Transportation

PAT McCRORY
Governor

NICHOLAS J. TENNYSON
Secretary

May 2, 2016

MEMORANDUM TO: Judith Corley-Lay, P.E., Ph.D.
State Pavement Management Engineer

Glen W. Mumford, P.E.
State Roadway Design Engineer

FROM: J. L. Pilipchuk, P.E., L.G.
State Geotechnical Engineer

DS MAM

DocuSigned by: John Pilipchuk
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STATE PROJECT: 43608.1.1 (I-5506) – Turnkey
COUNTY: Wake

DESCRIPTION: I-40 and SR 1002 (Aviation Parkway) Interchange

SUBJECT: Geotechnical Recommendations for Pavement Design

The Geotechnical Engineering Unit has completed the evaluation of the pavement design investigation for this project and presents the following recommendations.

The project consist of widening the existing multi-lane facility to construct a four-lane divided roadway with a center raised median and curb and gutter.

Soil Type: The predominant soils encountered consist of Triassic and roadway embankment soils. Soil types were sandy silt (A-4), clayey silt (A-5) and silty clay (A-7)

The project mainline is approximately 90 percent embankment. Anticipated borrow will likely consist of Triassic sandy silt (A-4) and silty clay (A-7). The design soil type is silty clay (A-4).

The length of this project is 0.849 miles.

Pavement Design Inputs: The following values are recommended to be used with the Design soil type:

ENVIRONMENTAL INPUTS								
TYPE	PASSING #200 SIEVE (%)	OPTIMUM MOISTURE CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	D_{60} (in)	LL	PI	SPECIFIC GRAVITY (G_S)	CBR
Sandy Silt	64	15.2	110.0	0.0216	33	7	2.69	7.9
Sandy Silt	50	11.2	118.4	0.0102	32	5	2.74	8.6

LIME AND CEMENT STABILIZATION INPUTS											
YOUNGS MODULUS		POISSON'S RATIO		UNCONFINED COMPRESISSIVE STRENGTH							
LIME	CEMENT	LIME	CEMENT	LIME (psi)				CEMENT (psi)			
30,000 psi	150,000 psi	0.15	0.15	76.6	64.1	75.0	80.5	146.8	133.4	239.2	258.3

DESIGN AND CONSTRUCTION RECOMMENDATIONS

I. Embankment Stability

A. The following areas may require Geotextile for Pavement Stabilization. These areas should be investigated during construction to determine if the Geotextile is required. Notify the Engineer when the roadbed is completed within 2" of subgrade elevation. The Engineer will sample and test subgrade soils for quality to determine if geotextile for pavement stabilization is required at locations shown in the plans and the other locations as directed. For subgrades without stabilization, allow 24 days to determine if geotextile for pavement stabilization is required. For stabilized subgrades with geotextile for pavement stabilization, stabilize subgrade soils to 12" beyond the base course as shown in plans.

Recommend 10,650 square yards of Geotextile for Pavement Stabilization as a contingency to be used at the discretion of the Engineer.

LINE	STATION	STATION	SY
-L-	47+50	49+00	1100
-L-	52+25	54+75	1800
-RPB-	22+00	26+50	1350
LPB	15+00	19+28	1300
-Y-	62+50	75+00	4000
-Y-	79+50	83+00	1100

II. Subgrade Stability

A. Aggregate Stabilization

Stabilizer Aggregate

Recommend a quantity of 500 tons of Stabilizer Aggregate to be include in the project contract as a contingency item.

B. Stabilize subgrade for the project (mainline, ramps, loops) as follows:

(a) Lime Stabilization (method-slurry) 50% of project; 20lbs/yd^2 @ 8 in. depth.

(b) Cement Stabilization 50% of project; 55lbs/yd^2 @ 7 in. depth.

C. Aggregate Subgrade
Recommend a quantity of 2,500 cubic yards of shallow undercut to be included in the project contract as a contingency item.

Geotextile for Soil Stabilization
Recommend 7,500 square yards of Geotextile for Soil Stabilization to be included in the project contract as a contingency item.

Class IV Subgrade Stabilization
Recommend 5,000 tons of Class IV Subgrade Stabilization material to be included in the project contract as a contingency item.

III. Miscellaneous

A. Proof Rolling
It is recommended that proof rolling be performed on this project and should conform to Standard Specifications, Article 260.

B. Blotting Sand
Recommend 20 tons of Blotting Sand to be included in the project contract as a contingency item.

Note: For additional recommendation and quantities refer to the Geotechnical Report-Final Design and Construction Recommendations.

JLP/MAM/JBB

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ATTACHMENT 4:	Dynamic Cone Penetrometer Tests	18

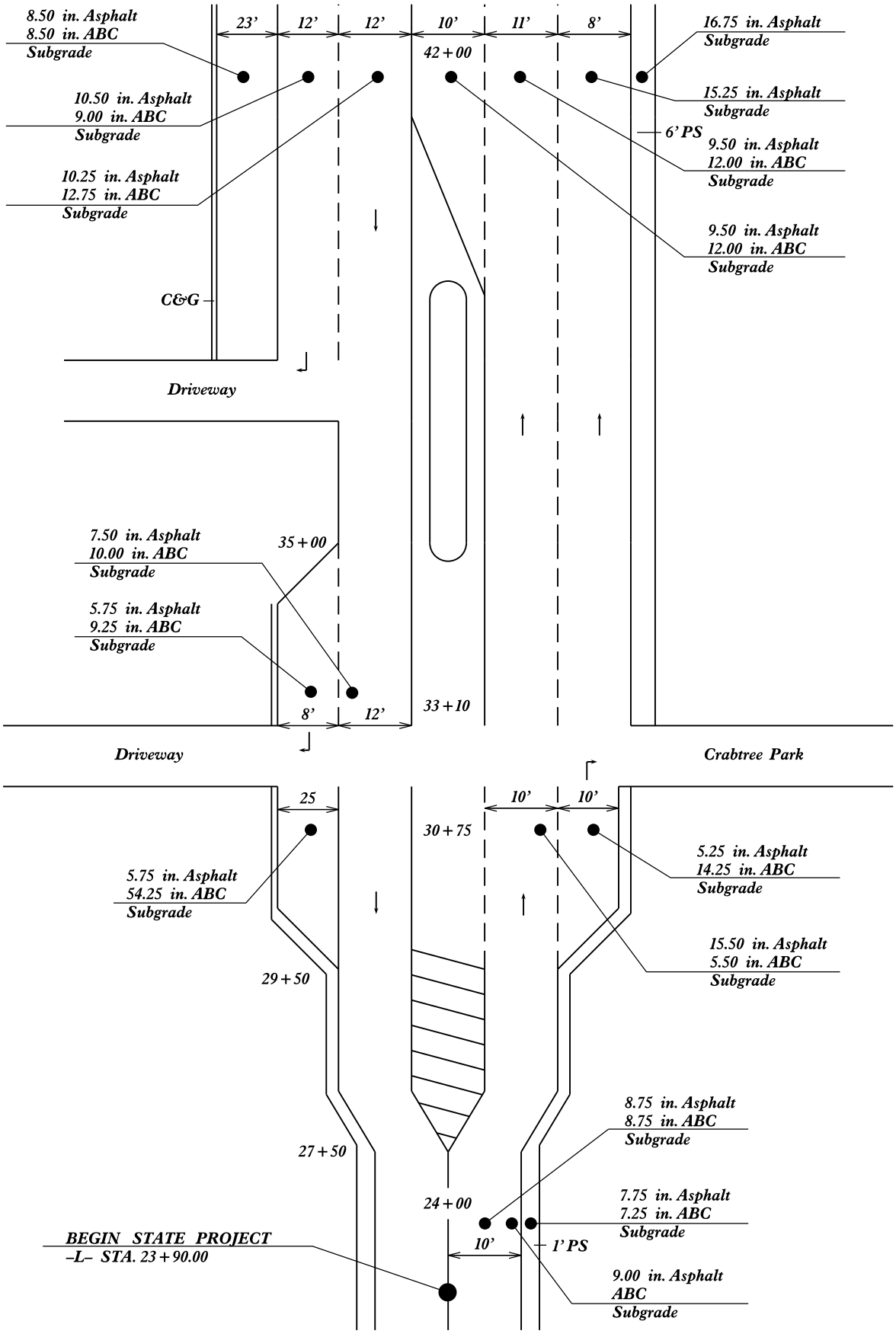
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
Summary of Quantities

WBS Number: 43608.1.1 County: WAKE Project Engineer:
TIP Number: I-5506 Field Office: CENTRAL Project Geologist: J. B. BARFIELD
Description: I-40 and SR 1002 (Aviation Parkway) Interchange

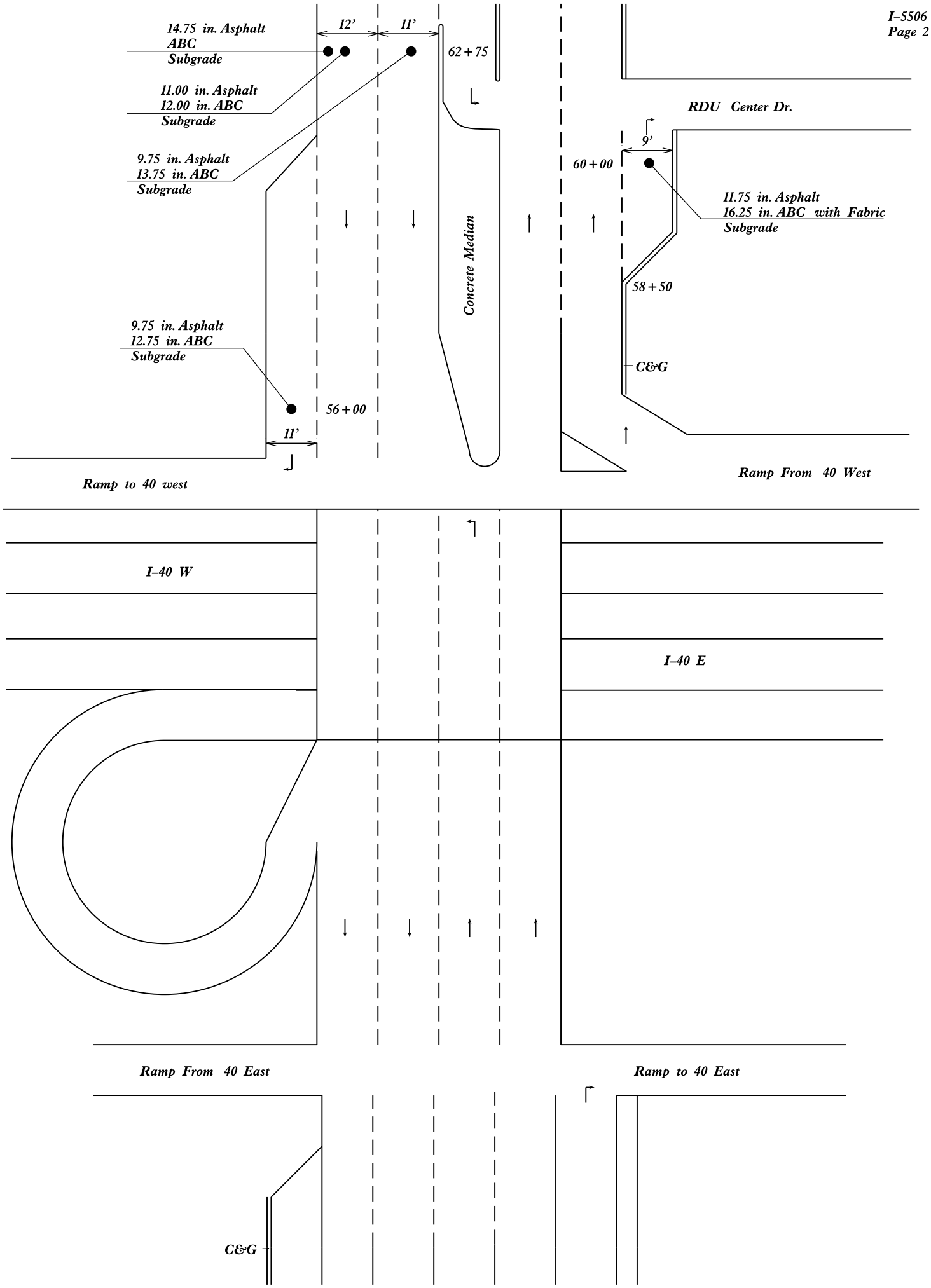
Pay Item No.	Pay Item/ Quantity Adjustment	Spec Book Section No. or Special Provision (SP) Reference	Report Section	Alignment	Begin Station	End Station	Quantity	Units / %
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. C	Contingency	N/A	N/A	7,500	SY
						Total Quantity of Geotextile for Soil Stabilization =	**7,500**	**SY**
1099500000-E	Shallow Undercut	505 - Aggregate Subgrade	II. C	Contingency	N/A	N/A	2,500	CY
						Total Quantity of Shallow Undercut =	**2,500**	**CY**
1099700000-E	Class IV Subgrade Stabilization	505 - Aggregate Subgrade	II. C	Contingency	N/A	N/A	5,000	TON
						Total Quantity of Class IV Subgrade Stabilization =	**5,000**	**TON**
1110000000-E	Stabilizer Aggregate	510 - Aggregate Stabilization	II. A	Contingency	N/A	N/A	500	TON
						Total Quantity of Stabilizer Aggregate =	**500**	**TON**
1115000000-E	Geotextile for Pavement Stabilization	SP - Geotextile for Pavement Stabilization	I. A	Varies	N/A	N/A	10,650	SY
						Total Quantity of Geotextile for Pavement Stabilization =	**10,650**	**SY**
2143000000-E	Blotting Sand	818 - Blotting Sand	III. B	Contingency	N/A	N/A	20	TON
						Total Quantity of Blotting Sand =	**20**	**TON**
N/A	Lime-Treated Soil	501 - Lime-Treated Soil	II. B	Varies	N/A	N/A	50	%
						Total Quantity of Lime-Treated Soil =	**50**	**%**
N/A	Soil-Cement Base	542 - Soil-Cement Base	II. B	Varies	N/A	N/A	50	%
						Total Quantity of Soil-Cement Base =	**50**	**%**

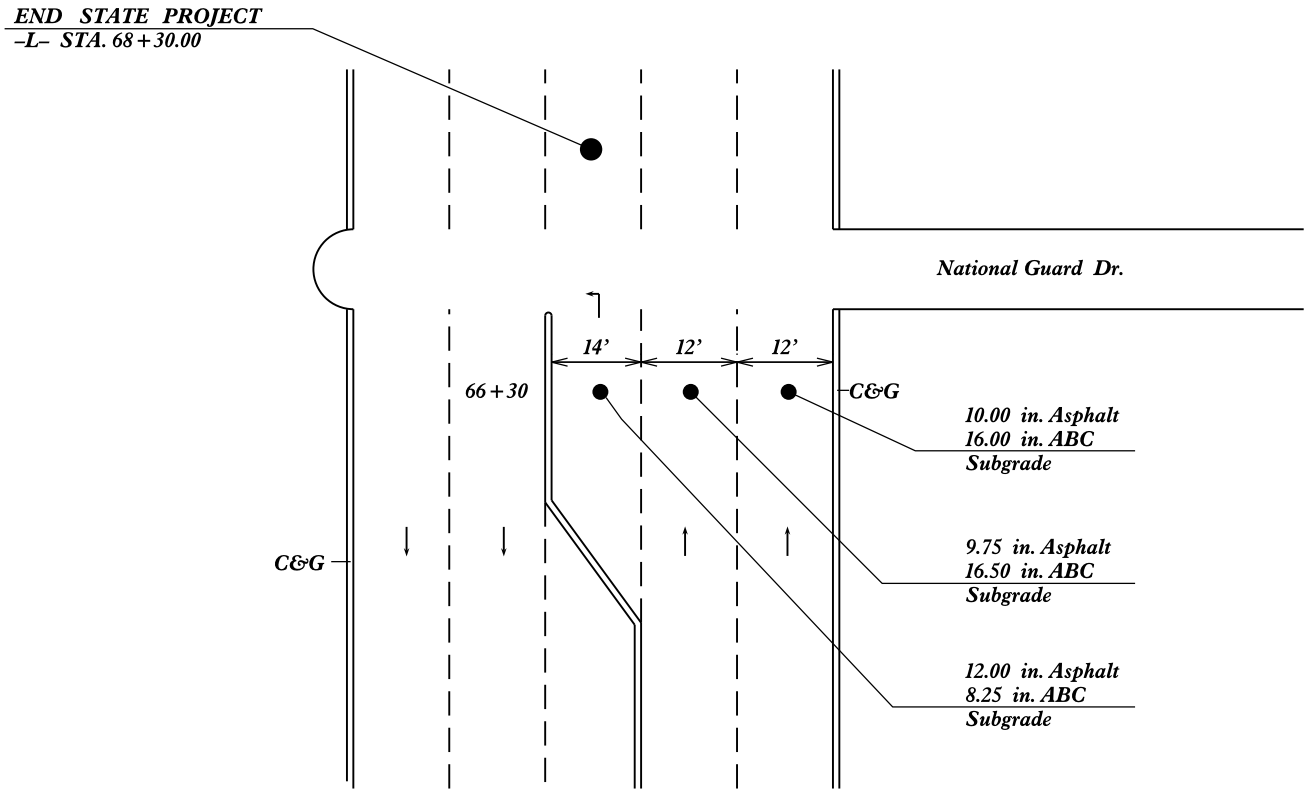
State Project No.: 43608.1.1 (I–5506) Wake County

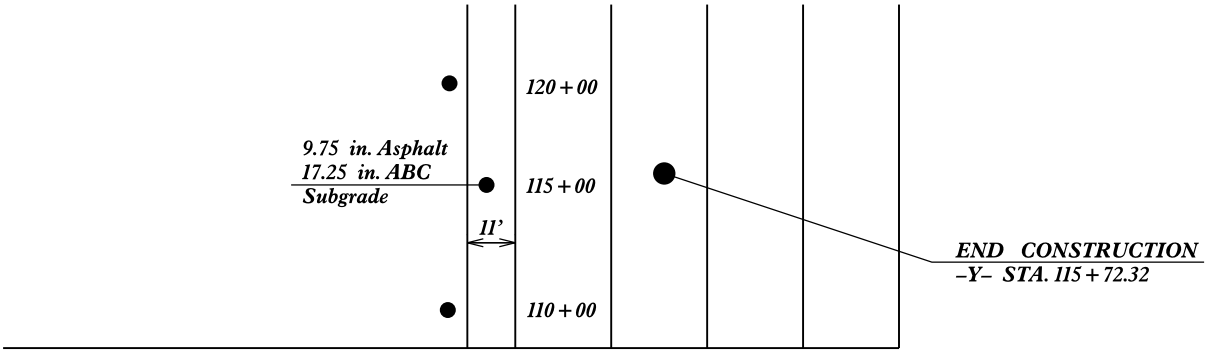
Description: I–40 and SR 1002 (Aviation Parkway) Interchange

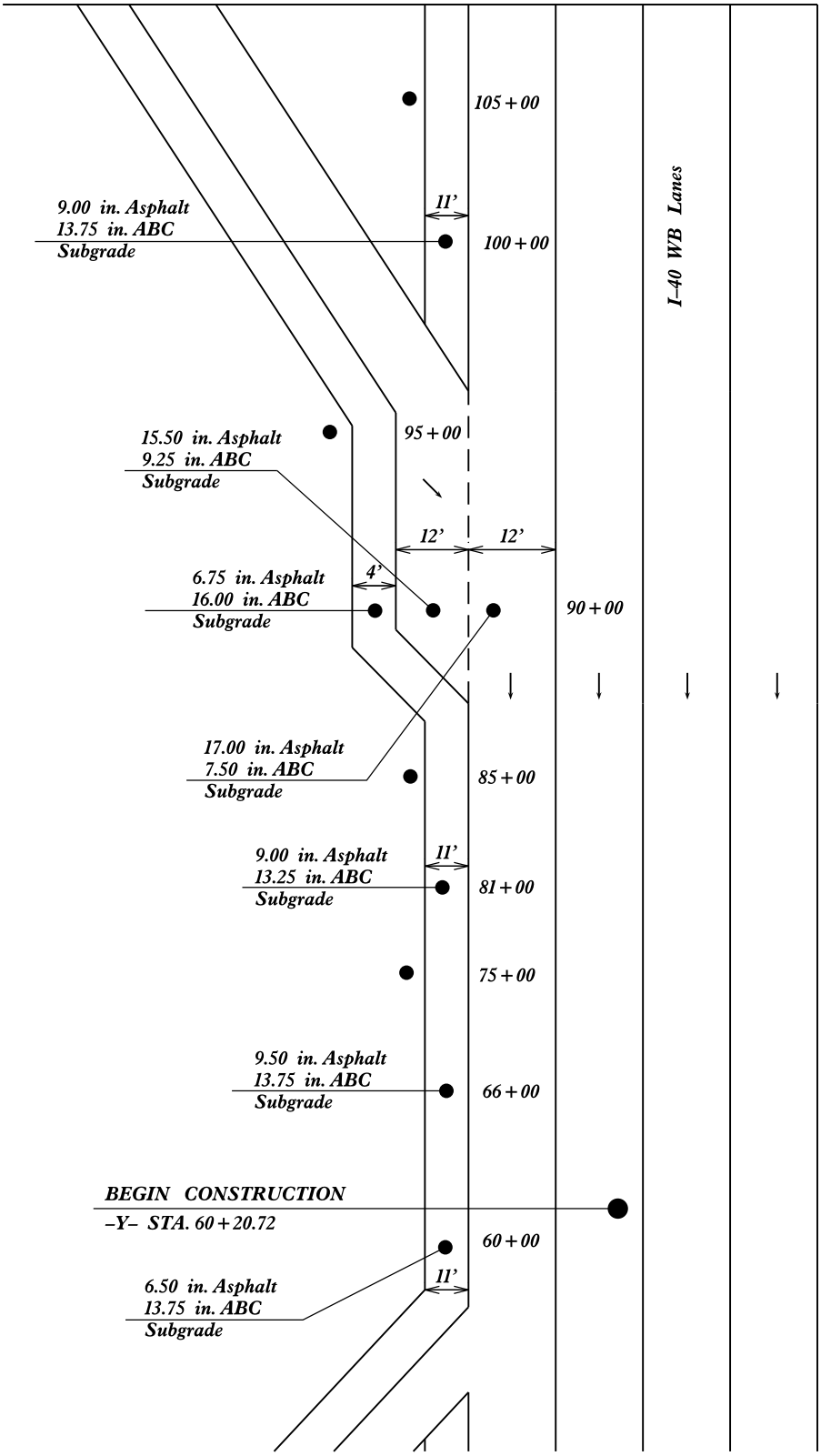


Not to Scale


14.75 in. Asphalt
ABC
Subgrade
12'
11'
62 + 75
11.00 in. Asphalt
12.00 in. ABC
Subgrade
9.75 in. Asphalt
13.75 in. ABC
Subgrade
Concrete Median
9.75 in. Asphalt
12.75 in. ABC
Subgrade
56 + 00
11'
Ramp to 40 west
RDU Center Dr.
9'
60 + 00
11.75 in. Asphalt
16.25 in. ABC with Fabric
Subgrade
58 + 50
C&G
Ramp From 40 West
I–40 W
I–40 E
Ramp From 40 East
Ramp to 40 East
C&G


END STATE PROJECT
–L– STA. 68+30.00
National Guard Dr.
14'
12'
12'
66+30
C&G
C&G
10.00 in. Asphalt
16.00 in. ABC
Subgrade
9.75 in. Asphalt
16.50 in. ABC
Subgrade
12.00 in. Asphalt
8.25 in. ABC
Subgrade


120 + 00
9.75 in. Asphalt
17.25 in. ABC
Subgrade
115 + 00
11'
END CONSTRUCTION
–Y– STA. 115 + 72.32
110 + 00


105 + 00
I–40 WB Lanes
9.00 in. Asphalt
13.75 in. ABC
Subgrade
11'
100 + 00
15.50 in. Asphalt
9.25 in. ABC
Subgrade
95 + 00
12'
12'
6.75 in. Asphalt
16.00 in. ABC
Subgrade
4'
90 + 00
17.00 in. Asphalt
7.50 in. ABC
Subgrade
85 + 00
9.00 in. Asphalt
13.25 in. ABC
Subgrade
11'
81 + 00
75 + 00
9.50 in. Asphalt
13.75 in. ABC
Subgrade
66 + 00
BEGIN CONSTRUCTION
–Y– STA. 60 + 20.72
60 + 00
6.50 in. Asphalt
13.75 in. ABC
Subgrade
11'

PAVEMENT CORES FOR
43608.1.1, I-5506, Wake County

LINE	STATION	ABC (in)	LAYER THICKNESS (in)	LAYERS	REMARKS
-L-	24+00 RT LN (I) 8.75 in. Asphalt	8.75	7.00	S	5 lifts, lifts 1-2 delaminated, the side wall of the core for lifts 2, 3 and 5 stripped of AC and fine aggregate from coring
			1.75	I	1 lift, 2.75" bottom-up crack
-L-	24+00 RT LN (O)	-	9.00		Crumbled, white line present on bottom of one of the pieces
-L-	24+00 RT PS 7.75 in. Asphalt	7.25	5.50	S	3 lifts, lifts 2-3 delaminated, side wall for lift 3 moderately stripped from coring
			1.25	I	1 lift, moderate severity stripping, bottom 1" missing
-L-	30+75 RT LN 15.5 in. Asphalt	5.50	3.25	S	2 lifts
			1.50	I	1 lift
			2.50	S	2 lift, next section of core crumbled
			2.50	S	2 lifts, moderate severity stripping
			0.50		Cse aggregate
-L-	30+75 RTL (RT) 5.25 in. Asphalt	14.25	2.50	S	2 lifts
			2.75	B	1 lift
-L-	30+75 LT PS 5.75 in. Asphalt	54.25	2.75	S	2 lifts
			3.00	I	1 lift
-L-	33+10 RTL (LT)	9.25	5.75	S	3 lifts, low severity stripping at contact between lifts 1 & 2
-L-	33+10 LT LN	10.00	7.50	S	4 lifts, full depth crack, 3 pieces
-L-	42+00 LT PS 8.5 in. Asphalt	8.50	3.00	S	2 lifts
			5.50	I	2 lifts
-L-	42+00 RTL (LT) 10.5 in. Asphalt	9.00	10.50	S	6 lifts, 1.5" top-down crack, low severity stripping in lift 1, mechanical break at 3.5", 4" bottom-up crack
-L-	42+00 LT LN 10.25 in. Asphalt	12.75	7.75	S	5 lifts, mechanical break at 5.5", the side wall of lift 5 has low severity stripping from coring
			2.50	I	1 lift
-L-	42+00 RT ISL 9.5 in. Asphalt	12.00	7.50	S	6 lifts, lift 1 delaminated, top of lift 3 yellow line, mechanical break at 4.25", the side wall of lifts 2-6 have low severity stripping from coring
			2.00	I	1 lift
-L-	42+00 RT OSL 9.5 in. Asphalt	12.00	8.00	S	6 lifts, lift 6 has high AC content to aggregate ratio
			1.50	I	1 lift
-L-	42+00 RTL (RT) 15.25 in. Asphalt	-	5.50	S	4 lifts
			9.75	B	1 lift, mechanical break at 3"
-L-	42+00 RT PS 16.75 in. Asphalt	-	3.00	S	2 lifts
			3.25	I	1 lift, delaminted from base layer
			10.50	B	1 lift
-L-	56+00 RTL (LT) 9.75 in. Asphalt	12.75	7.00	S	5 lifts, lifts 4-5 delaminated
			2.75	I	1 lift, low severity stripping
-L-	60+00 RTL (RT) 11.75 in. Asphalt	16.25	2.75	S	2 lifts, fabric found at bottom of ABC
			9.00	B	2 lifts, low severity stripping between lifts 1-2
-L-	62+75 LT OSL (O) 17.75 in. Asphalt	-	5.00	S	3 lifts, lifts 2-3 delamintaed, lifts 3-4 delaminated, lifts 2,3,4 moderate to high severity stripping
			9.00	B	1 lift, mechanical break at 1.25", low to moderate stripping from top of base to 5"

PAVEMENT CORES FOR
43608.1.1, I-5506, Wake County

LINE	STATION	ABC (in)	LAYER THICKNESS (in)	LAYERS	REMARKS
-L-	62+75 LT OSL (I) 11 in. Asphalt	12.00	8.00	S	5 lifts, lifts 2-3 delaminated, top of lift 3 old white line, lifts 3-4 delaminated, lifts 2,3,4 moderate to high severity stripping, the remaining of the core is crumbled
-L-	62+75 LT ISL 9.75 in. Asphalt	13.75	7.50	S	5 lifts, lifts 3-4 and 4-5 delaminated, lifts 3,4 moderate severity stripping
			2.25	I	1 lift
-L-	66+30 LTL 12 in. Asphalt	8.25	8.25	S	6 lifts, lifts 2-3 delaminated
			3.75	B	1 lift
-L-	66+30 RT ISL 9.75 in. Asphalt	16.50	6.50	S	4 lifts
			3.25	B	1 lift
-L-	66+30 RT OSL 10 in. Asphalt	16.00	6.00	S	4 lifts, mechanical break at 3.5"
			4.00	B	1 lift
-Y-	60+00 WB OSS 6.5 in. Asphalt	13.75	5.50	S	3 lifts, lifts 2-3 have low severity stripping, lifts 2-3 delaminated
			0.50		Coarse aggregate present at the bottom of surface, some of the aggregate may be missing
-Y-	66+00 WB OSS 9.5 in. Asphalt	13.75	5.00	S	3 lifts, lifts 1-2 delaminated, low severity stripping at contacts of lifts 2-3
			4.50	B	1 lift, low severity stripping
-Y-	81+00 WB OSS 9.0 in. Asphalt	13.25	5.50	S	4 lifts, low severity stripping at contact between lifts 1-2, lifts 2-3 delaminated
			3.50	B	1 lift, Bottom 1" has moderate severity stripping
-Y-	90+00 WB OSS 6.75 in. Asphalt	16.00	4.00	S	3 lifts, lifts 2-3 delaminated, lift 2 has low severity stripping
			2.75	B	1 lift, Bottom 1" missing
-Y-	90+00 WB Ramp 15.5 in. Asphalt	9.25	9.00	S	6 lifts, lifts 1-4 have low to moderate severity stripping
			6.50	B	1 lift
-Y-	90+00 WB OSL 17 in. Asphalt	7.50	1.75	S	1 lift
			5.75	I	2 lifts, lifts 1-2 delaminated
			9.50	B	1 lift, low severity stripping at contact between Intermediate and Base
-Y-	100+00 WB OSS 9 in. Asphalt	13.75	5.00	S	4 lifts
			4.00	B	1 lift
-Y-	115+00 WB OSS 9.75 in. Asphalt	17.25	5.00	S	4 lifts, lifts 1-2 and 3-4 delmaminated
			4.75	B	1 lift

PAVEMENT CORE PHOTOGRAPHS
Tip No. I-5506 | Project No. 43608.1.1
Wake County, NC

24+00 RT LN (I) | **24+00 RT LN (O)**

24+00 RT PS

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

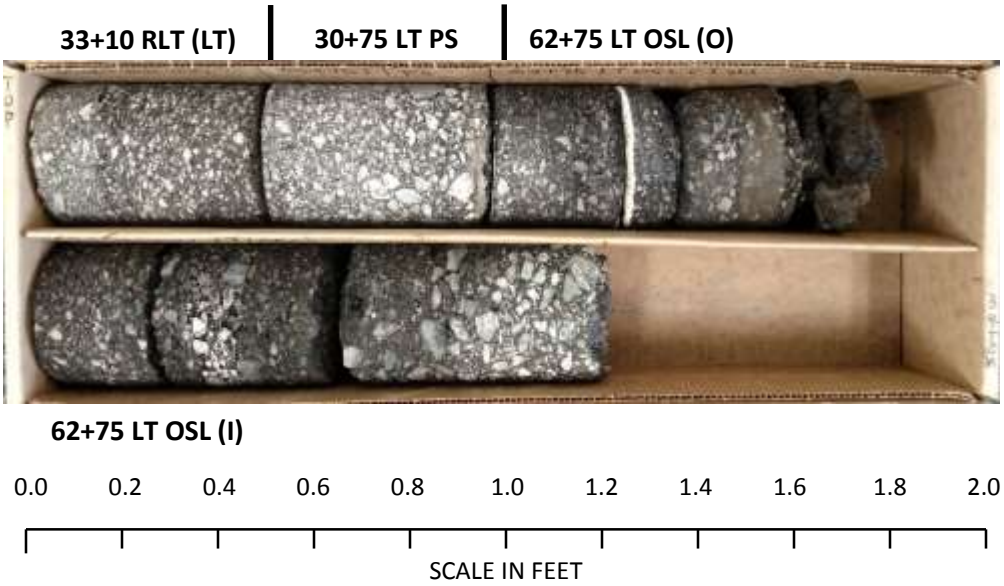
30+75 RT LN | **30+75 RTL (RT)**

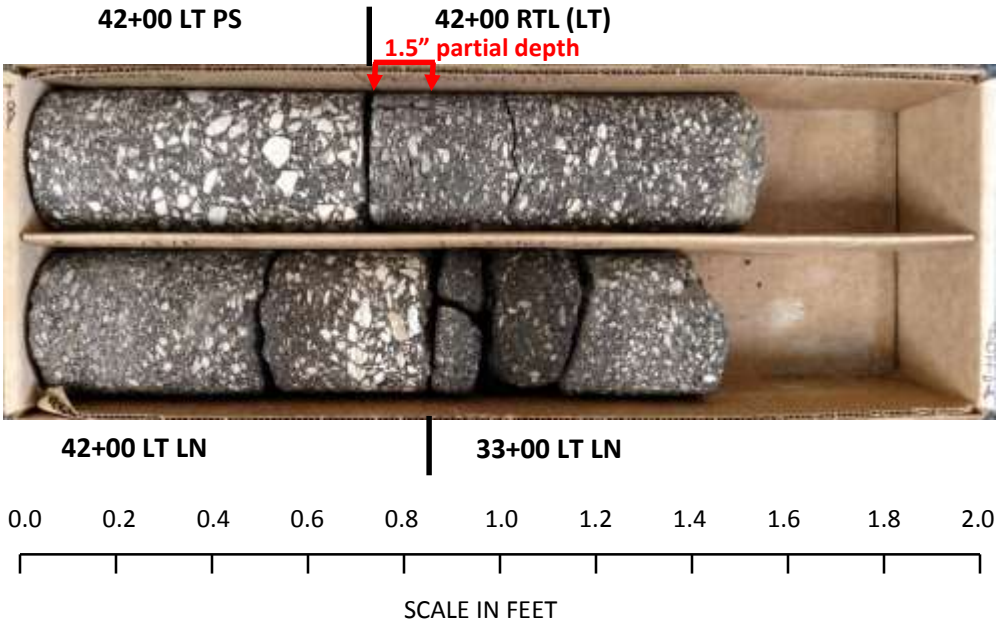
42+00 RT PS

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

PAVEMENT CORE PHOTOGRAPHS
Tip No. I-5506 | Project No. 43608.1.1
Wake County, NC





PAVEMENT CORE PHOTOGRAPHS
Tip No. I-5506 | Project No. 43608.1.1
Wake County, NC

42+00 RTL (RT)

42+00 RT (OSL) | **42+00 RT ISL**

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

56+00 RTL (LT) | **62+75 LT ISL**

115+00 WB OSS

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

PAVEMENT CORE PHOTOGRAPHS
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60+00 RTL (RT) | **66+30 RT OSL**

66+30 RT ISL | **66+30 LTL**

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

81+00 WB OSS

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

PAVEMENT CORE PHOTOGRAPHS
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90+00 WB RAMP

90+00 WB OSL

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

100+00 WB OSS | **90+00 WB OSS**

66+00 WB OSS | **60+00 WB OSS**

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

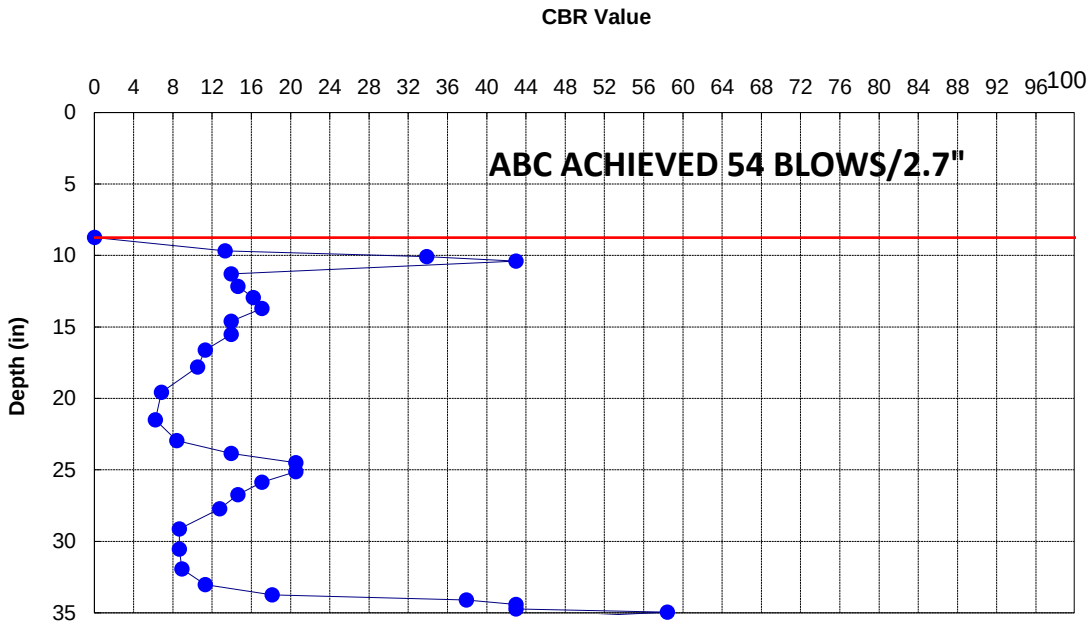
FILE	I-5506_CONEPEN_ENG…

24+00 RT LN (I), 7' LT — RAW — FILL — 1

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 8.7 to 36.4	
# of Values	35
Avg CBR	26.3
Wghtd Avg.	16.1
Max CBR	70.9
Min CBR	6.2

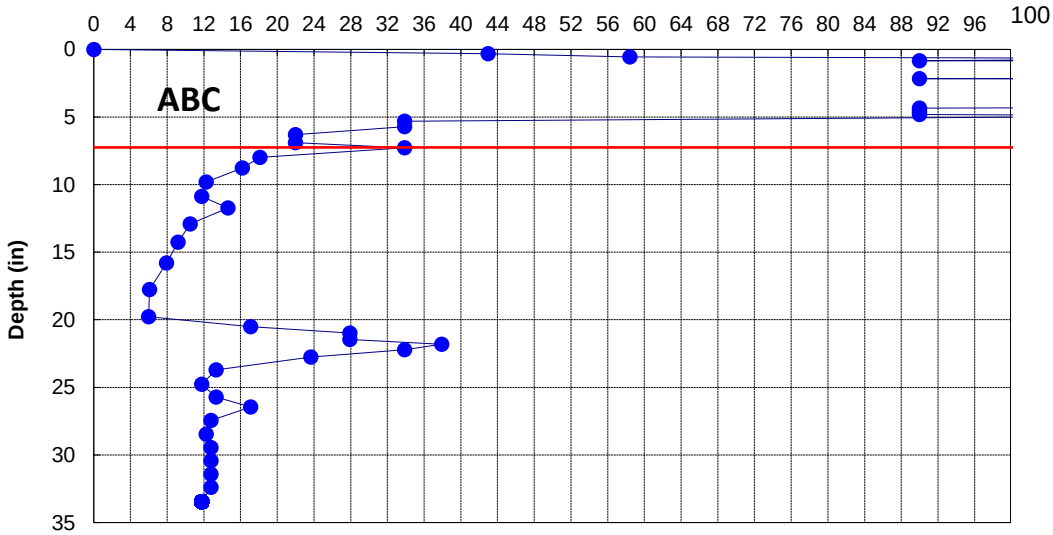


24+00 RT PS, 0.5' RT — RAW — FILL — 2

Datum = ABC/SG — 04/04/16

Interval 0.0 to 7.3	
# of Values	49
Avg CBR	100+
Wghtd Avg.	95.7
Max CBR	100+
Min CBR	22.0

Interval 7.3 to 33.5	
# of Values	27
Avg CBR	15.7
Wghtd Avg.	13.0
Max CBR	37.9
Min CBR	6.0



CONE PENETROMETER RESULTS
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PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_CONEPEN_ENG…

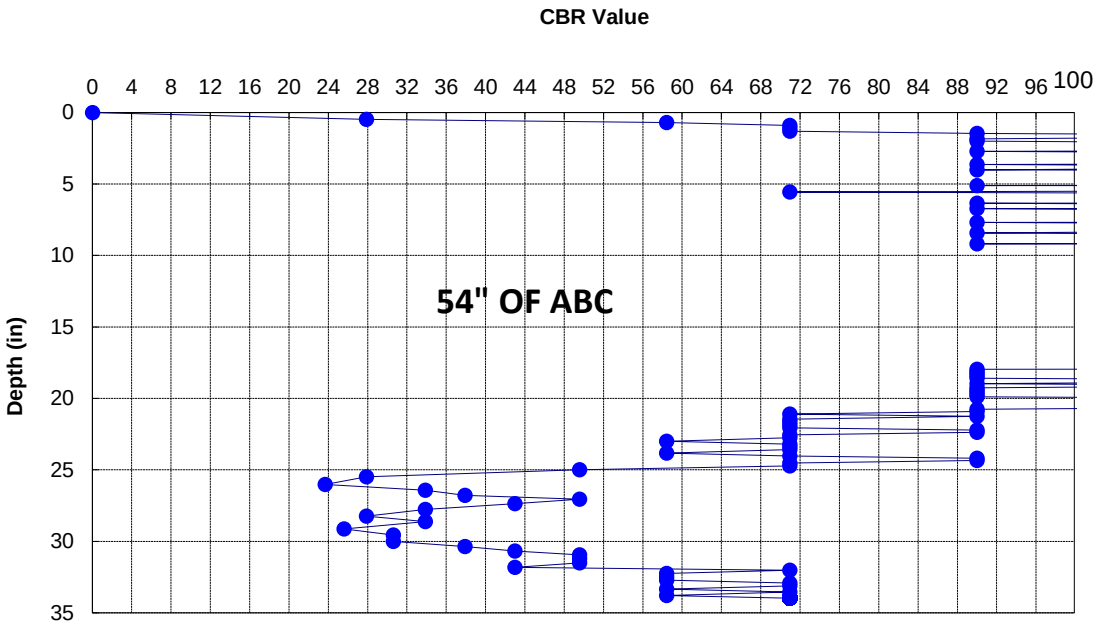
30+75 LT PS, 5' RT — RAW — 3

FILL

Datum = ABC — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 34.0	
# of Values	315
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	23.7



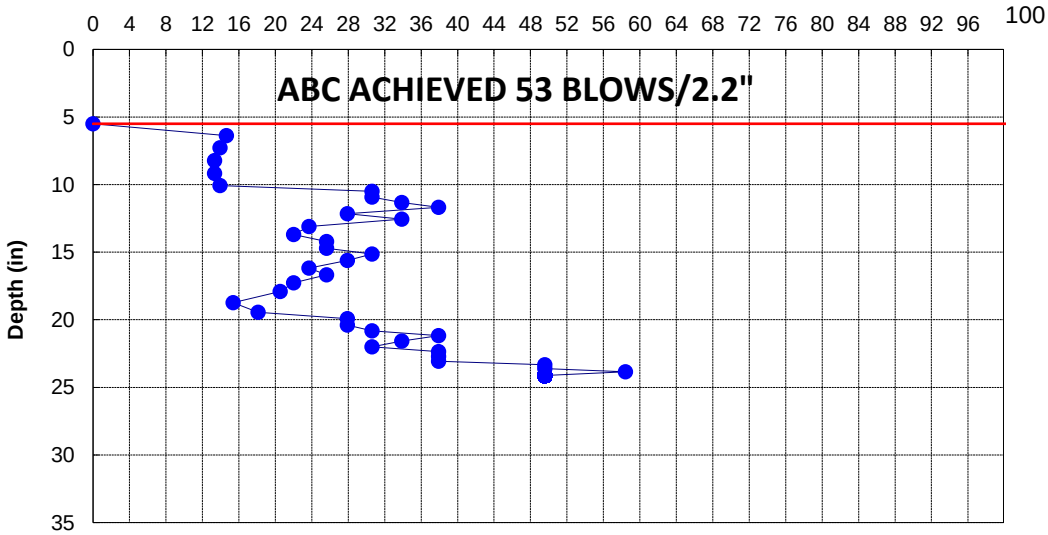
30+75 RT LN, 12' LT — RAW — 4

FILL

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 5.5 to 24.1	
# of Values	36
Avg CBR	29.3
Wghtd Avg.	25.3
Max CBR	58.4
Min CBR	13.3



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

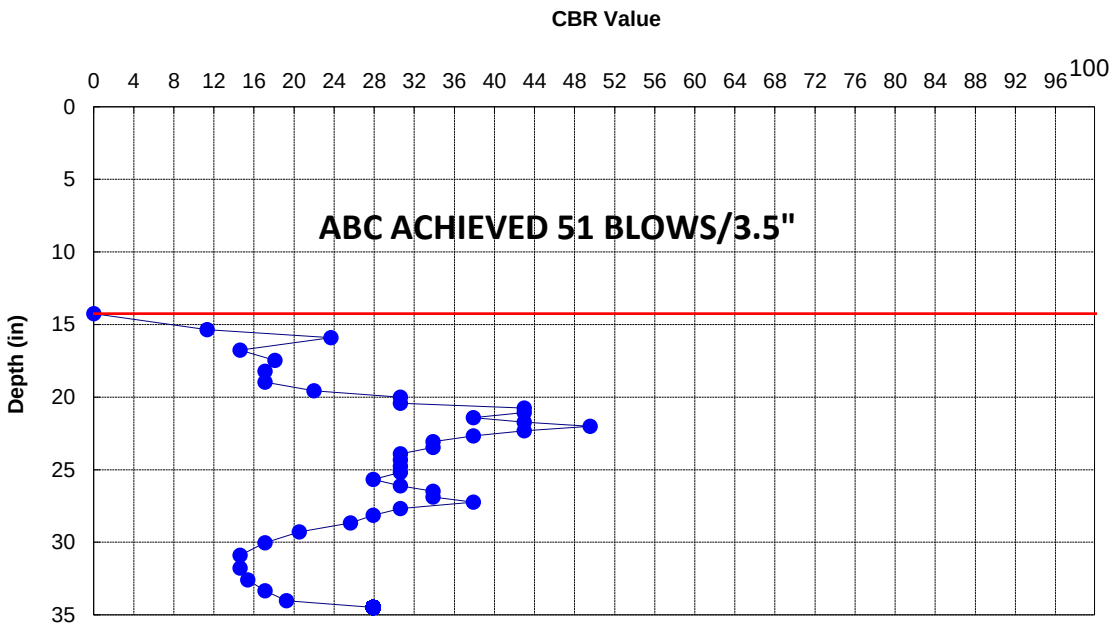
FILE	I-5506_CONEPEN_ENG…

30+75 RTL (RT), 2.5' LT — RAW — FILL — 5

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 14.0 to 34.5	
# of Values	38
Avg CBR	28.1
Wghtd Avg.	24.6
Max CBR	49.6
Min CBR	11.3

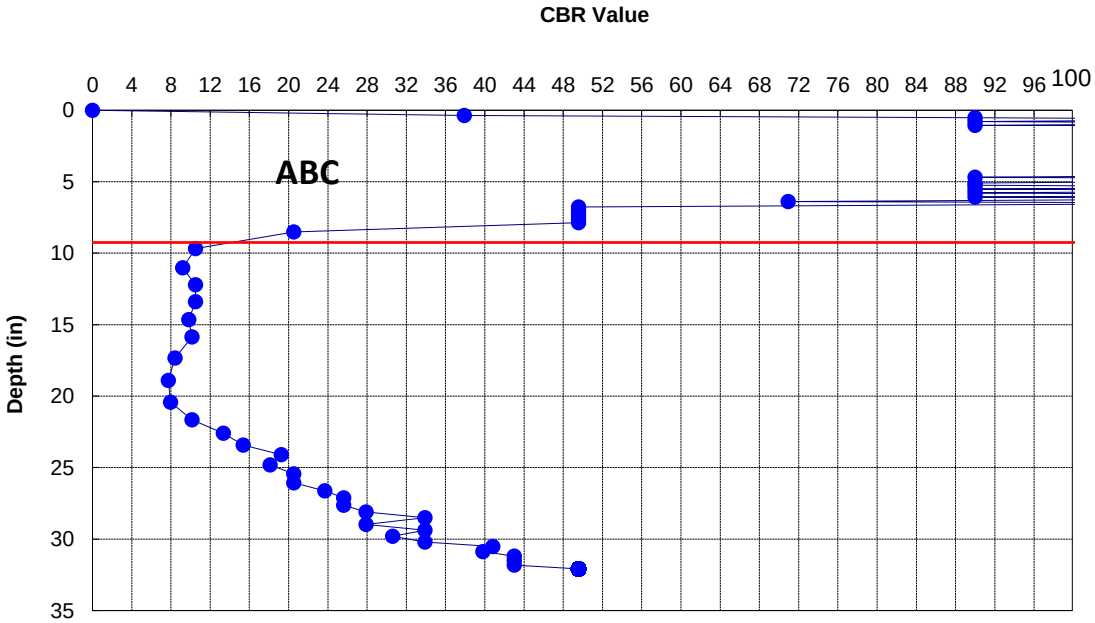


33+10 RTL (LT), 4' RT — RAW — GRADE — 6

Datum = ABC/SG — 04/05/16

Interval 0.0 to 9.7	
# of Values	77
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	10.5

Interval 9.7 to 32.1	
# of Values	30
Avg CBR	23.8
Wghtd Avg.	17.1
Max CBR	49.6
Min CBR	7.7



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

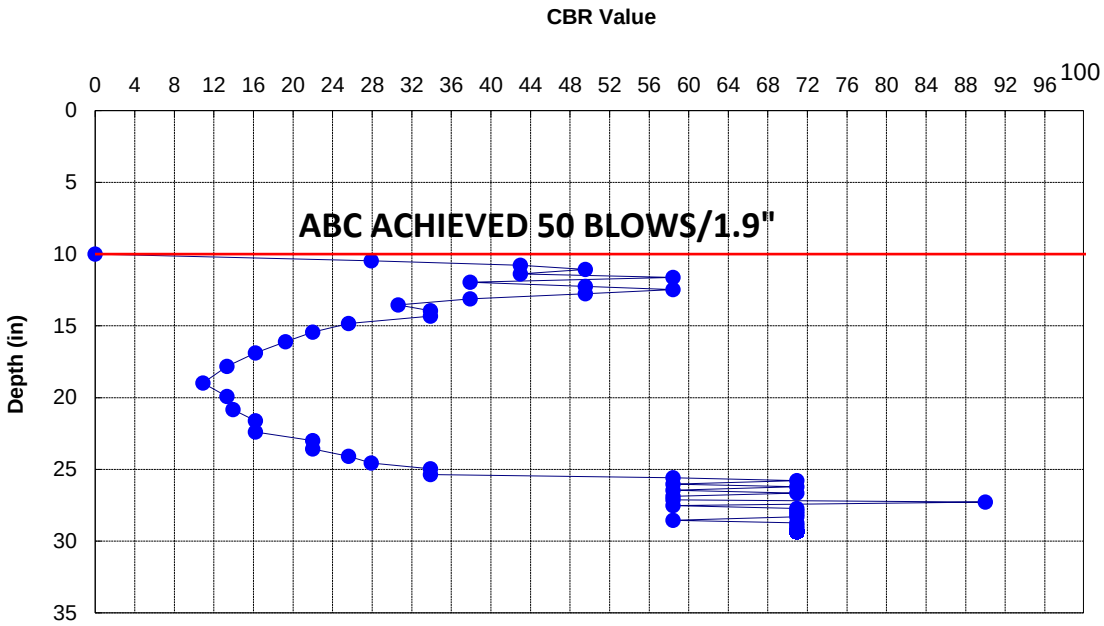
GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_CONEPEN_ENG…

33+10 LT LN, 12' RT — RAW — 7
GRADE
Datum = SG — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

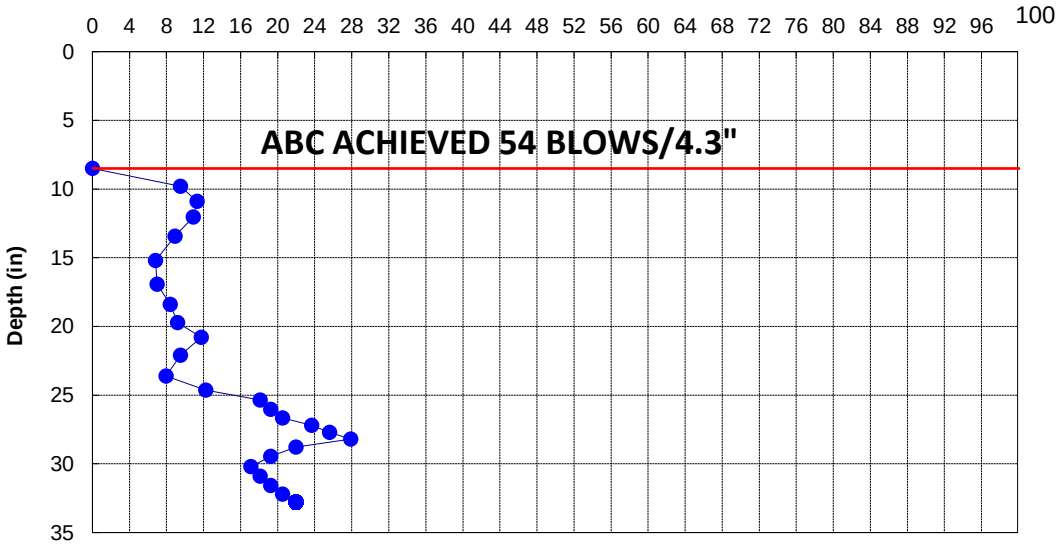
Interval 10.0 to 29.3	
# of Values	48
Avg CBR	45.1
Wghtd Avg.	33.1
Max CBR	90.0
Min CBR	10.9



42+00 LT PS, 16' LT — RAW — 8
CUT
Datum = SG — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 8.5 to 32.8	
# of Values	25
Avg CBR	15.5
Wghtd Avg.	12.9
Max CBR	27.9
Min CBR	6.8



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_CONEPEN_ENG…

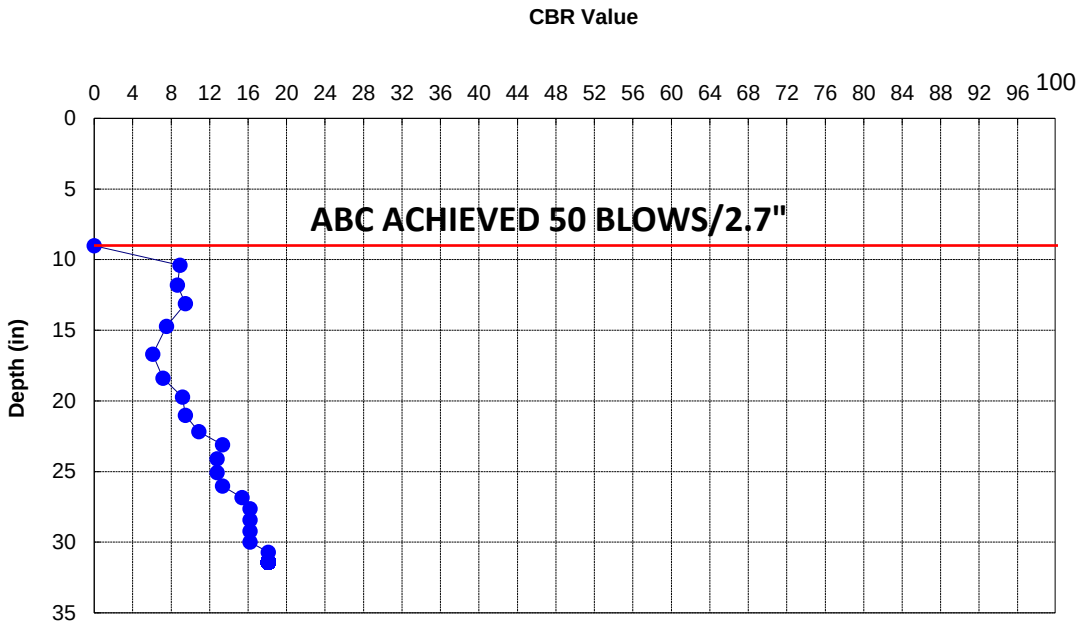
42+00 RTL (LT), 9' RT — RAW — 9

CUT

Datum = SG — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 9.0 to 31.4	
# of Values	20
Avg CBR	12.3
Wghtd Avg.	11.1
Max CBR	18.1
Min CBR	6.1



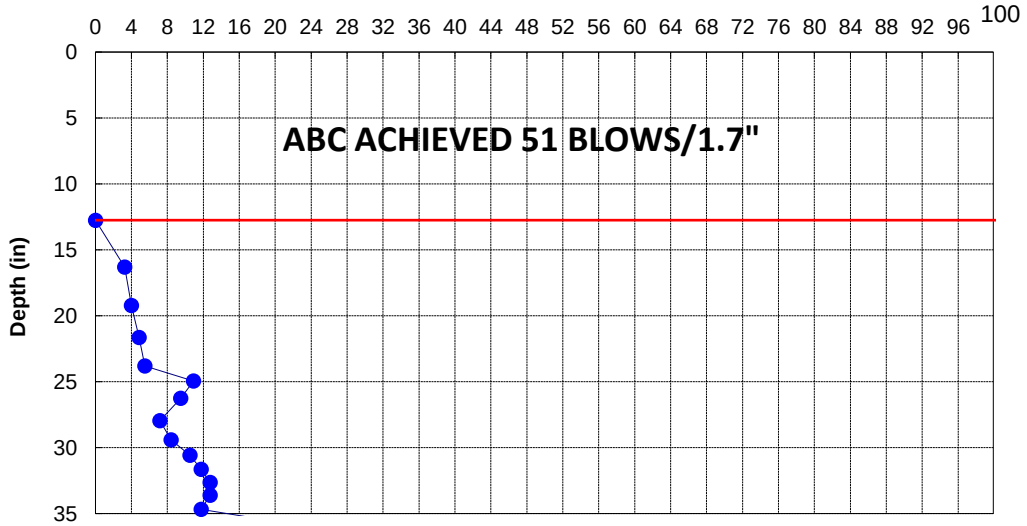
42+00 LT LN, 18' RT — RAW — 10

CUT

Datum = SG — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 12.8 to 37.7	
# of Values	17
Avg CBR	10.7
Wghtd Avg.	8.3
Max CBR	19.2
Min CBR	3.3



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

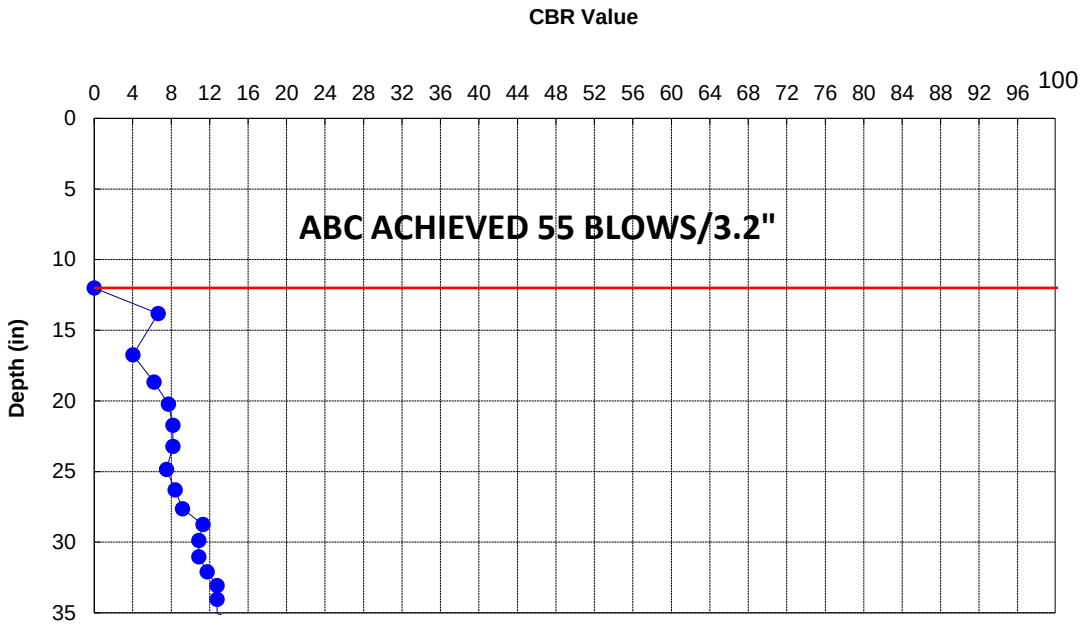
FILE	I-5506_CONEPEN_ENG…

42+00 RT ISL, 24.5' LT — RAW — FILL — 11

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 12.0 to 36.7	
# of Values	18
Avg CBR	10.0
Wghtd Avg.	9.0
Max CBR	16.2
Min CBR	4.0

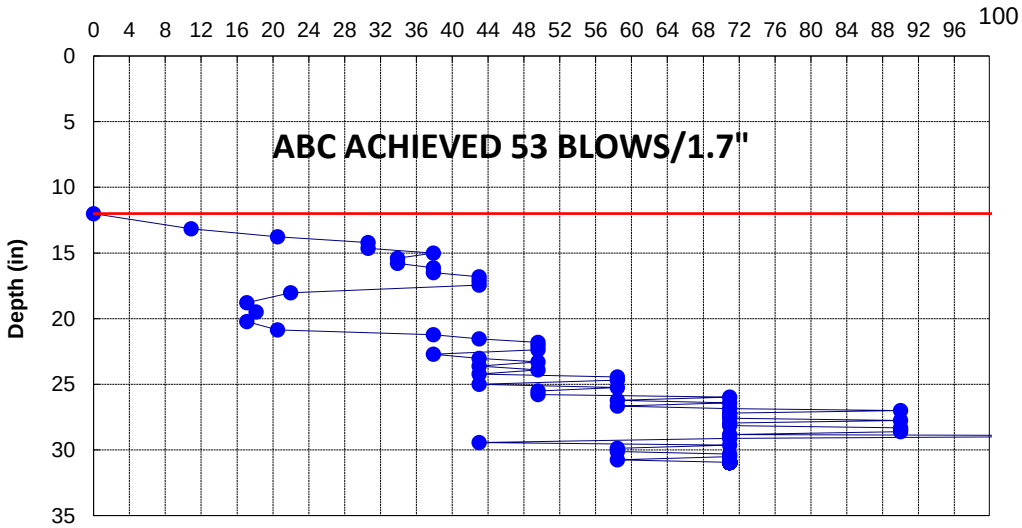


42+00 RT OSL, 14.5' LT — RAW — FILL — 12

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 12.0 to 30.9	
# of Values	60
Avg CBR	53.5
Wghtd Avg.	42.9
Max CBR	100+
Min CBR	10.9



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_CONEPEN_ENG…

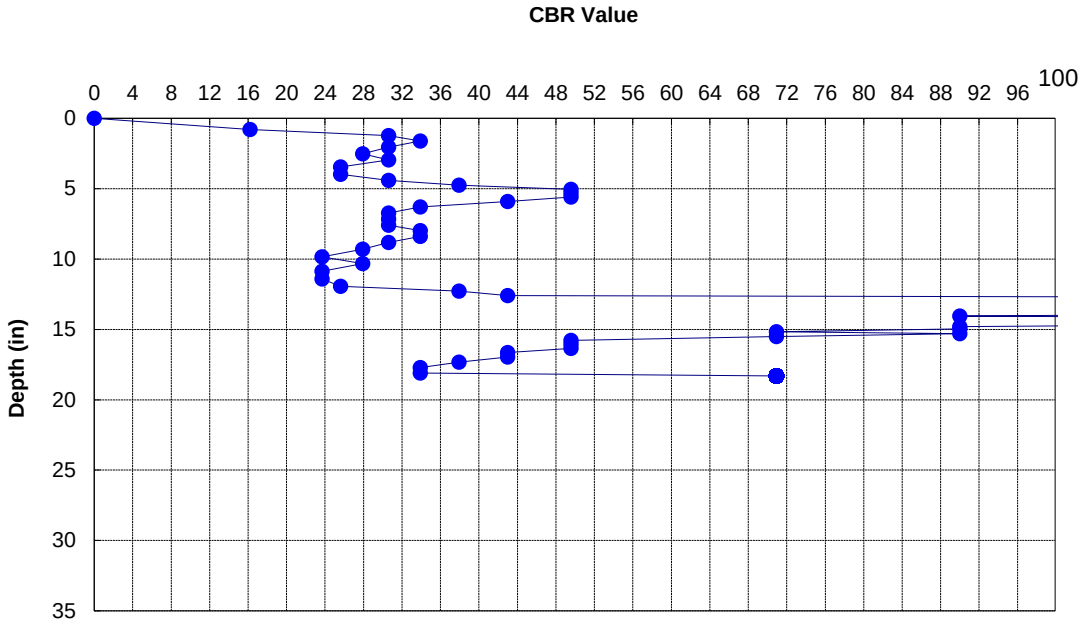
42+00 RTL (RT), 5' LT — RAW — 13

FILL

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 18.3	
# of Values	62
Avg CBR	71.8
Wghtd Avg.	46.0
Max CBR	100+
Min CBR	16.2



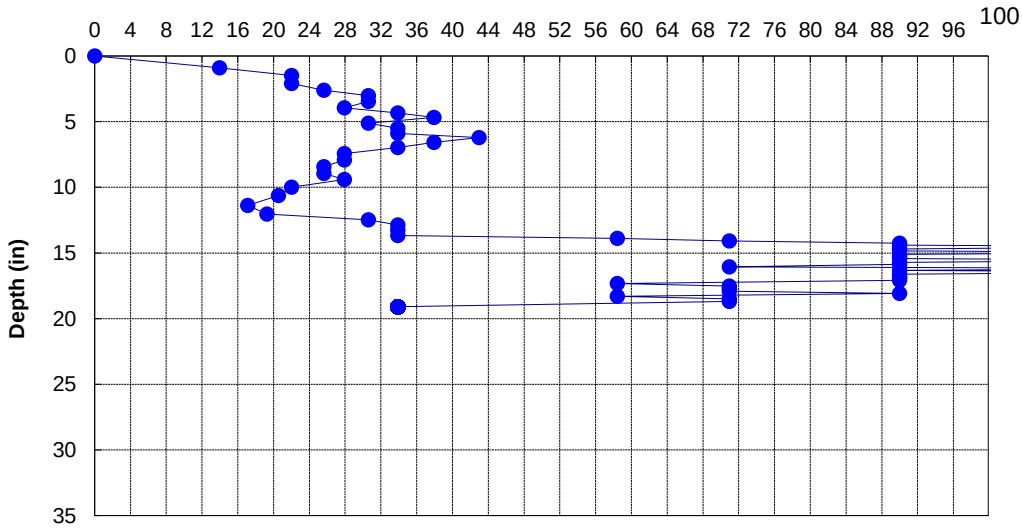
42+00 RT PS, 3' RT — RAW — 14

FILL

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 19.1	
# of Values	59
Avg CBR	58.8
Wghtd Avg.	41.8
Max CBR	100+
Min CBR	13.9



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_CONEPEN_ENG…

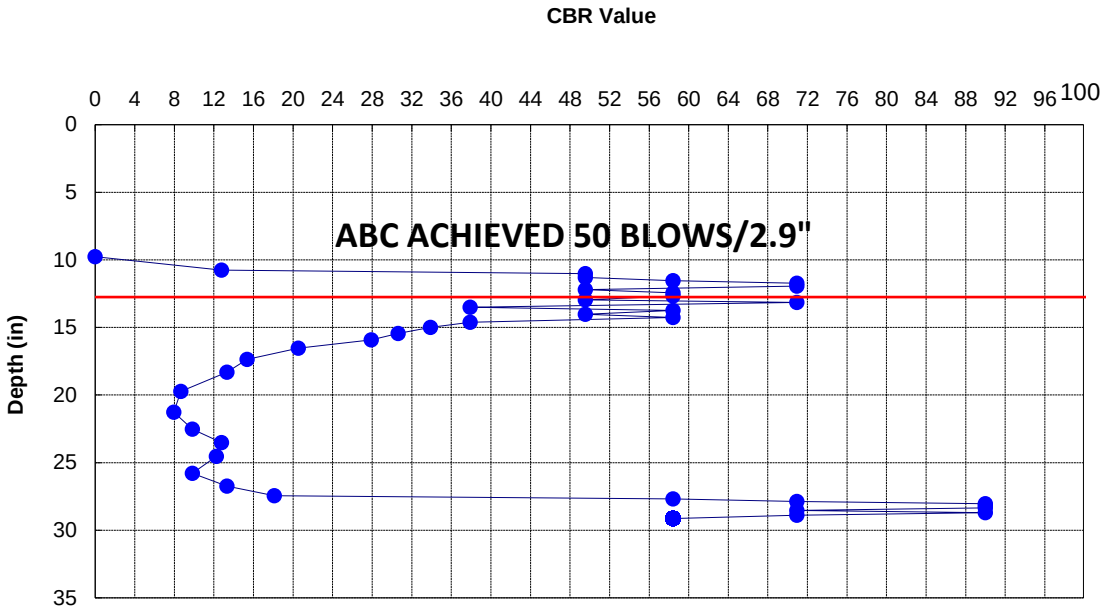
56+00 RTL (LT), 7.5' RT — RAW — 15

FILL

Datum = ABC/SG — 04/05/16

Interval 10.7 to 13.7	
# of Values	13
Avg CBR	53.5
Wghtd Avg.	44.3
Max CBR	70.9
Min CBR	12.8

Interval 13.7 to 29.1	
# of Values	26
Avg CBR	41.1
Wghtd Avg.	21.9
Max CBR	90.0
Min CBR	7.9



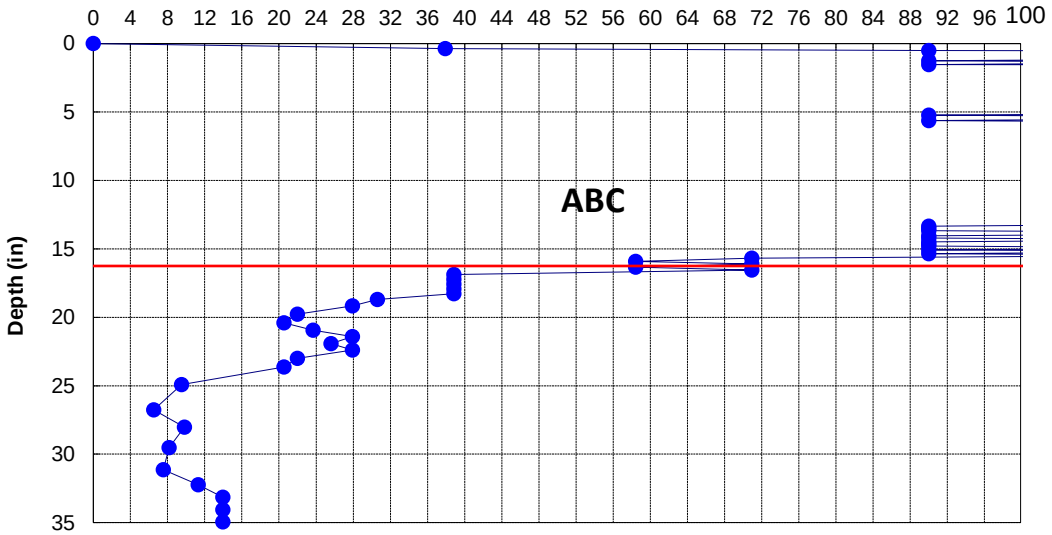
60+00 RTL (RT), 4' LT — RAW — 16

FILL

Datum = ABC/SG/FABRIC — 04/04/16

Interval 0.0 to 16.5	
# of Values	157
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	37.9

Interval 16.5 to 40.8	
# of Values	31
Avg CBR	21.0
Wghtd Avg.	16.3
Max CBR	38.8
Min CBR	6.5



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

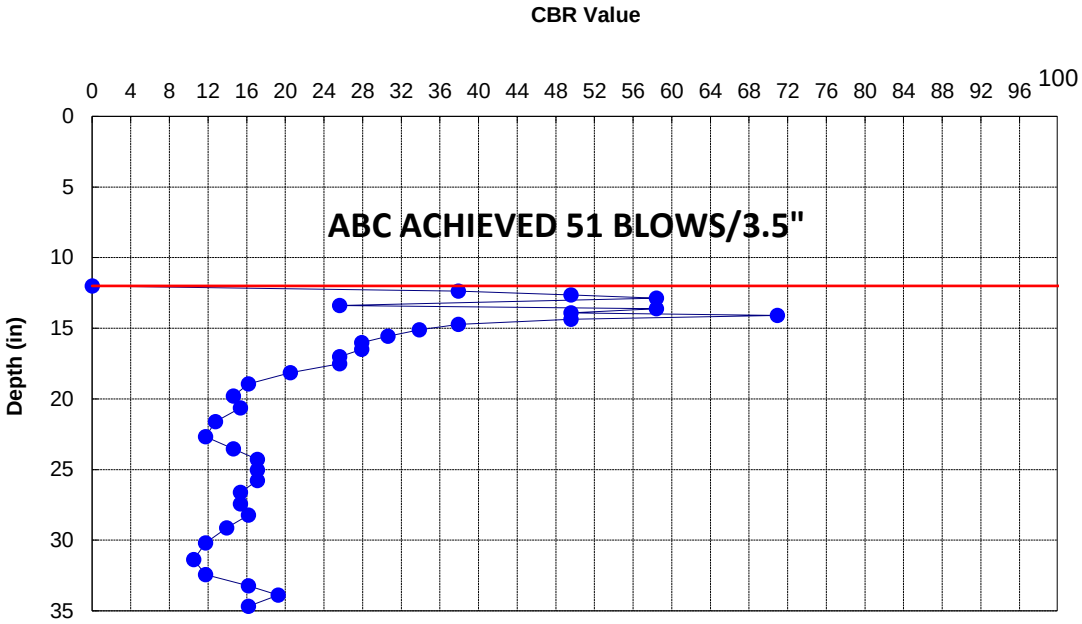
FILE	I-5506_CONEPEN_ENG…

62+75 LT OSL (I), 7' RT — RAW — FILL — 17

Datum = SG — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 12.0 to 35.5	
# of Values	36
Avg CBR	25.8
Wghtd Avg.	19.8
Max CBR	70.9
Min CBR	10.5

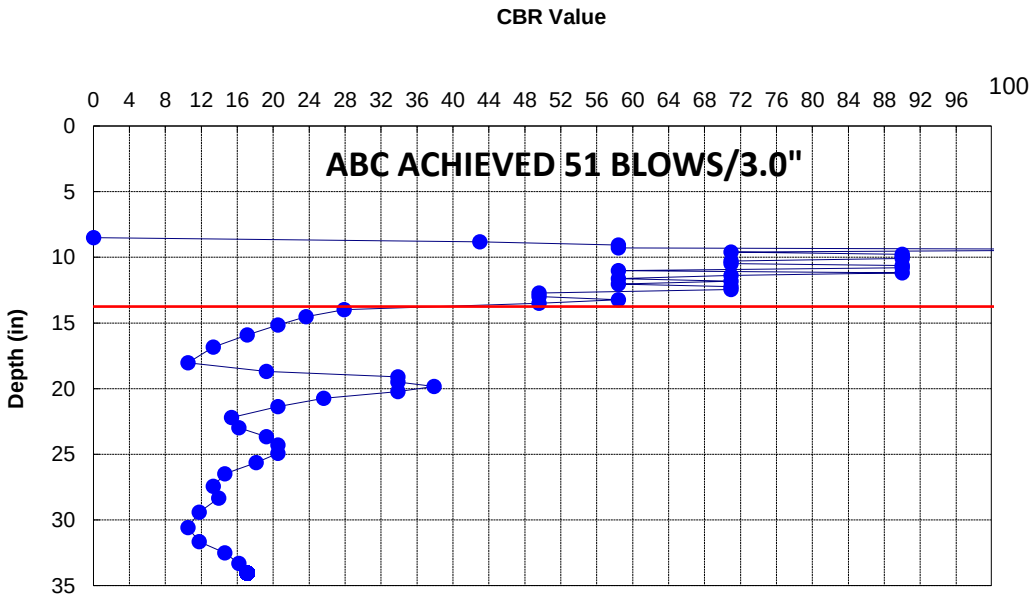


62+75 LT ISL, 19' RT — RAW — FILL — 18

Datum = ABC/SG — 04/05/16

Interval 8.8 to 14.0	
# of Values	25
Avg CBR	69.2
Wghtd Avg.	63.4
Max CBR	100+
Min CBR	27.9

Interval 14.0 to 34.1	
# of Values	27
Avg CBR	19.4
Wghtd Avg.	17.2
Max CBR	37.9
Min CBR	10.5



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_CONEPEN_ENG…

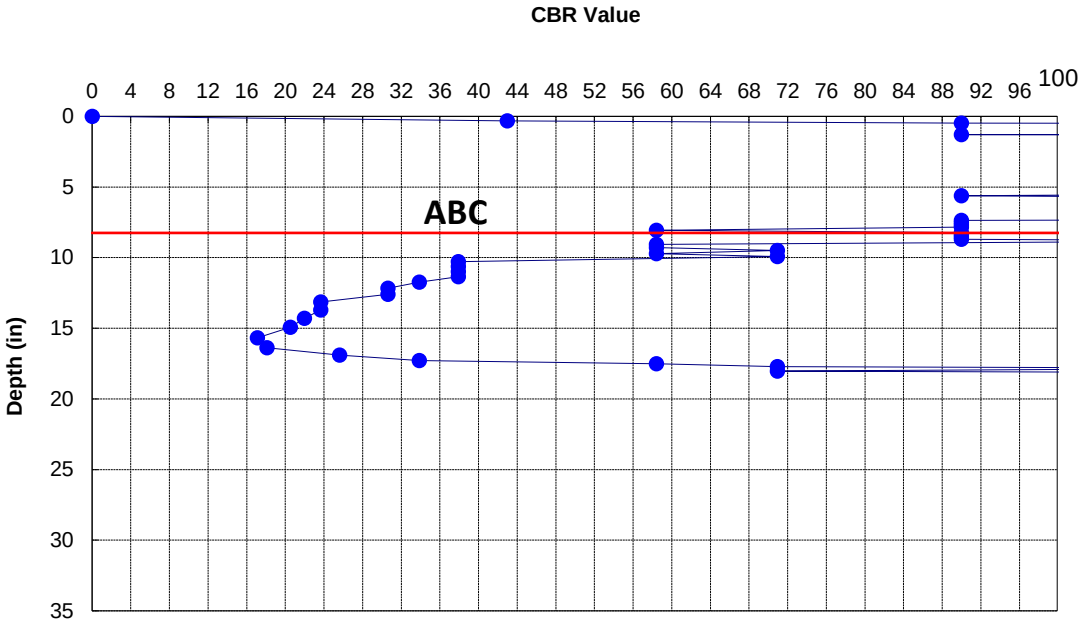
66+30 LTL, 31' LT — RAW — 19

FILL

Datum = ABC/SG — 04/04/16

Interval 0.0 to 8.2	
# of Values	78
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	43.0

Interval 8.2 to 20.0	
# of Values	51
Avg CBR	100+
Wghtd Avg.	59.7
Max CBR	100+
Min CBR	17.1



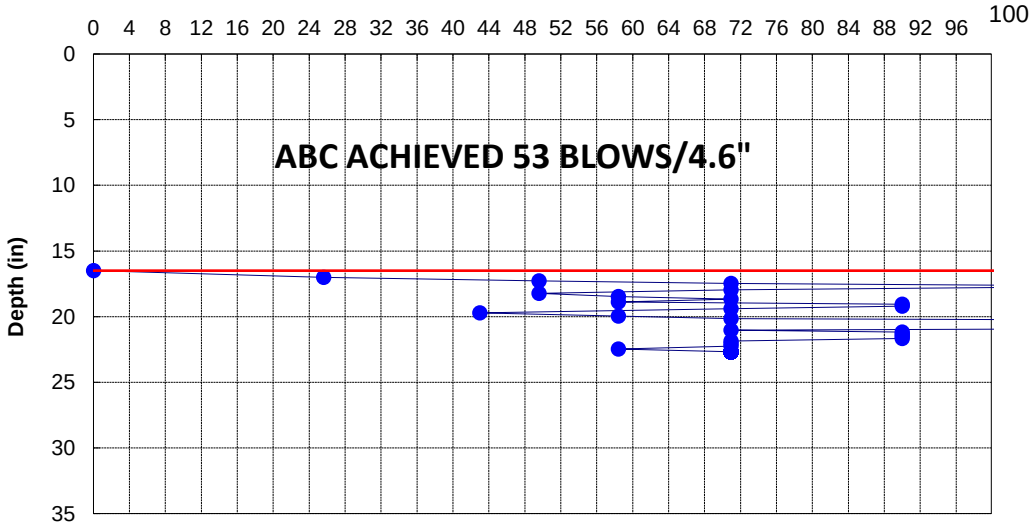
66+30 RT ISL, 17' LT — RAW — 20

FILL

Datum = SG — 04/04/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 16.5 to 22.7	
# of Values	32
Avg CBR	82.6
Wghtd Avg.	72.4
Max CBR	100+
Min CBR	25.6



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_(2)_CONEPEN_ENG…

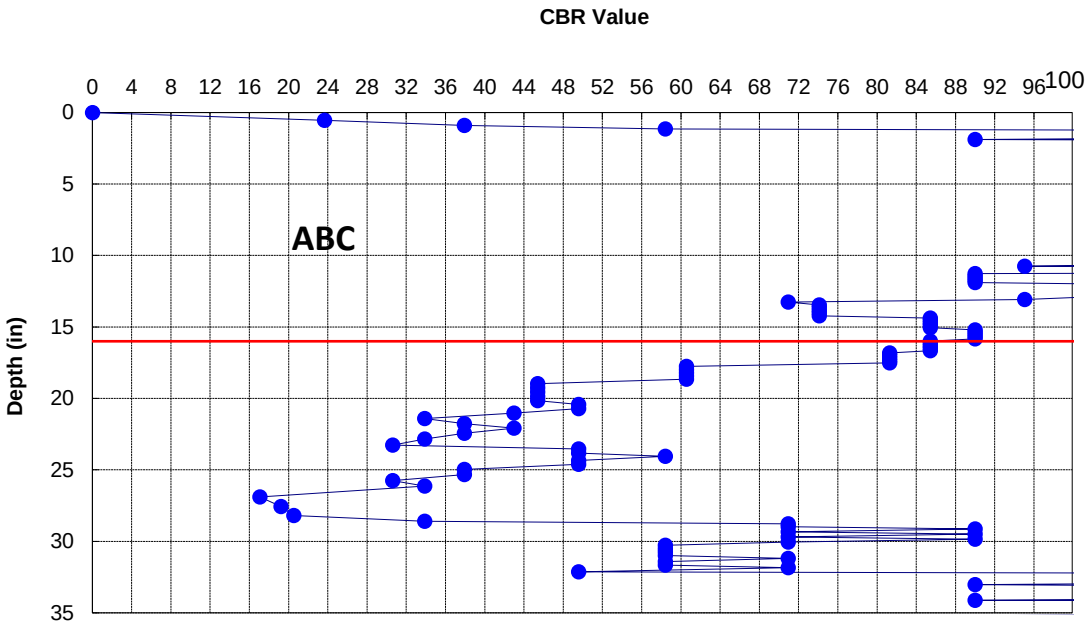
66+30 RT OSL, 5' LT — RAW — 21

FILL

Datum = ABC/SG — 04/04/16

Interval 0.0 to 16.0	
# of Values	130
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	23.7

Interval 16.0 to 36.2	
# of Values	94
Avg CBR	96.2
Wghtd Avg.	64.6
Max CBR	100+
Min CBR	17.1



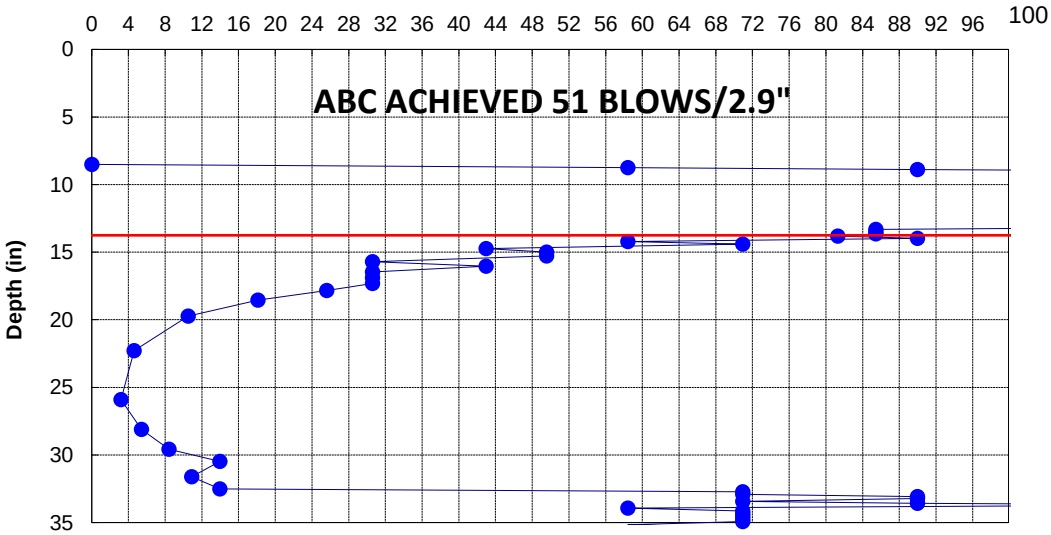
60+00 WB OSS, 6' LT — RAW — 22

FILL

Datum = ABC/SG — 04/06/16

Interval 0.0 to 13.8	
# of Values	48
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	58.4

Interval 13.8 to 37.6	
# of Values	45
Avg CBR	50.9
Wghtd Avg.	24.8
Max CBR	100+
Min CBR	3.2



LEDGEND

CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

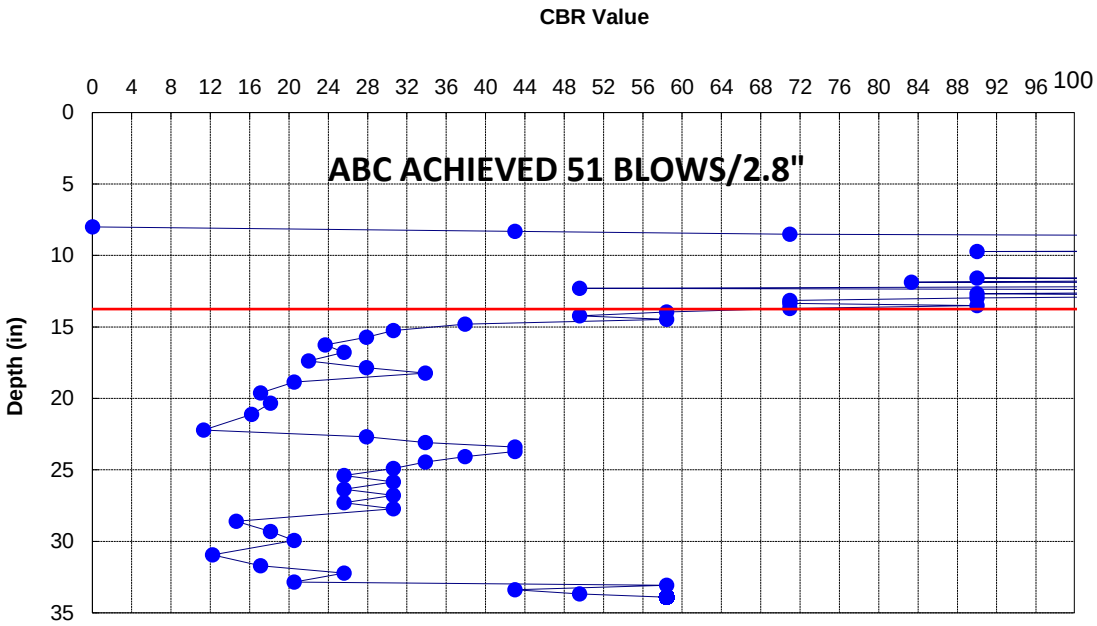
FILE	I-5506_(2)_CONEPEN_ENG…

66+00 WB OSS, 5' LT — RAW — FILL — 23

Datum = ABC/SG — 04/06/16

Interval 0.0 to 13.7	
# of Values	50
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	43.0

Interval 13.7 to 33.9	
# of Values	40
Avg CBR	30.9
Wghtd Avg.	26.0
Max CBR	58.4
Min CBR	11.3

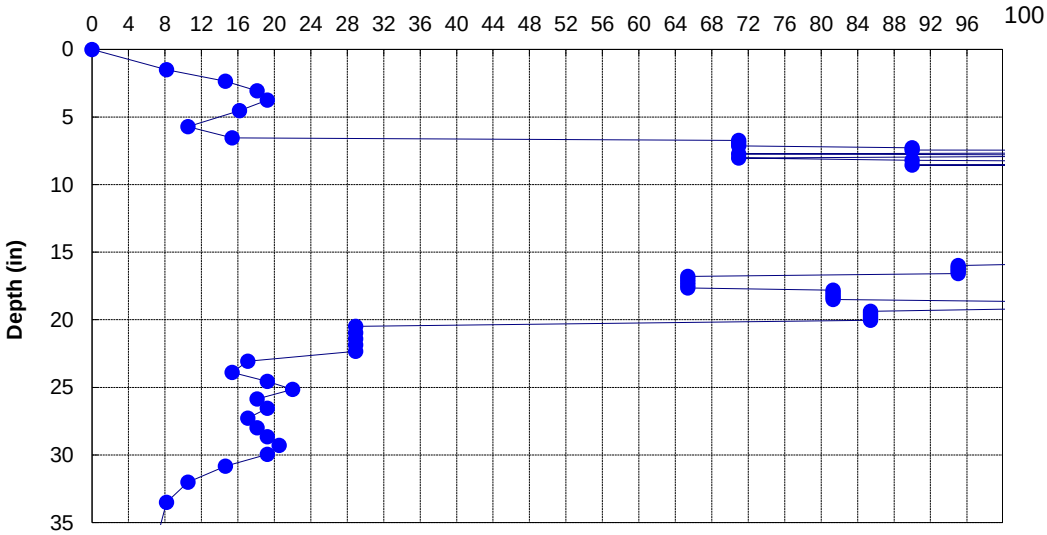


75+00 OES, 12.5' LT — RAW — FILL — 24

Datum = EGS — 04/06/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 51.2	
# of Values	156
Avg CBR	100+
Wghtd Avg.	41.2
Max CBR	100+
Min CBR	7.2



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

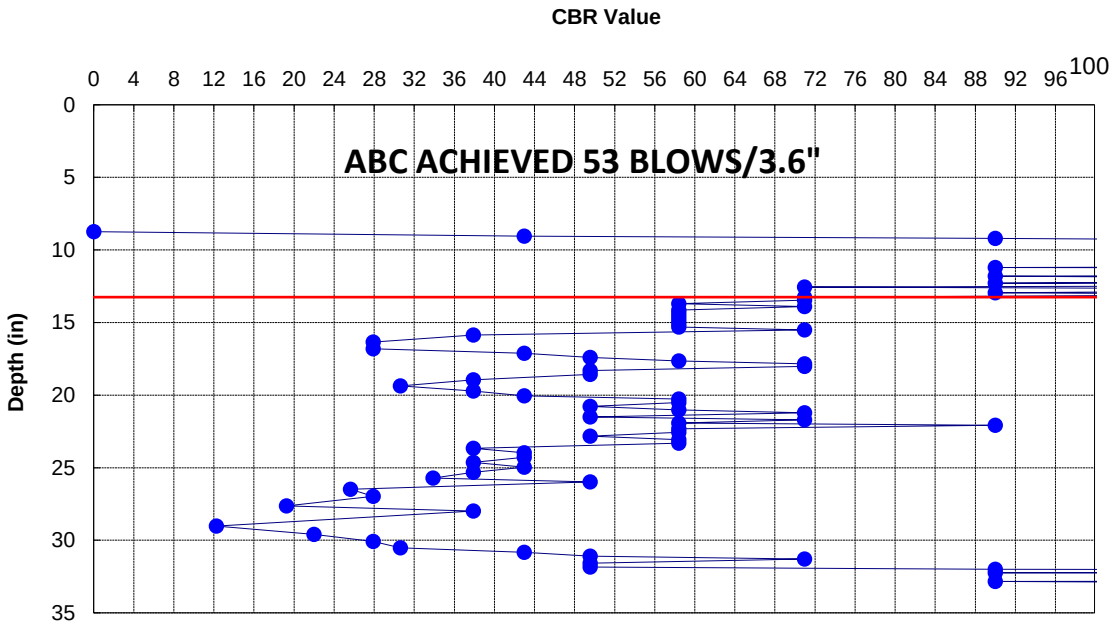
GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_(2)_CONEPEN_ENG…

81+00 WB OSS, 6' LT — RAW — 25
FILL
Datum = ABC/SG — 04/06/16

Interval 0.0 to 13.7	
# of Values	45
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	43.0

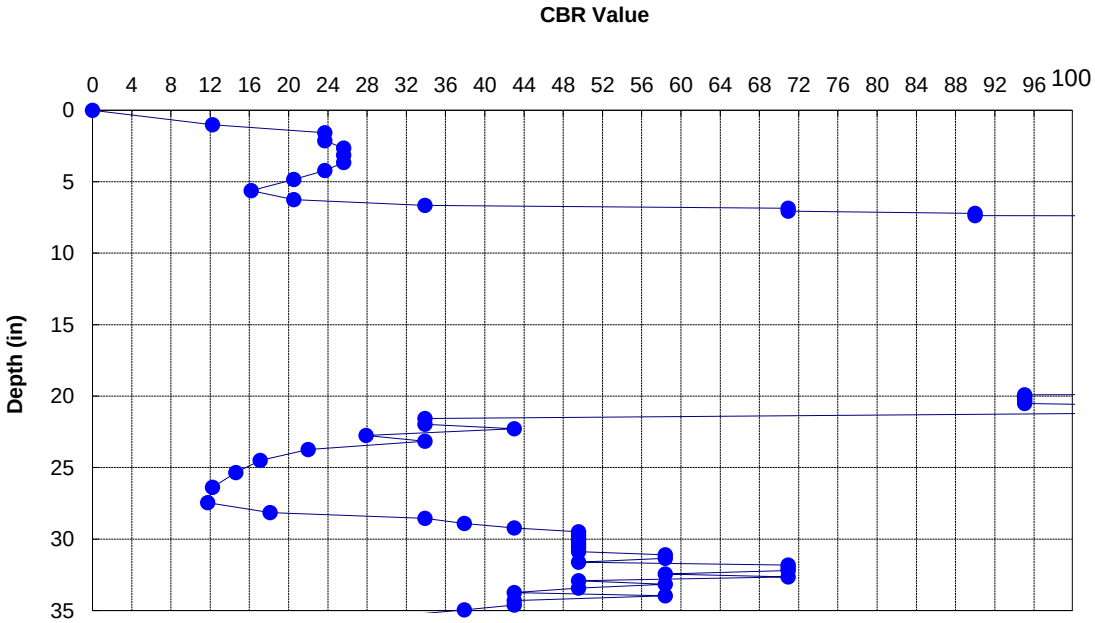
Interval 13.7 to 33.3	
# of Values	72
Avg CBR	76.6
Wghtd Avg.	50.2
Max CBR	100+
Min CBR	12.2



85+00 OES, 13' LT — RAW — 26
FILL
Datum = EGS — 04/06/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 50.9	
# of Values	244
Avg CBR	100+
Wghtd Avg.	66.6
Max CBR	100+
Min CBR	11.8



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

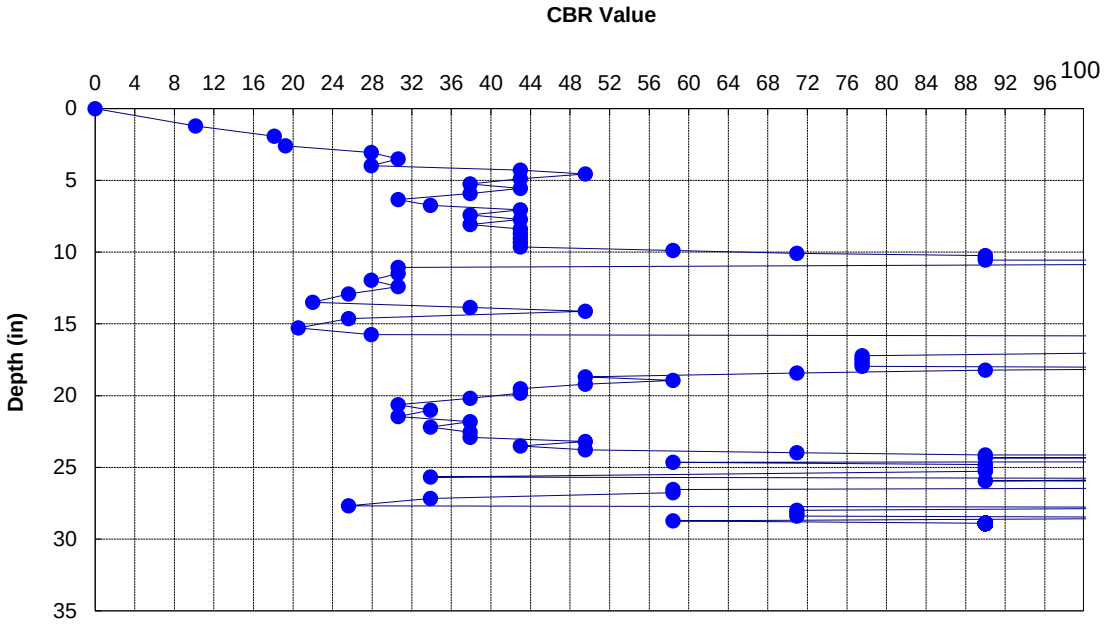
GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_(2)_CONEPEN_ENG…

95+00 OES, 6.5'LT — RAW — 27
CUT
Datum = EGS — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

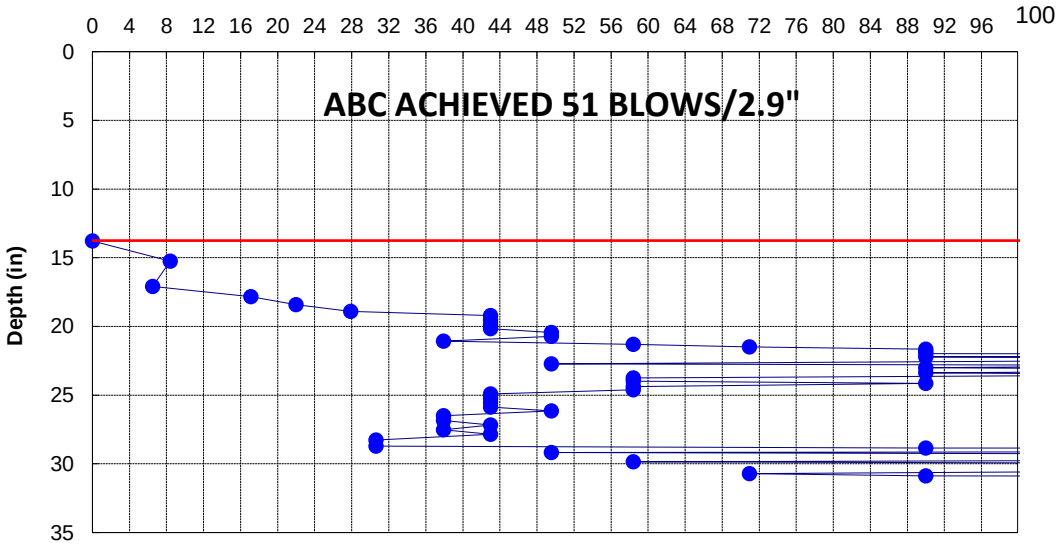
Interval 0.0 to 28.9	
# of Values	103
Avg CBR	75.4
Wghtd Avg.	48.6
Max CBR	100+
Min CBR	10.1



90+00 WB OSL, 14.5' RT — RAW — 28
CUT
Datum = SG — 04/06/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 13.8 to 31.2	
# of Values	68
Avg CBR	100+
Wghtd Avg.	53.6
Max CBR	100+
Min CBR	6.5



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_(2)_CONEPEN_ENG…

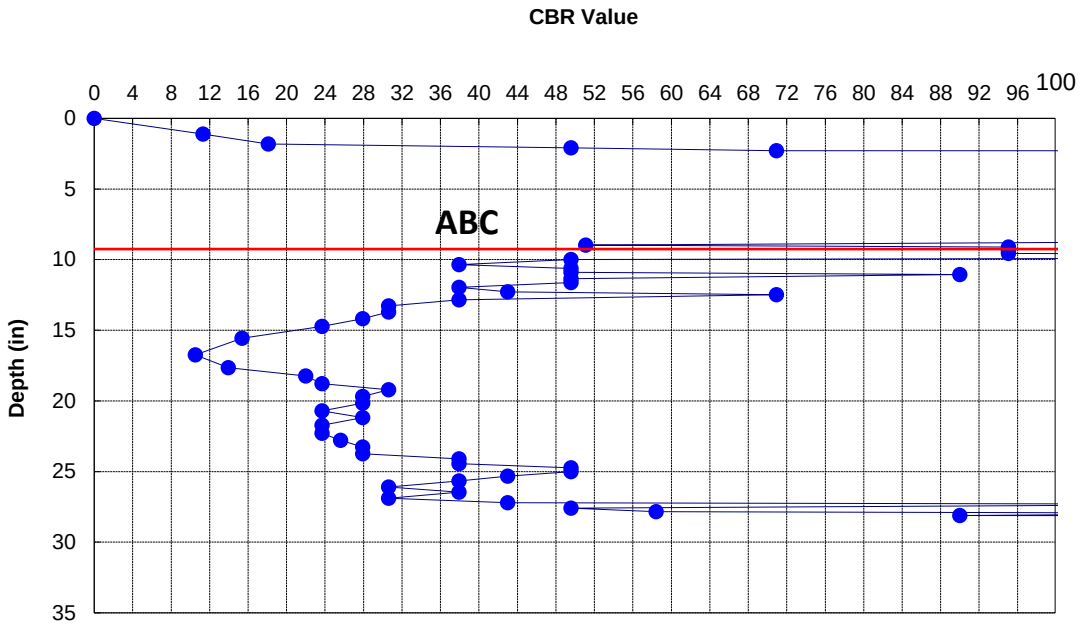
90+00 WB RAMP, 4' RT — RAW — 29

CUT

Datum = ABC/SG — 04/06/16

Interval 0.0 to 9.3	
# of Values	31
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	11.3

Interval 9.3 to 29.5	
# of Values	82
Avg CBR	100+
Wghtd Avg.	55.8
Max CBR	100+
Min CBR	10.5



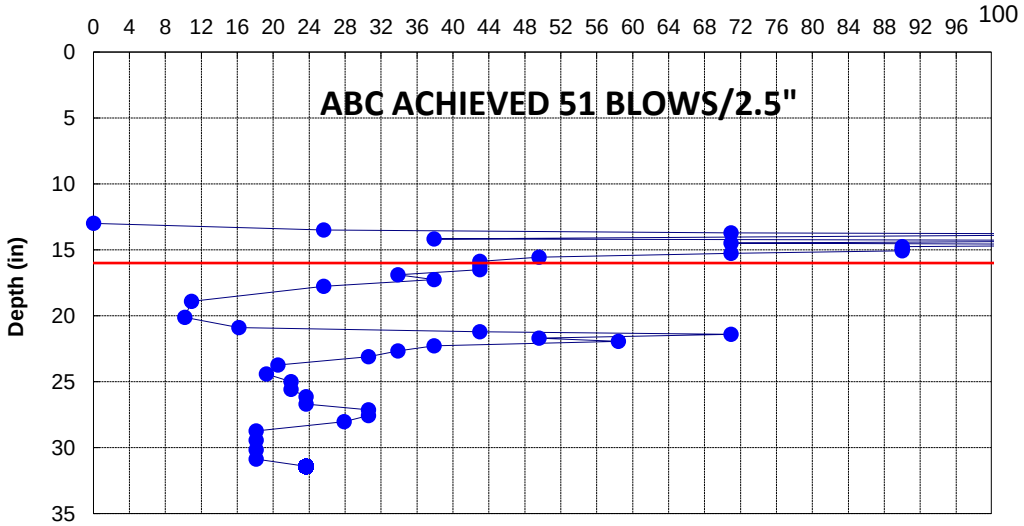
90+00 WB OSS, 3' LT — RAW — 30

CUT

Datum = ABC/SG — 04/06/16

Interval 13.5 to 16.5	
# of Values	15
Avg CBR	72.8
Wghtd Avg.	59.1
Max CBR	100+
Min CBR	25.6

Interval 16.5 to 31.4	
# of Values	27
Avg CBR	28.7
Wghtd Avg.	23.6
Max CBR	70.9
Min CBR	10.1



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_(2)_CONEPEN_ENG…

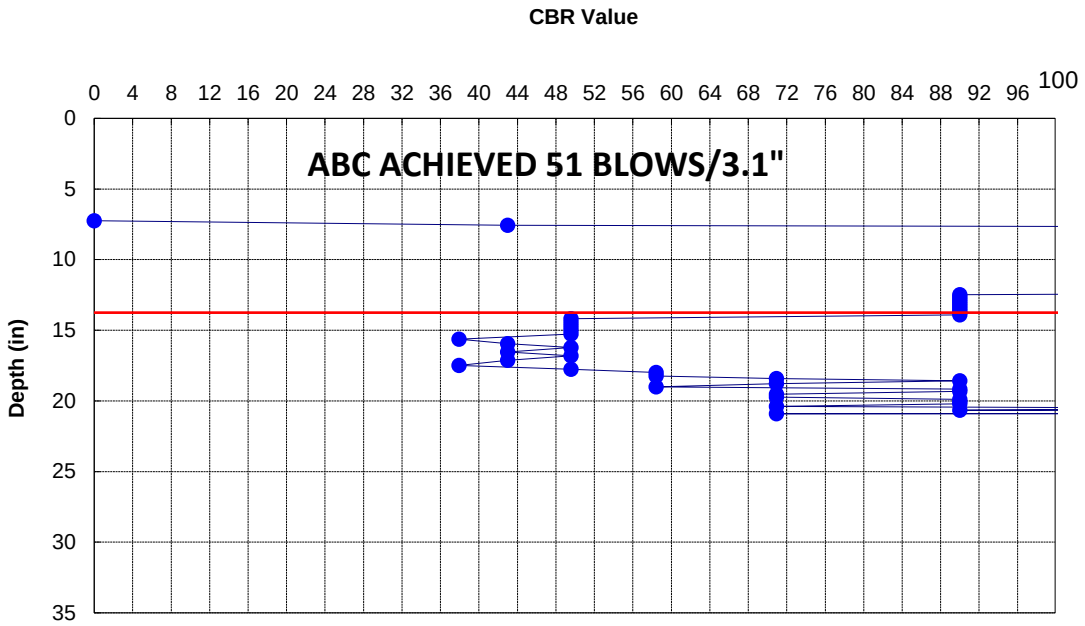
100+00 WB OSS, 6' LT — RAW — 31

CUT

Datum = ABC/SG — 04/06/16

Interval 7.6 to 13.9	
# of Values	81
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	43.0

Interval 13.9 to 21.4	
# of Values	40
Avg CBR	100+
Wghtd Avg.	74.5
Max CBR	100+
Min CBR	37.9



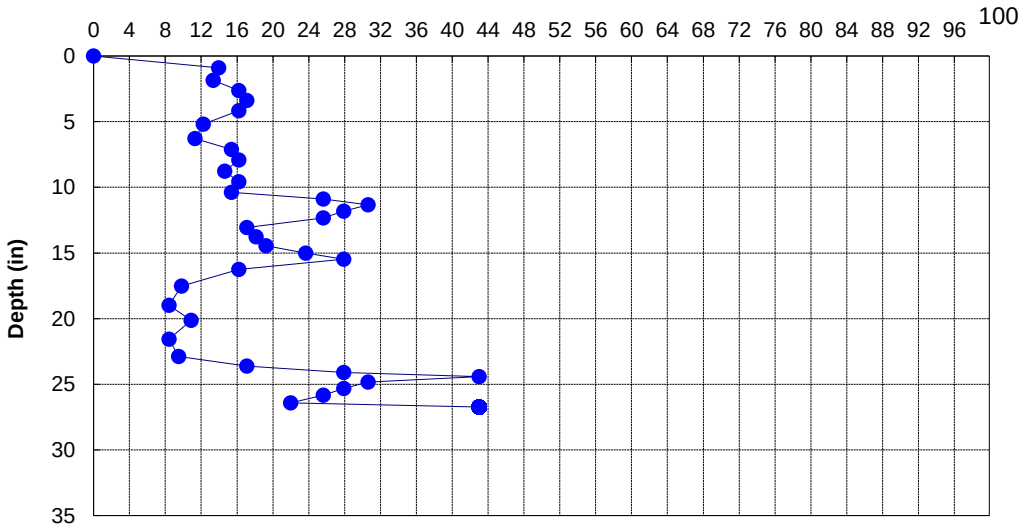
105+00 OES, 13' LT — RAW — 32

CUT

Datum = -24" BELOW EGS — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 26.7	
# of Values	35
Avg CBR	19.8
Wghtd Avg.	16.7
Max CBR	43.0
Min CBR	8.4



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_(2)_CONEPEN_ENG…

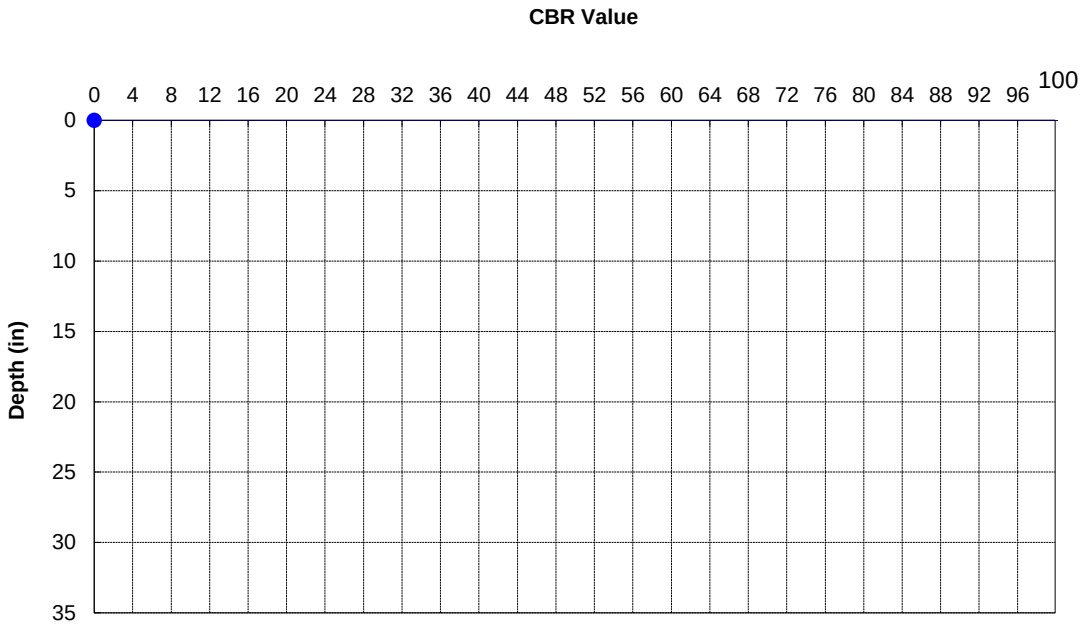
110+00 OES, 14' LT — RAW — 33

CUT

Datum = -17.5" BELOW EGS — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 1.1	
# of Values	55
Avg CBR	100+
Wghtd Avg.	100+
Max CBR	100+
Min CBR	100+



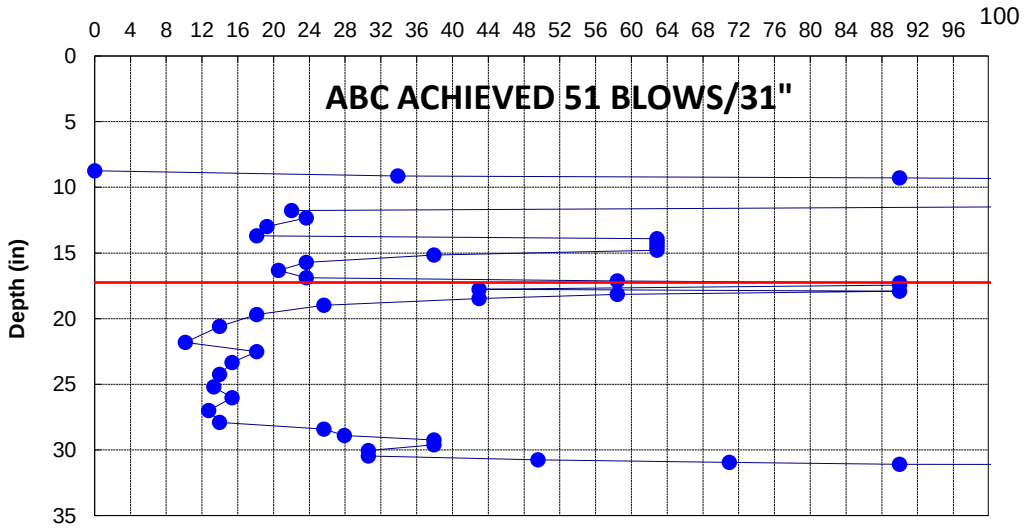
115+00 WB OSS, 6' LT — RAW — 34

CUT

Datum = ABC/SG — 04/05/16

Interval 0.0 to 17.4	
# of Values	36
Avg CBR	96.2
Wghtd Avg.	57.0
Max CBR	100+
Min CBR	18.1

Interval 17.4 to 32.1	
# of Values	61
Avg CBR	100+
Wghtd Avg.	57.4
Max CBR	100+
Min CBR	10.1



CONE PENETROMETER RESULTS
NC - DOT, GEOTECHNICAL ENGINEERING UNIT

PROJECT NO.	43608.1.1
PROJECT ID	I-5506
ROUTE	AVIATION PKWY/I-40
COUNTY	WAKE

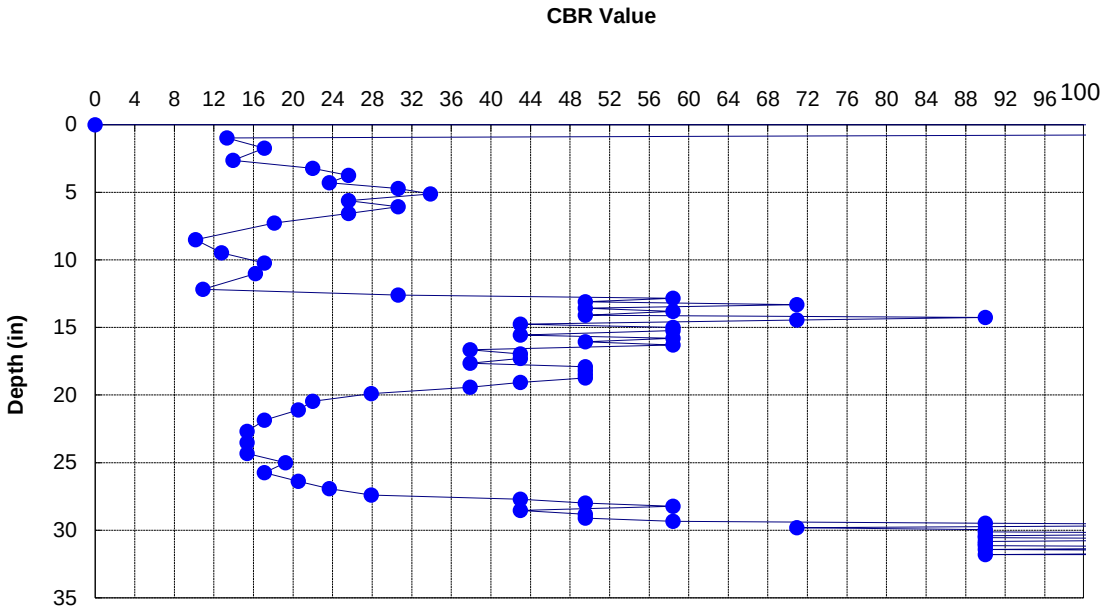
GEOLOGIST	JBB
GEOTECHS	F&R

FILE	I-5506_(2)_CONEPEN_ENG…

120+00 OES, 4' LT — RAW — 35

FILL

Datum = EGS — 04/05/16

Interval 0.0 to 0.0	
# of Values	0
Avg CBR	#DIV/0!
Wghtd Avg.	#DIV/0!
Max CBR	0.0
Min CBR	0.0

Interval 0.0 to 31.9	
# of Values	82
Avg CBR	60.5
Wghtd Avg.	34.7
Max CBR	100+
Min CBR	10.1