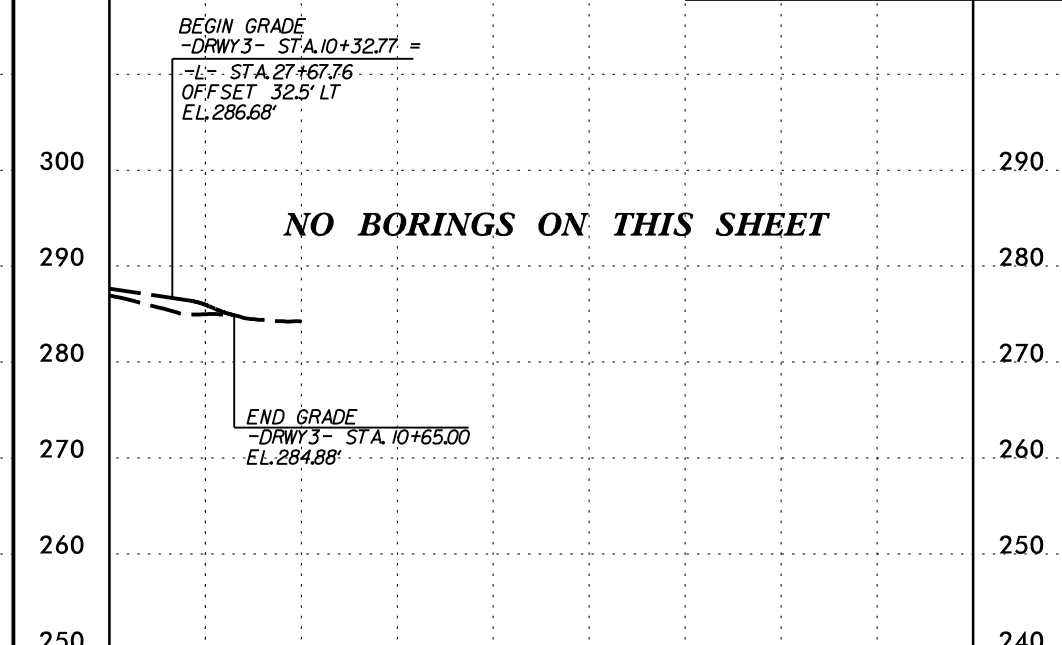
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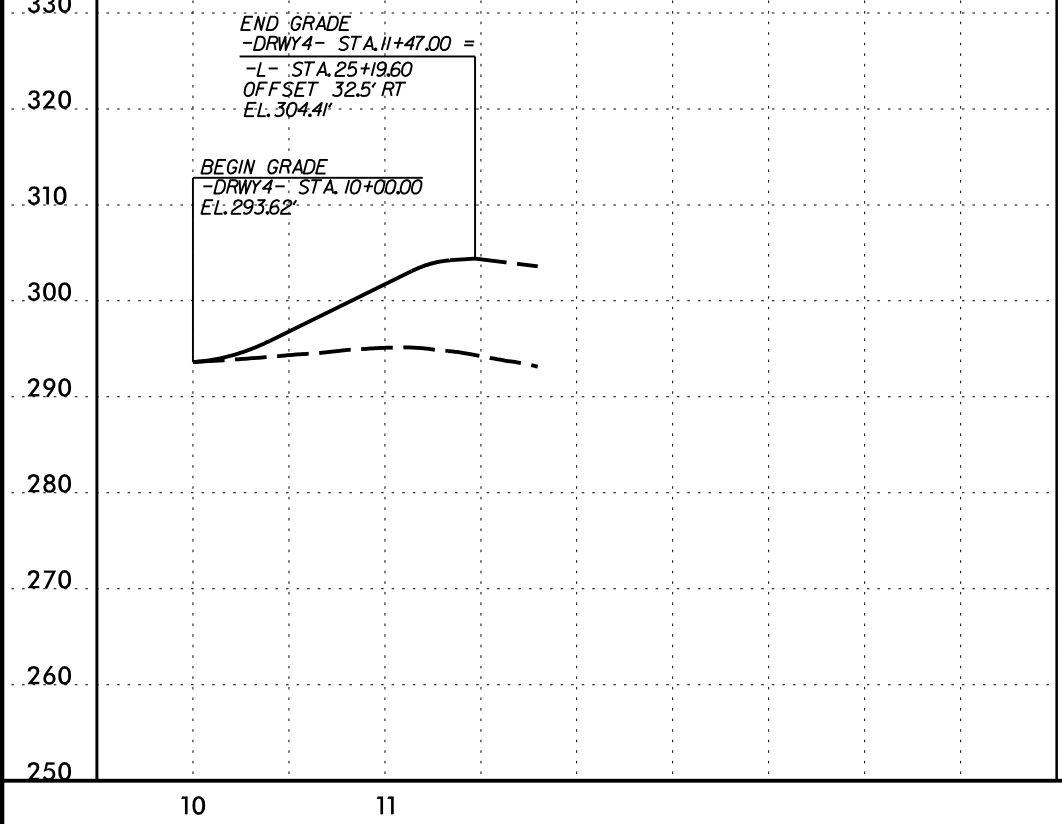
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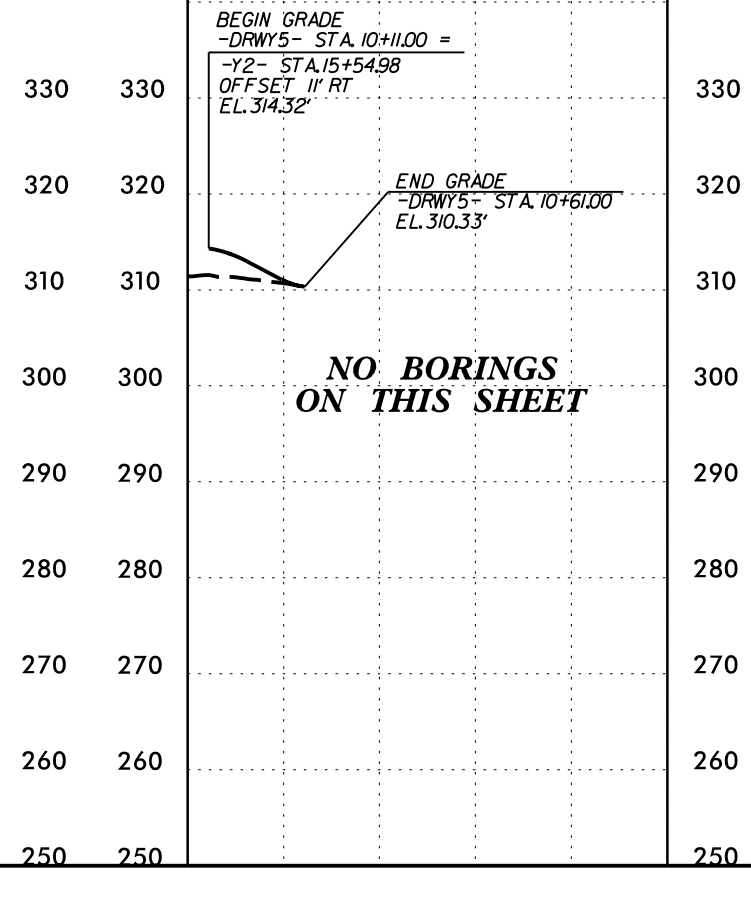
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**REFERENCE: P-5715**

**PROJECT: 46927**

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**  
**SUBSURFACE INVESTIGATION**  
**APPENDIX A**  
**PAVEMENT INVESTIGATION**

Falcon Engineering, Inc.

1210 Trinity Road, Suite 110 Cary, NC 27513

## PAVEMENT SECTION AND SUBGRADE CONDITION SUMMARY

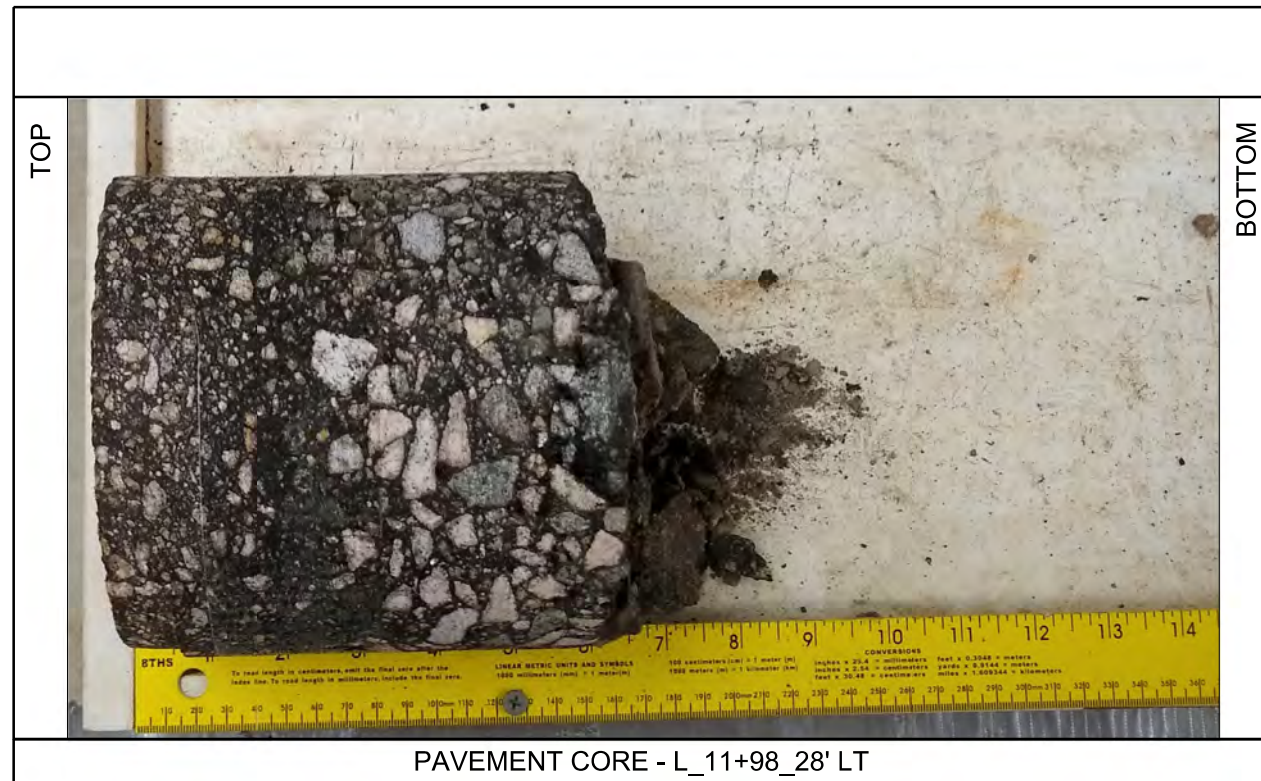
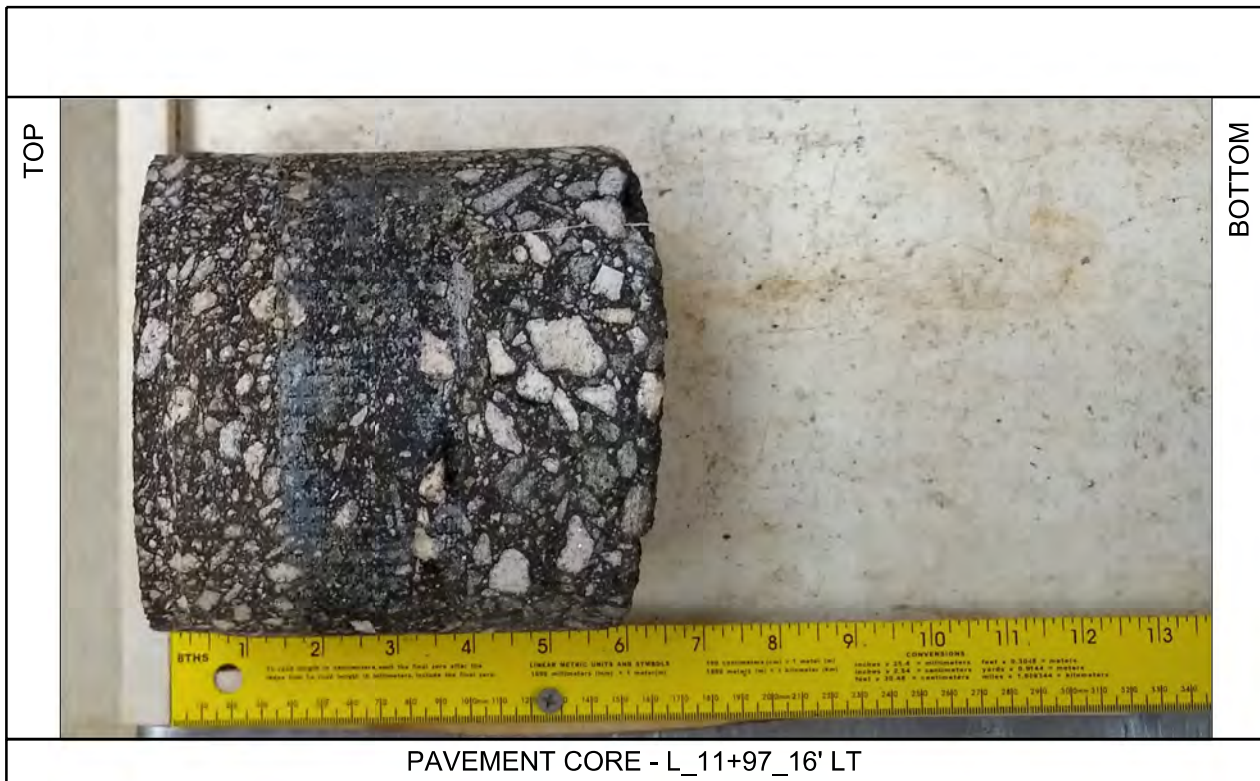
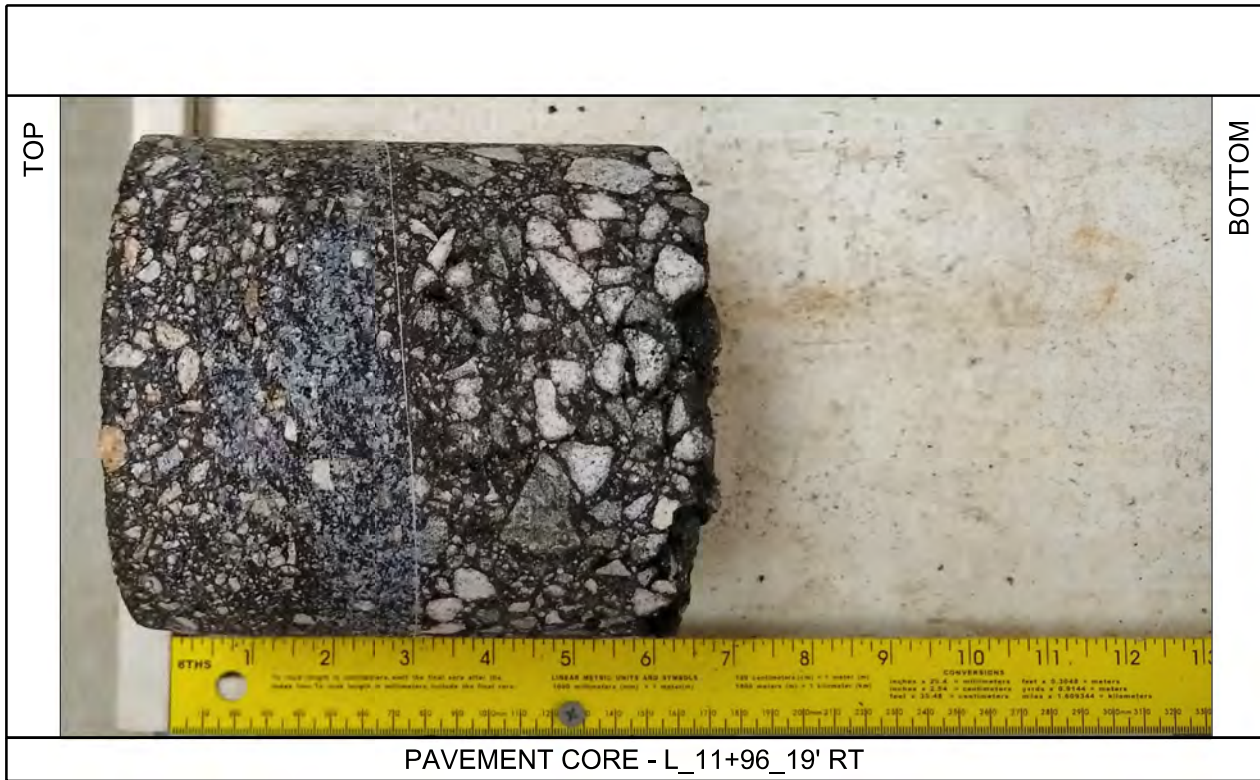
## NEW HOPE CHURCH ROAD GRADE SEPARATION

## WAKE COUNTY, NORTH CAROLINA

TIP No.: P-5715 WBS No.46927.1.FS1 Falcon Project No.: G17062.00

TEST LOCATION				PAVEMENT SECTION THICKNESS (INCHES)			SUBGRADE	NOTES
ALIGNMENT	LANE	STATION	OFFSET	HMA	AGGREGATE BASE	TOTAL	IN-SITU CBR	
-L-	EB, OTL	11+96	19' RT	6.00	7.00	13.00	>20	Multiple Layers
-L-	EB, ISL	11+96	5' RT	6.00	6.00	12.00	>20	Multiple Layers, delamination at 1 inch
-L-	WB, ISL	11+97	16' LT	6.00	8.00	14.00	>20	Multiple Layers
-L-	WB, OSL	11+98	28' LT	6.00	6.00	12.00	19	Multiple Layers, base course crumbling
-L-	WB, OSL	29+41	32' LT	8.00	7.00	15.00	7	Multiple Layers
-L-	WB, ISL	29+50	12' LT	14.00	10.00	24.00	>20	Multiple Layers, delamination at 14 inches
-L-	EB, ISL	29+50	1' RT	18.00	5.00	23.00	15	Multiple Layers, delamination at 15 inches
-L-	EB, OTL	29+53	26' RT	6.00	6.00	12.00	8	Multiple Layers
-Y1-	SB	12+44	10' RT	3.00	4.00	7.00	5	-
-Y2-	NB	16+17	3' LT	8.00	7.00	15.00	8	-
REPRESENTATIVE AVERAGE				8.3	6.9	15	10	-

LEGEND: NB - NORTHBOUND, SB - SOUTHBOUND, EB - EASTBOUND, WB - WESTBOUND, OSL - OUTSIDE LANE, ISL - INSIDE LANE, CTL - CENTRAL TURN LANE



FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
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PAVEMENT CORE PHOTOGRAPHS

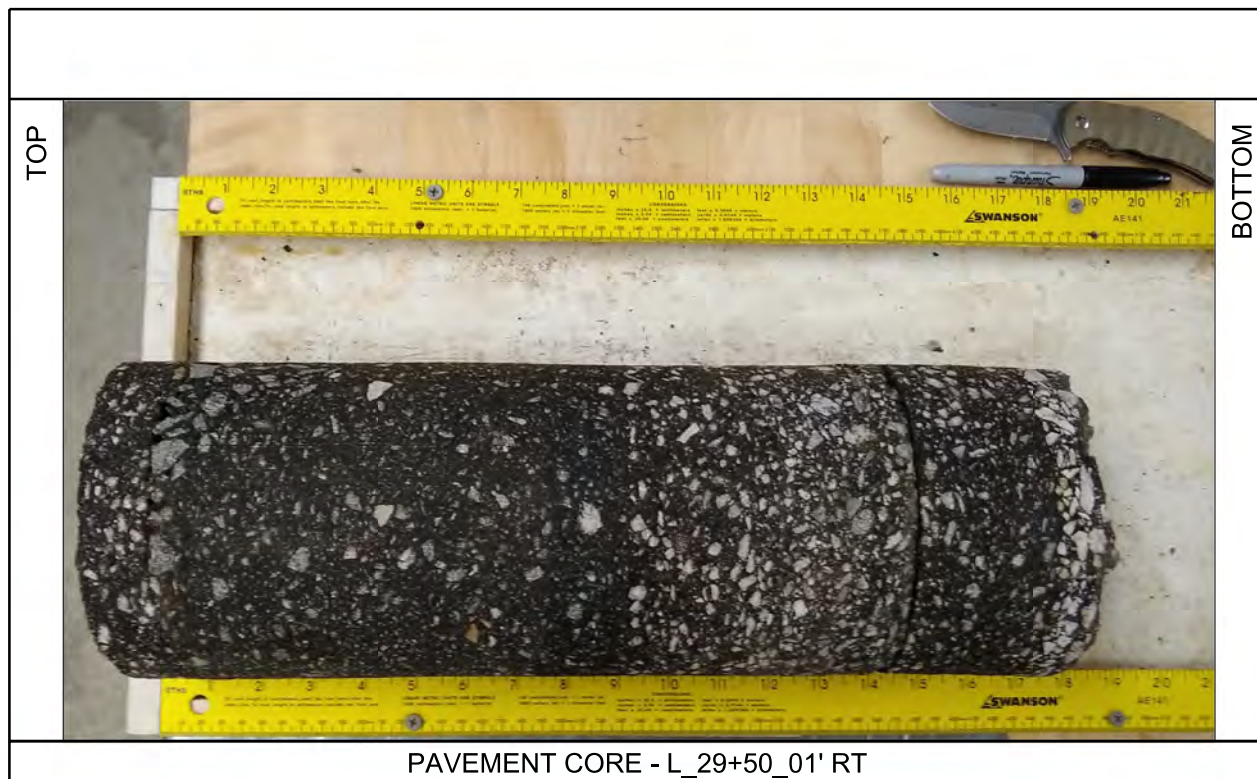
NEW HOPE CHURCH ROAD GRADE SEPARATION  
 WAKE COUNTY, NORTH CAROLINA  
 WBS NO.:46927.1.1 | TIP NO.:P-5715  
 FALCON PROJECT NO.: G17062.00



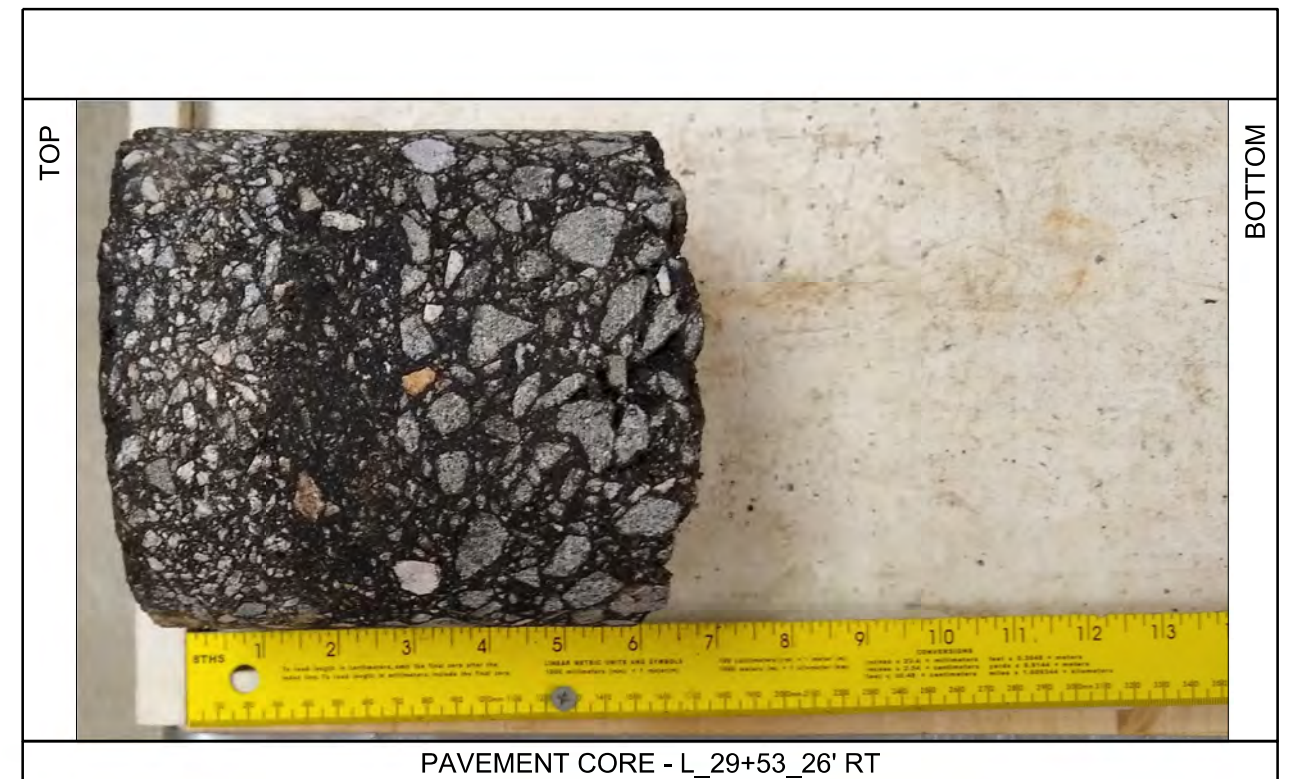
PAVEMENT CORE - L\_29+41\_32' LT



PAVEMENT CORE - L\_29+50\_12' LT



PAVEMENT CORE - L\_29+50\_01' RT



PAVEMENT CORE - L\_29+53\_26' RT




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PAVEMENT CORE PHOTOGRAPHS

NEW HOPE CHURCH ROAD GRADE SEPARATION  
 WAKE COUNTY, NORTH CAROLINA  
 WBS NO.:46927.1.1 | TIP NO.:P-5715  
 FALCON PROJECT NO.: G17062.00



	FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 CARY, NC 27513 PHONE: 919.871.0800 FAX: 919.871.0803	<b>PAVEMENT CORE PHOTOGRAPHS</b>
		NEW HOPE CHURCH ROAD GRADE SEPARATION WAKE COUNTY, NORTH CAROLINA WBS NO.:46927.1.1   TIP NO.:P-5715 FALCON PROJECT NO.: G17062.00





### DCP TEST DATA

File Name: L\_11+97\_16'LT

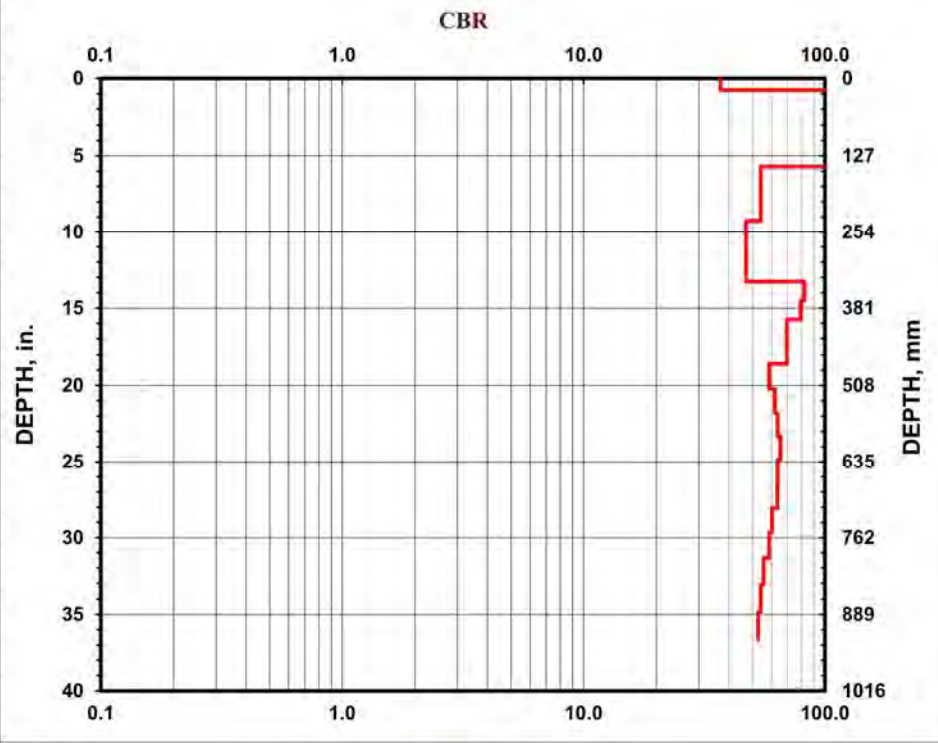
Project: New Hope Church G17062  
 Location: L\_11+97\_16'LT

Date: 26-Jul-18  
 Soil Type(s): Sandy Clay (A-6)

Hammer  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

Soil Type  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
Start	0	1
3	19	1
3	25	1
20	41	1
20	54	1
20	62	1
20	68	1
20	71	1
20	79	1
20	83	1
20	87	1
20	94	1
20	95	1
20	99	1
20	101	1
40	101	1
55	115	1
20	145	1
10	190	1
10	235	1
10	286	1
10	337	1
10	368	1
10	400	1
10	436	1
10	472	1
10	514	1
10	554	1
10	593	1
10	631	1
10	670	1
11	713	1
10	754	1
10	796	1
10	840	1
10	885	1
10	931	1



### DCP TEST DATA

File Name: L\_11+98\_28'LT

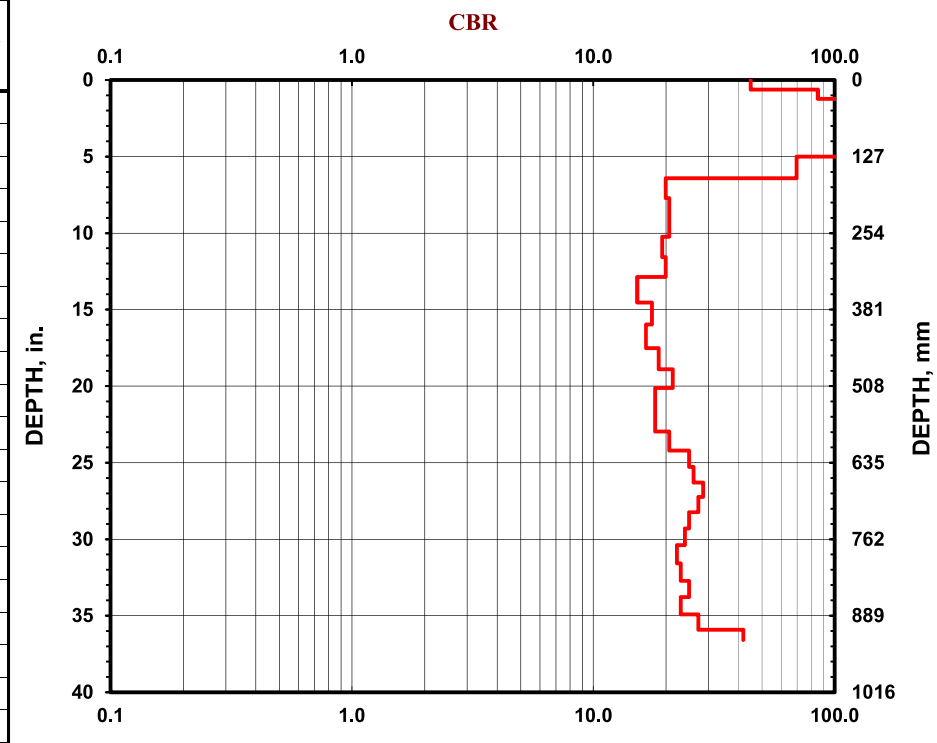
Project: New Hope Church G17062  
 Location: L\_11+98\_28'LT

Date: 25-Jul-18  
 Soil Type(s): Clay (A-6)

Hammer  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

Soil Type  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
Start	0	1
3	16	1
5	31	1
5	42	1
20	65	1
20	74	1
20	84	1
20	86	1
20	89	1
20	97	1
20	103	1
20	112	1
20	127	1
10	163	1
3	196	1
3	228	1
3	260	1
3	294	1
3	327	1
3	369	1
3	406	1
3	445	1
3	480	1
3	511	1
3	547	1
3	583	1
3	615	1
3	642	1
3	668	1
3	692	1
3	717	1
3	744	1
3	772	1
3	802	1
3	831	1
3	858	1
3	887	1
3	912	1
3	929	1



### DCP TEST DATA

File Name: L\_29+41\_32'LT

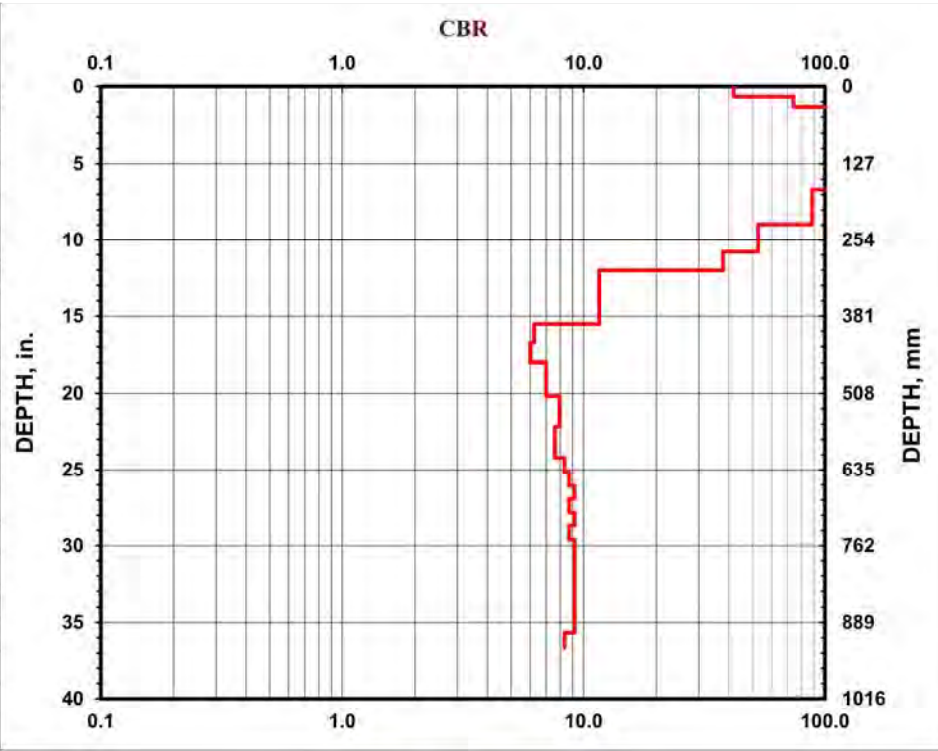
Project: New Hope Church G17062  
 Location: L\_29+41\_32'LT

Date: 6-Aug-18  
 Soil Type(s): Clay (A-6)

- Hammer
- 10.1 lbs.
  - 17.6 lbs.
  - Both hammers used

- Soil Type
- CH
  - CL
  - All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
start	0	1
3	17	1
5	34	1
10	58	1
10	77	1
10	101	1
10	122	1
10	147	1
10	170	1
10	199	1
10	228	1
10	274	1
5	305	1
5	394	1
1	425	1
1	457	1
1	485	1
1	513	1
1	538	1
1	563	1
1	589	1
1	615	1
1	639	1
1	662	1
1	684	1
1	707	1
1	729	1
1	752	1
1	774	1
1	796	1
1	818	1
1	840	1
1	862	1
1	884	1
1	906	1
1	930	1



### DCP TEST DATA

File Name: L\_29+50\_12'LT

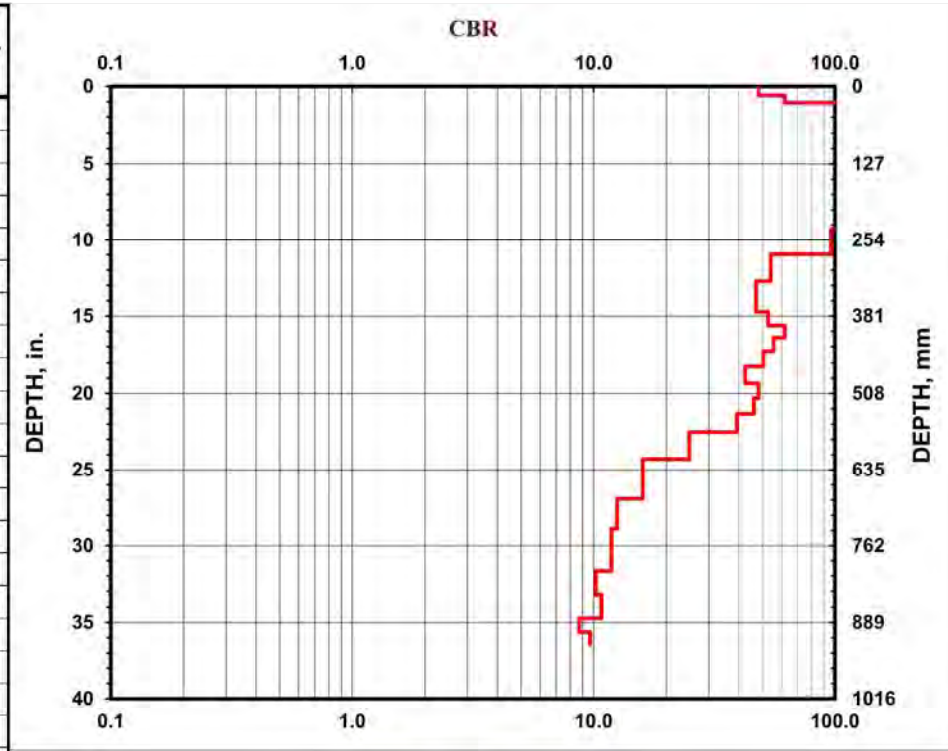
Project: New Hope Church G17062  
 Location: L\_29+50\_12'LT

Date: 6-Aug-18  
 Soil Type(s): Clayey Sand (A-2-4)

- Hammer
- 10.1 lbs.
  - 17.6 lbs.
  - Both hammers used

- Soil Type
- CH
  - CL
  - All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
start	0	1
3	15	1
3	27	1
5	39	1
10	60	1
10	76	1
10	91	1
10	101	1
20	123	1
20	139	1
20	150	1
30	159	1
30	169	1
30	172	1
30	180	1
30	196	1
20	211	1
20	235	1
16	278	1
10	323	1
10	374	1
5	397	1
5	417	1
5	439	1
5	463	1
5	491	1
5	516	1
5	542	1
5	572	1
5	617	1
5	684	1
3	734	1
2	769	1
2	804	1
2	844	1
2	882	1
1	905	1
1	926	1



### DCP TEST DATA

File Name: L\_29+50\_01'RT

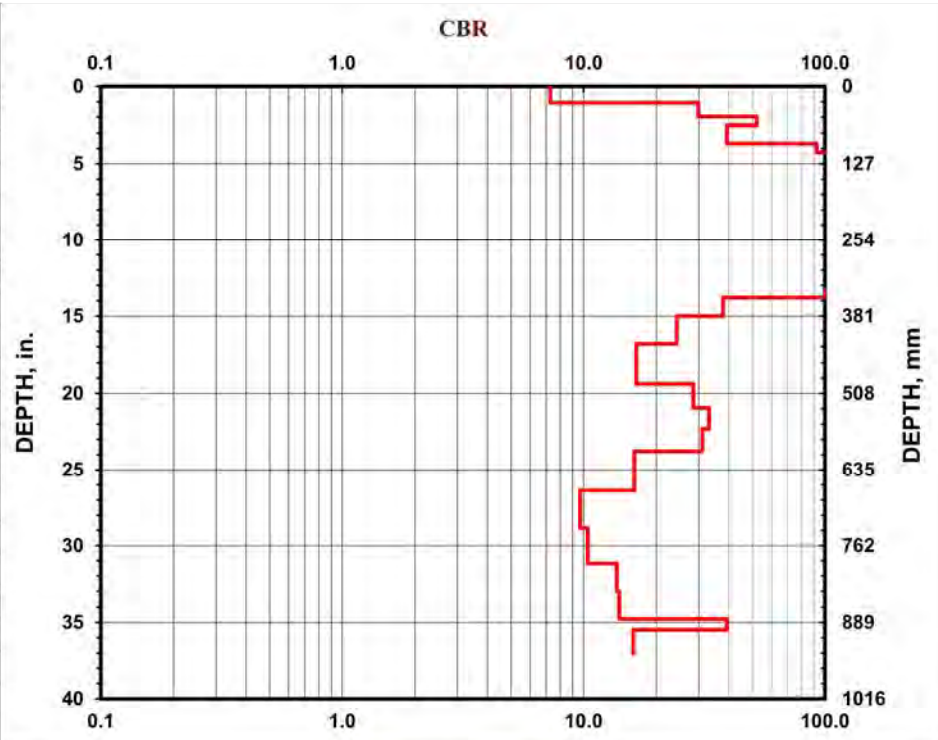
Project: New Hope Church G17062  
 Location: L\_29+50\_01'RT

Date: 25-Jul-18  
 Soil Type(s): Silty Sand (A-2-4)

Hammer  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

Soil Type  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
start	0	1
1	27	1
3	50	1
3	64	1
5	94	1
5	108	1
50	120	1
50	128	1
50	133	1
50	143	1
40	150	1
50	162	1
10	167	1
20	170	1
50	167	1
60	177	1
50	188	1
30	203	1
20	232	1
20	243	1
20	247	1
40	290	1
20	337	1
5	350	1
5	381	1
5	427	1
5	492	1
5	532	1
5	567	1
5	604	1
5	670	1
3	733	1
3	792	1
3	838	1
3	883	1
3	901	1
3	941	1



### DCP TEST DATA

File Name: L\_29+53\_26'RT

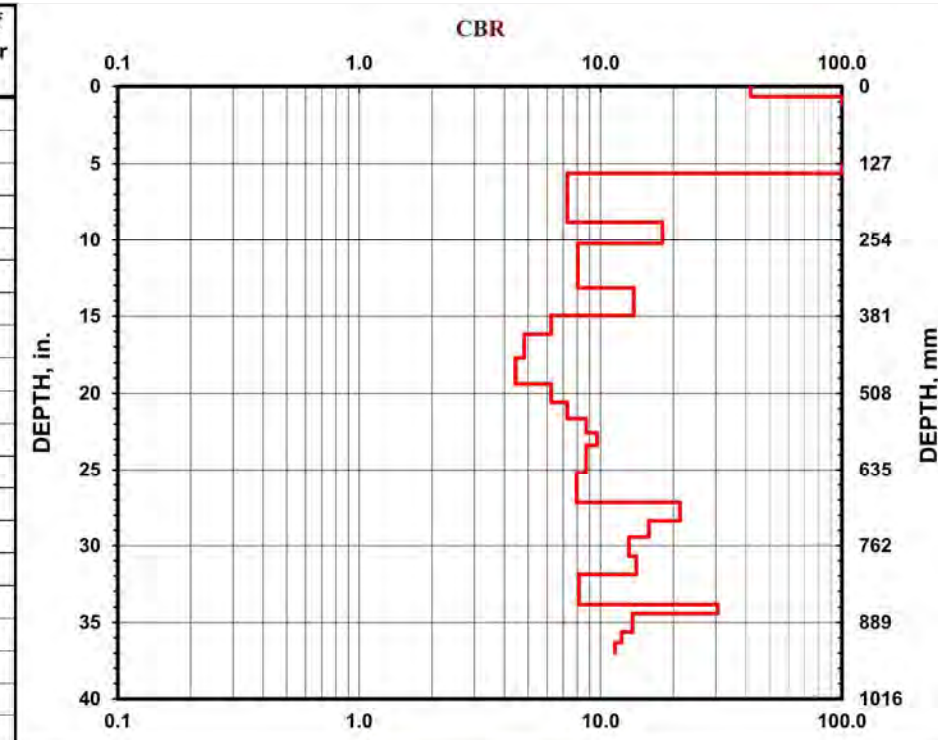
Project: New Hope Church G17062  
 Location: L\_29+53\_26'RT

Date: 7-Aug-18  
 Soil Type(s): Sandy Clay (A-6)

Hammer  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

Soil Type  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
Start	0	1
3	17	1
5	30	1
5	37	1
5	45	1
5	56	1
10	63	1
10	72	1
10	82	1
10	94	1
10	104	1
10	111	1
50	115	1
5	127	1
10	130	1
5	143	1
3	224	1
3	260	1
3	334	1
3	380	1
1	411	1
1	450	1
1	492	1
1	523	1
1	550	1
1	573	1
1	594	1
2	640	1
2	690	1
3	721	1
2	748	1
2	780	1
2	810	1
2	859	1
2	874	1
2	905	1
1	922	1
1	940	1



**DCP TEST DATA**

File Name: Y1\_12+44\_10'RT

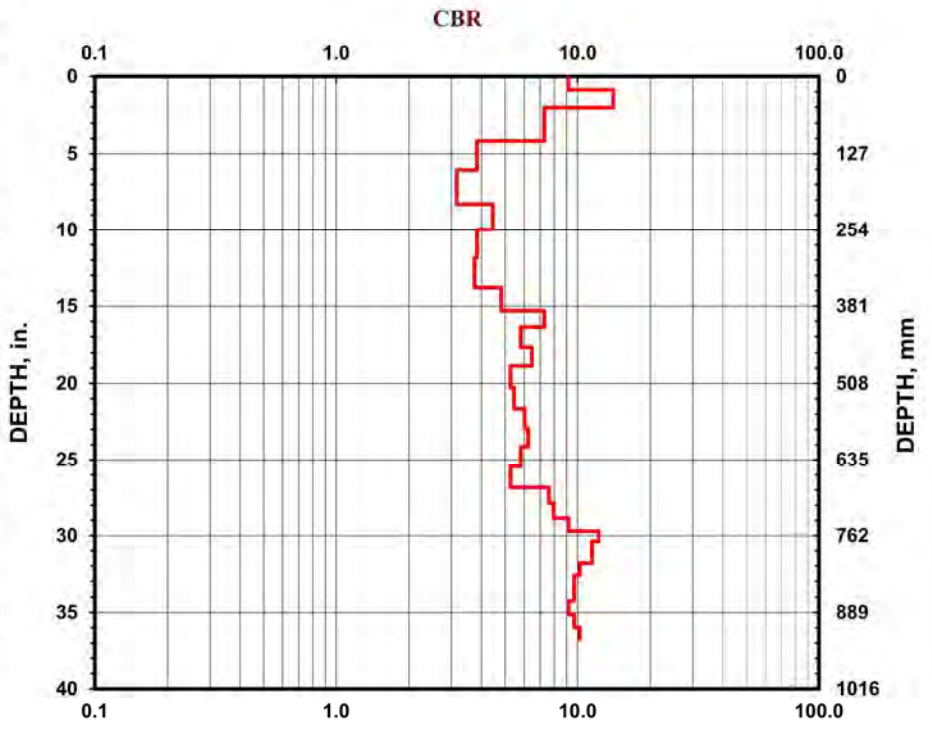
**Project:** New Hope Church G17062  
**Location:** Y1\_12+44\_10'RT

**Date:** 9-Aug-18  
**Soil Type(s):** Clay (A-6)

Hammer  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

Soil Type  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
Start	0	1
1	22	1
2	52	1
2	106	1
1	154	1
1	211	1
1	253	1
1	301	1
1	350	1
1	389	1
1	416	1
1	449	1
1	479	1
1	515	1
1	550	1
1	582	1
1	613	1
1	646	1
1	682	1
1	708	1
1	733	1
1	755	1
1	772	1
1	790	1
1	808	1
1	828	1
1	849	1
1	870	1
1	892	1
1	913	1
1	933	1



**DCP TEST DATA**

File Name: Y2\_16+17\_03'LT

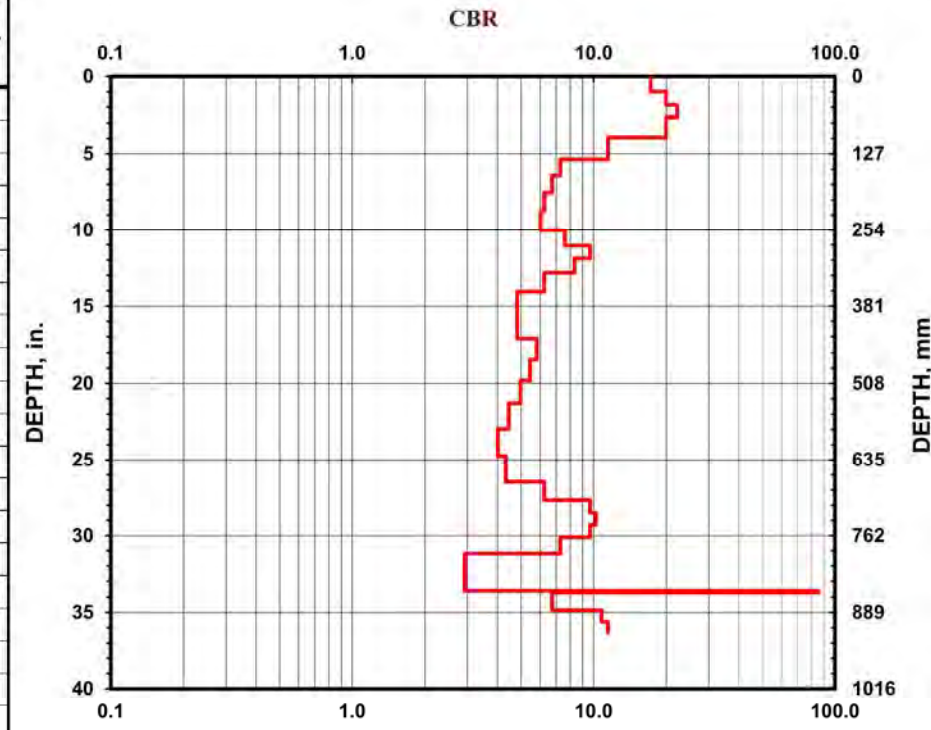
**Project:** New Hope Church G17062  
**Location:** Y2\_16+17\_03'LT

**Date:** 7-Aug-18  
**Soil Type(s):** Clay (A-6)

Hammer  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

Soil Type  
 CH  
 CL  
 All other soils

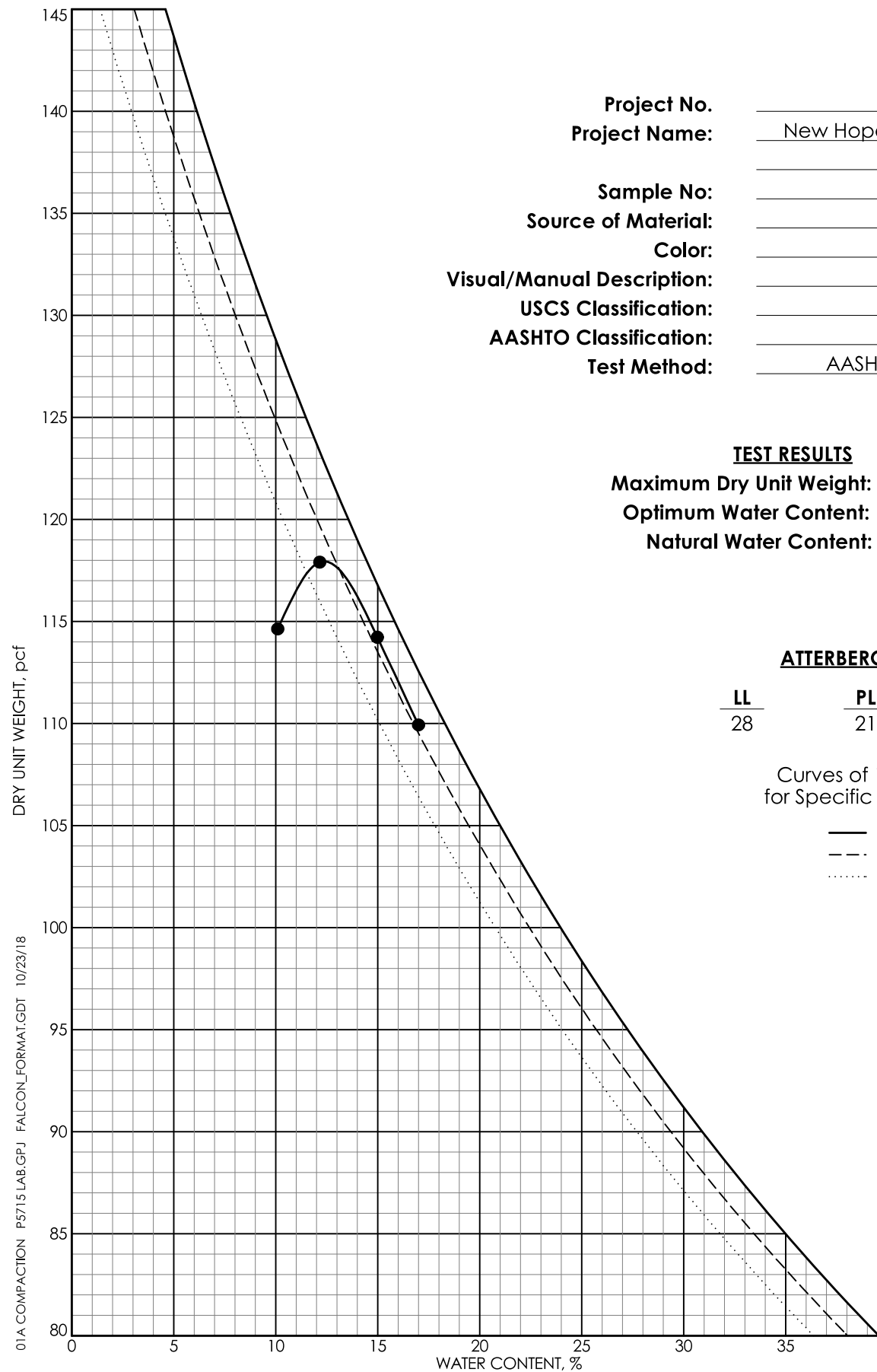
No. of Blows	Accumulative Penetration (mm)	Type of Hammer
Start	0	1
2	25	1
2	47	1
2	67	1
3	100	1
2	136	1
1	163	1
1	192	1
1	223	1
1	255	1
1	281	1
1	302	1
1	326	1
1	357	1
1	396	1
1	435	1
1	468	1
1	503	1
1	541	1
1	583	1
1	629	1
1	672	1
1	703	1
1	724	1
1	744	1
1	765	1
1	792	1
1	853	1
1	856	1
1	885	1
1	904	1
1	922	1



**REFERENCE: P-5715**

**PROJECT: 46927**

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
APPENDIX B  
LABORATORY RESULTS**



Project No: P-5715  
 Project Name: New Hope Church Road Grade  
 Separation  
 Sample No: BS-2  
 Source of Material: B-09  
 Color: Tan  
 Visual/Manual Description:  
 USCS Classification:  
 AASHTO Classification:  
 Test Method: AASHTO T-99 Method A

**TEST RESULTS**  
 Maximum Dry Unit Weight: 117.9 PCF  
 Optimum Water Content: 12.3 %  
 Natural Water Content: 6.8 %

**ATTERBERG LIMITS**

LL	PL	PI
28	21	7

Curves of 100% Saturation  
for Specific Gravity Equal to:

- 2.6
- - - 2.5
- ..... 2.4

FALCON ENGINEERING

1210 TRINITY RD., SUITE 110, Cary, NC 27513

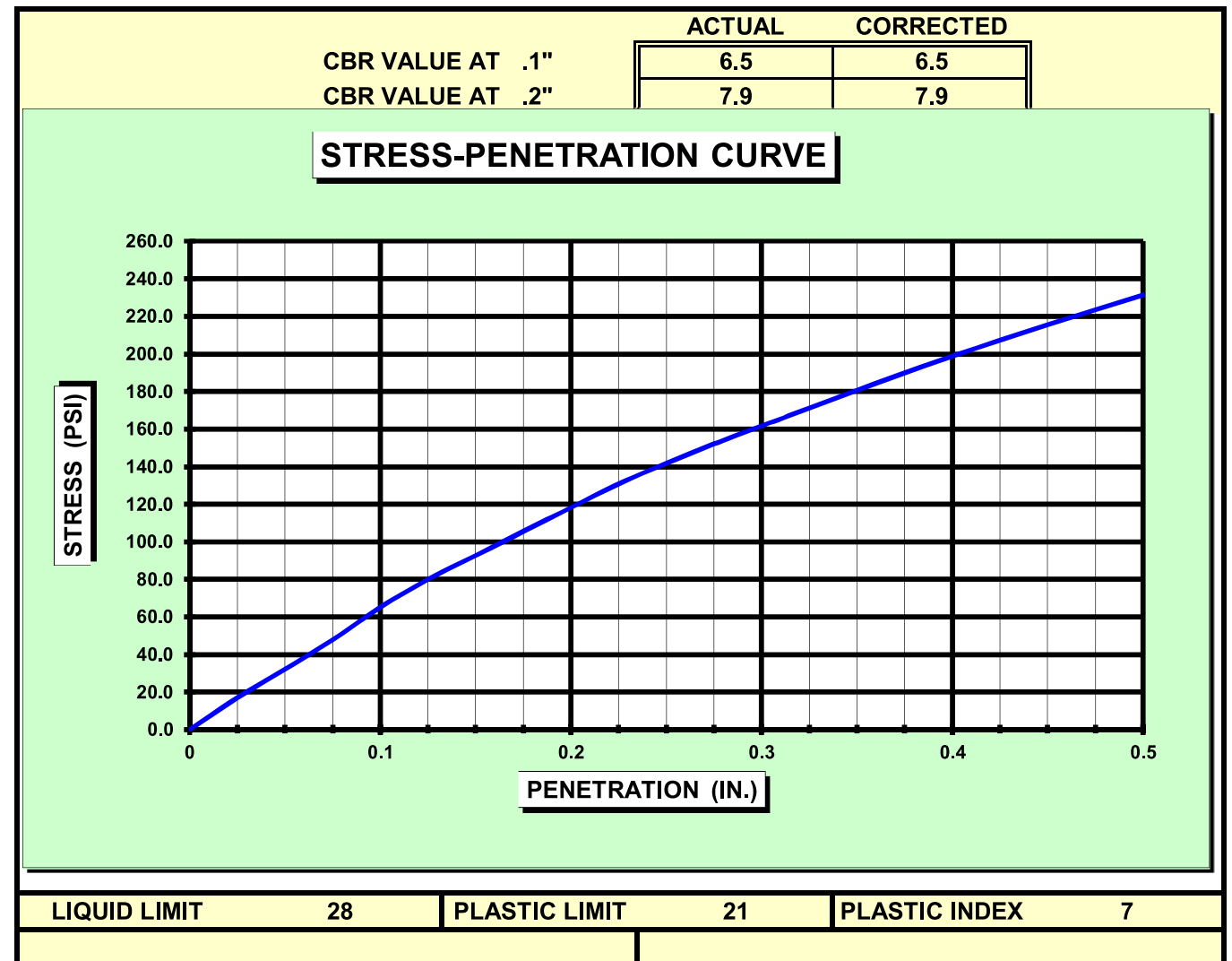
CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193

PROJECT #: G17062.00 DATE: 9/16/2018  
 PROJECT NAME: New Hope Church Road  
 BORING: B-09 SAMPLE: BS-2 DEPTH: 3.5-13.5

SOIL DESCRIPTION: Tan Silt (A-4)

COMPACTION METHOD	AASHTO T-99A	SOAK	96 HRS.
MAXIMUM DRY DENSITY	117.9 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	12.3%	LOAD CELL	6000
TEST DATA		SURCHARGE WEIGHT	
DRY DENSITY	114.6 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	14.0%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	97.2%	SWELL	0.79%



08-NOV-2018 11:19 T:\Projects\2017\G7062.00 Stantec P-5715 New Hope Church Road Grade Separation\5715\_NCDOT\_Electronic\_File\_Tree\Geotech\InvestigationDesign\5715\_GEO\_RDWY\CADD\_GEO\TECH\PlanProf\_09/28/19 cadmachine AT CAD

**TIP PROJECT: P-5715**

**CONTRACT: 46927**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

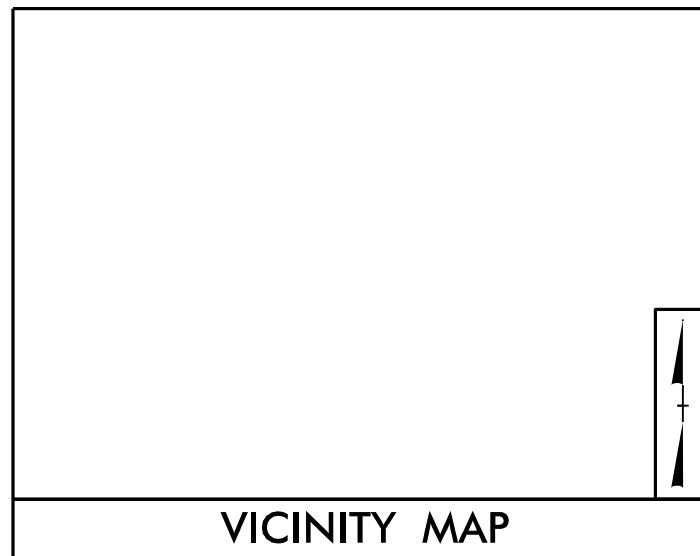
**WAKE COUNTY**

LOCATION: NEW HOPE CHURCH ROAD GRADE SEPARATION

TYPE OF WORK: GRADING, PAVING, DRAINAGE, STRUCTURE,  
AND RETAINING WALLS

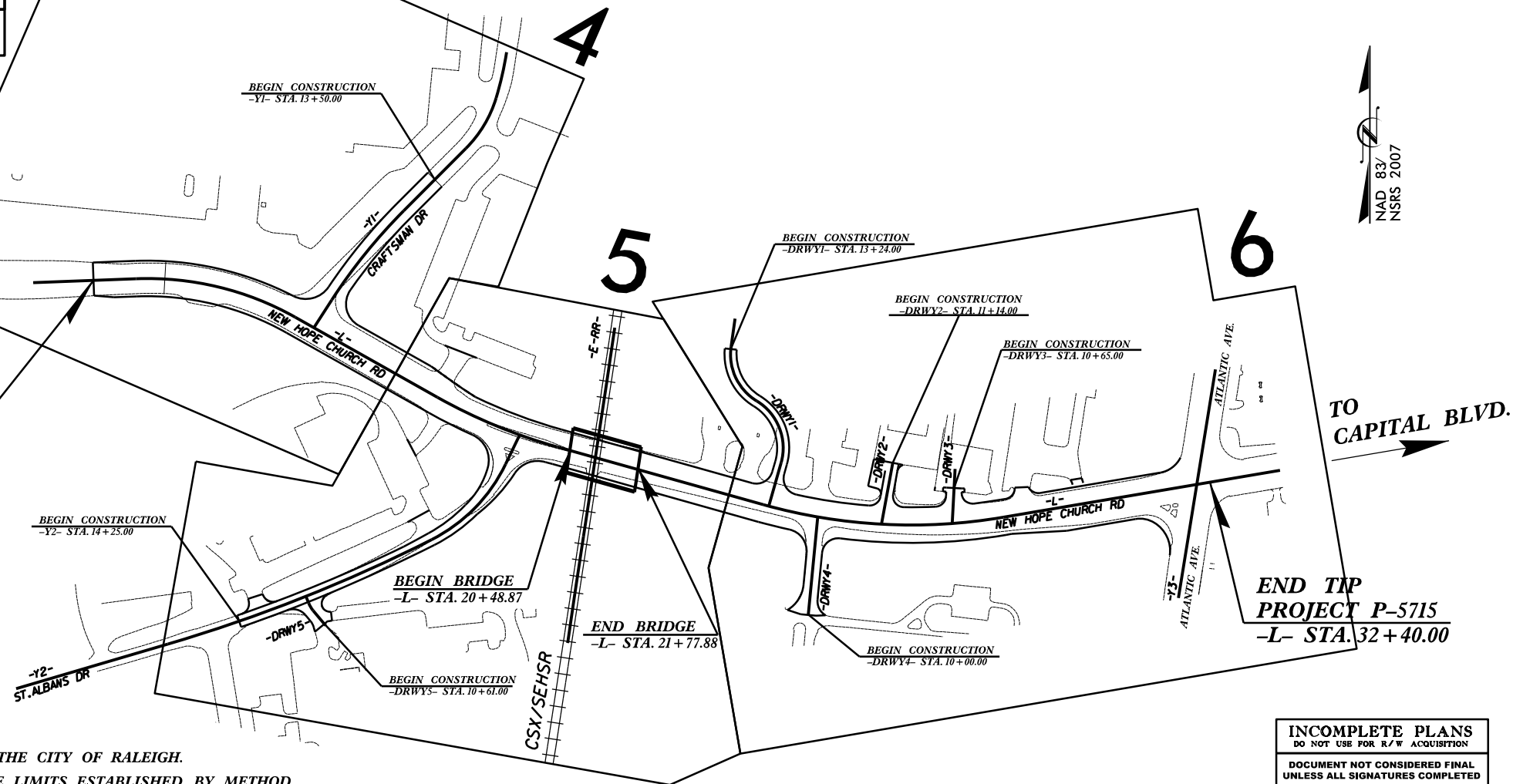
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5715	2A	24
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
47117.1.1	N/A	P.E.	
47117.2.1	N/A	ROW, UTIL.	
47117.3.1	N/A	CONSTR.	

25% PLANS



BEGIN TIP PROJECT P-5715  
-L- POT STA. 11+10.00

TO WAKE FOREST ROAD



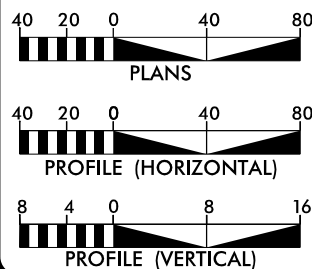
END TIP PROJECT P-5715  
-L- STA. 32+40.00

TO CAPITAL BLVD.

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF RALEIGH.  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD \_\_\_\_\_

INCOMPLETE PLANS  
DO NOT USE FOR R/W ACQUISITION  
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2020 = 23,496  
 ADT 2040 = 28,800  
 K = 8%  
 D = 65%  
 T = 3%\*  
 V = 35  
 \*TTST 1% DUAL 2%  
 FUNC CLASS = MINOR ARTERIAL

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT P-5715 = 0.379 MILES  
 LENGTH OF STRUCTURES TIP PROJECT P-5715 = 0.024 MILES  
 TOTAL LENGTH OF TIP PROJECT P-5715 = 0.403 MILES

Prepared In the Office of:



for the North Carolina Department of Transportation

2018 STANDARD SPECIFICATIONS	STANTEC CONTACT
RIGHT OF WAY DATE: NOVEMBER 20, 2018	STEVE SMALLWOOD, PE PROJECT ENGINEER
LETTING DATE: JUNE 16, 2020	NCDOT CONTACT: KUMAR TRIVEDI, PE

HYDRAULICS ENGINEER

SIGNATURE: \_\_\_\_\_ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: \_\_\_\_\_ P.E.

