SUMMIT
DESIGN AND ENGINEERING SERVICES
919.732.3883 SUMMIT-ENGINEER.COM
504 Meadowland Drive, Hillsborough, NC 27278

August 7, 2012

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENG. UNIT-WRO

___ ACCEPTED
X ACCEPTED AS NOTED
___ RETURNED FOR CORRECTIONS
___ SEE LETTER

BY: Dean Hardister, PE
DATE: 10/01/2012

AECOM
701 Corporate Center Drive, Suite 475
Raleigh, NC 27607

Attention: Mr. Len Hill, PE
Senior Project Manager

Reference: **Structure Foundation Recommendations**
Chatham County Bridge Replacement
Structure No. 341 on SR 1130 over Little Brush Creek
Chatham County, North Carolina
WBS: 17BP.8.R.9
Summit Project No. 12-0101.100

Dear Mr. Hill:

Summit Design and Engineering Services, PLLC (Summit) is pleased to present our foundation recommendations, calculations and subsurface report for the above referenced project.

We appreciate the opportunity to provide our professional engineering services on this project. Should you have any questions concerning this report or if we may be of further assistance, please contact us at your convenience.

Sincerely,
SUMMIT DESIGN AND ENGINEERING SERVICES, PLLC
Firm's NC License No. P-0339

Don Dewey

Don Dewey, P.E.
Associate Vice President - Geotechnical
N.C. Registration No. 20140
don.dewey@summit-engineer.com

NORTH CAROLINA PROFESSIONAL SEAL 20140 8-7-2012 ENGINEER DONALD C. DEWEY

FOUNDATION RECOMMENDATIONS

PROJECT 17BP.8.R.9

T.I.P. NO. 17BP.8.R.9

COUNTY Chatham

STATION 13+20.00 –L-

DESCRIPTION

Bridge No. 341 on SR 1130 over Little Brush Creek

	INITIALS	DATE
DESIGN	HDP	8/2/2012
CHECKED	DCD	8/2/2012
FINAL	HDP	8/2/2012

N.C. DEPT. OF TRANSPORTATION
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BY: Dean Hardister, PE

DATE: 10/01/2012

NORTH CAROLINA PROFESSIONAL SEAL 9551 ENGINEER HAROLD D. CROSS

Aug 2, 2012

	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	12+85.00 -L-	Cap on 12 x 53 steel piles (Drilled-in Piles)	85 tons/pile	Bottom of Cap Elevation = 512.81 feet +/- (left) & 514.33 (right) Estimated Tip Elevation = 502.8 feet +/- (left) & 504.3 (right) 15 Estimated Pile Length = ~~11~~ feet* +/- (left) 15 & ~~11~~ feet* (right) 7 piles in End Bent 1
END BENT 2	13+55.00 -L-	Cap on 12 x 53 steel piles (Drilled-in Piles)	85 tons/pile	Bottom of Cap Elevation = 512.07 feet +/- (left) & 513.58 (right) Estimated Tip Elevation = 502.1 feet +/- (left) & 503.6 (right) 15 Estimated Pile Length = ~~11~~ feet* +/- (left) 15 & ~~11~~ feet* (right) 7 piles in End Bent 2

* Estimated Average Pile Length includes a 1-foot embedment into the Cap

COMMENTS & NOTES (See Following Page)

FOUNDATION RECOMMENDATION NOTE ON PLANS AND COMMENTS

PROJECT: 17BP.8.R.9 TIP NO: 17BP.8.R.9 COUNTY: Chatham

STATION: 13+20.00 -L-

DESCRIPTION: Bridge No. 341 on SR 1130 over Little Brush Creek

Note on Plans:

1. For piles, see Section 450 of the Standard Specifications

2. Piles at End Bent No. 1 and End Bent No. 2 are designed for a factored resistance of 85 tons per pile.

3. Drive piles at End Bent No. 1 and End Bent No. 2 to a required driving resistance of 145 tons per pile.

4. Pile Excavation is required to install piles at End Bent No. 1. Excavate holes at pile location to Elevation 502.8 Feet (left) and Elevation 504.3 Feet (right) for Pile Excavation. See Section 450 of the Standard Specifications

5. Pile Excavation is required to install piles at End Bent No. 2. Excavate holes at pile location to Elevation 502.1 Feet (left) and Elevation 503.6 Feet (right) for Pile Excavation. See Section 450 of the Standard Specifications

6. ~~Steel H-Pile points are required for all steel H-Piles at End Bent No. 1 and End Bent No. 2. For steel pile points, see Section 450 of the Standard Specifications.~~

7. Testing piles with the PDA during driving, restriking or redriving may be required, the Engineer will determine the need for PDA testing. For PDA testing, see Section 450 of the Standard Specifications.

Comments:

1. Use 1.5 : 1 (H:V) End Bent slopes with Class II Rip-Rap slope protection.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENG. UNIT-WRO

___ ACCEPTED

X ACCEPTED AS NOTED

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___ SEE LETTER

BY: Dean Hardister, PE

DATE: 10/01/2012

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENG. UNIT-WRO

REVIEWED
X ACCEPTED AS NOTED
___ RETURNED FOR CORRECTIONS
___ SEE LETTER
BY: Dean Hardister, PE
DATE: 10/01/2012

PILE PAY ITEMS

(For 2012 Lettings and Later - Revised 4/18/11)

WBS ELEMENT: 17BP.8.R.9 DATE: 8/2/2012

TIP NO.: 17BP.8.R.9 DESIGNED BY: H. Pruitt

COUNTY: Chatham CHECKED BY: D. Dewey

STATION: 13+20.00 -L-

DESCRIPTION: Bridge No. 341 on SR 1130 over Little Brush Creek

NUMBER OF BENTS WITH PILES
NUMBER OF PILES PER BENT
NUMBER OF END BENTS WITH PILES: 2
NUMBER OF PILES PER END BENT: 7

Only required for "Predrilling for Piles" & "Pile Excavation" pay items

Bent # or End Bent #	PILE PAY ITEM QUANTITIES						
	Steel Pile Points (yes/no)	Pipe Pile Plates (yes/no/maybe)	Predrilling For Piles (per linear ft)	Pile Redrives (per each)	Pile Excavation (per linear ft) In Soil	Pile Excavation (per linear ft) Not In Soil	PDA Testing (per each)
End Bent 1	yes			40	~~61~~	~~9~~ 30	
End Bent 2	yes			35	~~39~~	~~31~~ 35	
TOTALS			0	0	~~100~~ 75	~~40~~ 65	1

Notes:

Blanks or "no" represent quantity of zero

If steel pile points are required, calculate quantity of "Steel Pile Points" as equal to the number of steel piles

If pipe pile plates are or may be required, calculate the quantity of "Pipe Pile Plates" as equal to the number of pipe piles

If PDA testing may be required, show quantities of "PDA Testing" on the substructure plans as totals only. If PDA testing is required, show quantities of "PDA Testing" on the substructure plans for each bent or end bent

DESIGN SUMMARY

WBS ELEMENT	17BP.8.R.9	DATE	8/2/2012
TIP NUMBER	17BP.8.R.9	DESIGNED BY	H. Pruitt
COUNTY	Chatham	CHECKED BY	D. Dewey
DESCRIPTION	Bridge No. 341 on SR 1130 over Little Brush Creek		
STATION	13+20.00 -L-		

Bent	Elevation Top of Pile*	Estimated Tip Elevation	POF Elevation	Length of Pile	Δ at Top of Pile	Average Length
End Bent 1 (LT)	513.8	502.8	n/a	11.0	n/a	11
End Bent 1 (RT)	515.3	504.3	n/a	11.0	n/a	11
End Bent 2 (LT)	513.1	502.1	n/a	11.0	n/a	11
End Bent 2 (RT)	514.6	503.6	n/a	11.0	n/a	11

* Elevation of Top of Pile includes a 1-foot embedment into the Cap

BRIDGE #341 - CHATHAM CO.

70' CORED SLAB w/ 33'0-0 WIDTH
∴ MAX. FACTORED PILE LOAD = 81 TONS ⇒ 85 TONS

A.) END BENT #1: STA 12+85.0

- BOTTOM OF CAP EL.: 512.81 (LT)
  514.33 (RT)
  EL 513.57 (AVG.)

- SUBSURFACE CONDITIONS: H_2O @ EL 570.30 (CREEK LEVEL)

1.) LEFT (EB1-A)

- 5.2' OF RESIDUAL - SILTY CLAY
- 3.6' OF WR
- CRYSTALLINE ROCK (METAVOLANIC) @ EL 504.0 (8.8')

2.) RIGHT (EB1-B)

- 7.1' OF RESIDUAL - SILTY/SANDY CLAY
- 1.6' OF WR
- CRYSTALLINE ROCK (METAVOLANIC) @ EL 505.6 (8.7')

SINCE IT IS LESS THAN 10 FEET TO ROCK, DRILLED-IN PILES WILL BE REQUIRED IN ORDER TO OBTAIN A 10-FOOT PILE LENGTH. BENT HAS 7 PILES ⇒ 1.25' AVG. ROCK EXCAVATION + 8.75' AVG. SOIL EXCAVATION ⇒ 8.8' TOTAL ROCK EXCAVATION + 61.2' SOIL EXCAVATION

HN, Page 1 of 3

FROM ROCK DATA FOR CHATHAM COUNTY,

$q_u \geq 3000$ psi FOR METAVOLCANIC ROCK. SINCE THE DEPTH OF EMBEDMENT INTO ROCK (i.e. ROCK SOCKET LENGTH) IS LESS THAN 1.5B, OR 3', LET $q_p = 1.5 q_u$

$= 1.5 \times 3000 \text{ psi} \times \frac{144 \text{ in}^2/\text{ft}^2}{1000} = 648^{\text{KSF}}$

$\phi_{STATIC} = 0.45$ (ROCK)

$R_n = 85^T \times 2 / 0.45 = 378^{\text{KIPS}}$

FOR HP 12x53 PILE, TIP AREA = 1^{ft^2} (PLUGGED WITH CONCRETE)

∴ TIP RESISTANCE, MIN. = $648^{\text{KSF}} \times 1^{\text{ft}^2} \geq 378^{\text{KIP}}$ ∴ OK

(NOTE: THIS NEGLECTS ANY CONCRETE AROUND PILE)

B.) END BENT #2: STA 13+55.0

- BOTTOM OF CAP EL: 512.07 (LT)
  513.58 (RT)
  EL 512.82 (AVG)
- SUBSURFACE CONDITIONS: H_2O @ EL 510.3 (CREEK LEVEL)

1.) LIFT (EB2-A)

- 3.3' OF RESIDUAL – SANDY CLAY
- 1.8' OF WR
- CRYSTALLINE ROCK (METAVOLCANIC) @ EL 507.0 (5.1')

2.) RIGHT (BS 2-B)

- 1.6' OF RESIDUAL EMBANKMENT - SILTY CLAY
- 3.0' OF RESIDUAL - SANDY CLAY
- 1.5' OF WR
- CRYSTALLINE ROCK (ALTERATION) @ EL 50.25 (C.P.)

AS WITH BS #1, DEPTH TO ROCK WILL BE LESS THAN 10 FEET. THEREFORE, USE DRILLED-IN PILES TO DEPTH OF 10 FEET INTO ROCK FOR ENTIRE BENT. FOR BS #2, AVG DEPTH TO ROCK = 5.6' ⇒ 39.2' OF SOIL EXCAVATION FOR 7 PILES + 30.8' OF ROCK EXCAVATION (i.e. TOTAL OF 70' OF EXCAVATION @ BENT).

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.8.R.9	TIP 17BP.8.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 - Chatham County			GROUND WTR (ft)
BORING NO. EB1-A	STATION 12+81	OFFSET 16 ft LT	ALIGNMENT -L-
COLLAR ELEV. 518.0 ft	TOTAL DEPTH 14.0 ft	NORTHING 700,684	EASTING 1,847,513
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 87% 07/22/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

GROUND WTR (ft): 0 HR. Dry; 24 HR. FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP NO	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV (ft)	DEPTH (ft)
520						Bottom of Cap @ El 512.8					
										518.0 GROUND SURFACE	0.0
515	514.0	4.0	5	3	5			M		ROADWAY EMBANKMENT Red-Brown, Silty CLAY (A-7), With Some Gravel 514.0	4.0
510	509.0	9.0	3	4	8			W		RESIDUAL Orange-Brown and Gray, Silty CLAY (A-7), With Trace Rock Fragments and Sand 507.6	10.4
505	504.0	14.0	50/0.0			50/0.0				WEATHERED ROCK (Metavolcanic) 504.0	14.0
										CRYSTALLINE ROCK (Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 504.0 ft on Crystalline Rock (Metavolcanic) Harder drilling at 10.4 feet was interpreted as the top of weathered rock	

0.0
5.2
8.8

5+3
3+4
16
12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.8.R.9	TIP 17BP.8.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 - Chatham County			GROUND WTR (ft)
BORING NO. EB1-B	STATION 12+84	OFFSET 18 ft RT	ALIGNMENT -L-
COLLAR ELEV. 518.5 ft	TOTAL DEPTH 12.9 ft	NORTHING 700,665	EASTING 1,847,485
DRILL RIG/HAMMER EFF./DATE SUM3359 CME 450 87% 07/22/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

GROUND WTR (ft): 0 HR. Dry; 24 HR. FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
520						BOTTOM OF CAP @ EL 514.3					
										518.5 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
515	514.7	3.8	4	3	4	7		LL		Red-Brown Silty CLAY (A-7) With Some Gravel	0.0
										513.2	2.1'
										Brown Silty CLAY (A-7) With Little Sand	
510	509.7	8.8	8	14	18			M		Orange Brown and Gray Fine Sandy CLAY (A-6) With Little Rock Fragments	7.4'
	506.7	12.8	100/0.1							505.6 CRYSTALLINE ROCK	8.9'

(Metavolcanic)
Boring Terminated with Standard Penetration Test Refusal at Elevation 505.6 ft on Crystalline Rock (Metavolcanic)

Harder drilling at 11.3 feet was interpreted as the top of weathered rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.8.R.9	TIP 17BP.8.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 - Chatham County			GROUND WTR (ft)
BORING NO. EB2 A	STATION 13+57	OFFSET 18 ft LT	ALIGNMENT -L
COLLAR ELEV. 517.8 ft	TOTAL DEPTH 10.8 ft	NORTHING 700,627	EASTING 1,847,557
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 87% 07/22/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

0 HR. Dry
24 HR. FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
520						Bottom of Cap @ El. 512.1				
515	513.8	4.0	4	7	3			M		GROUND SURFACE 0.0 ROADWAY EMBANKMENT Red-Brown, Silty CLAY (A-7), With Little Gravel and Trace Organics RESIDUAL Orange Brown and Gray, Sandy CLAY (A-6) 6.0 WEATHERED ROCK 3.3' (Metavolcanic) 5.1' CRYSTALLINE ROCK (Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 507.0 ft on Crystalline Rock (Metavolcanic)
510	508.8	9.0	21	75/0.1						
	507.0	10.8	50/0.3							

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.8.R.9	TIP 17BP.8.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 - Chatham County			GROUND WTR (ft)
BORING NO. EB2-B	STATION 13+55	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 516.4 ft	TOTAL DEPTH 10.9 ft	NORTHING 700,609	EASTING 1,847,530
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 87% 07/22/2011		DRILL METHOD HS Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FAD

ELEV (ft)	CASING ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
520						BOTTOM OF CAP @ EL. 513.6					
										516.4 GROUND SURFACE	0.0
515	516.5	1.9								ROADWAY EMBANKMENT Brown to Orange Brown, Silty CLAY (A-7), With Some Gravel	1.6'
510	508.5	8.9	6	21	No 0.5					RESIDUAL Orange Brown and Gray, Sandy CLAY (A-6)	4.6'
	505.5	10.9	50/0.0			100/0.2				WEATHERED ROCK (Metavolcanic) CRYSTALLINE ROCK (Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 505.5 ft on Crystalline Rock (Metavolcanic)	6.1'

STATE	STATE PROJECT REFERENCE NO	SHEET NO	TOTAL SHEETS
N.C.	17BP.8.R.9	1	7

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *17BP.8.R.9* F.A. PROJ. *n/a*

COUNTY *Chatham*

PROJECT DESCRIPTION *Bridge No. 341 on SR 1130 over Brush Creek*

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2, 2A	LEGEND
3	SITE PLAN
4, 5	BORING LOGS

PERSONNEL

B. Smith

L. Gonzalez-Castillo

C. Husketh

INVESTIGATED BY *B. Worley, PG*

CHECKED BY *D. Dewey, PE*

SUBMITTED BY *Summit Design & Engineering*

DATE *JULY, 2012*

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA within THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU IN-PLACE TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHODS. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED ON 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 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.

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

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 LICENSED 7-31-12 SEAL 1926 GEOLOGIST BRADLEY D. WORLEY

DRAWN BY: *M. Brandon*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

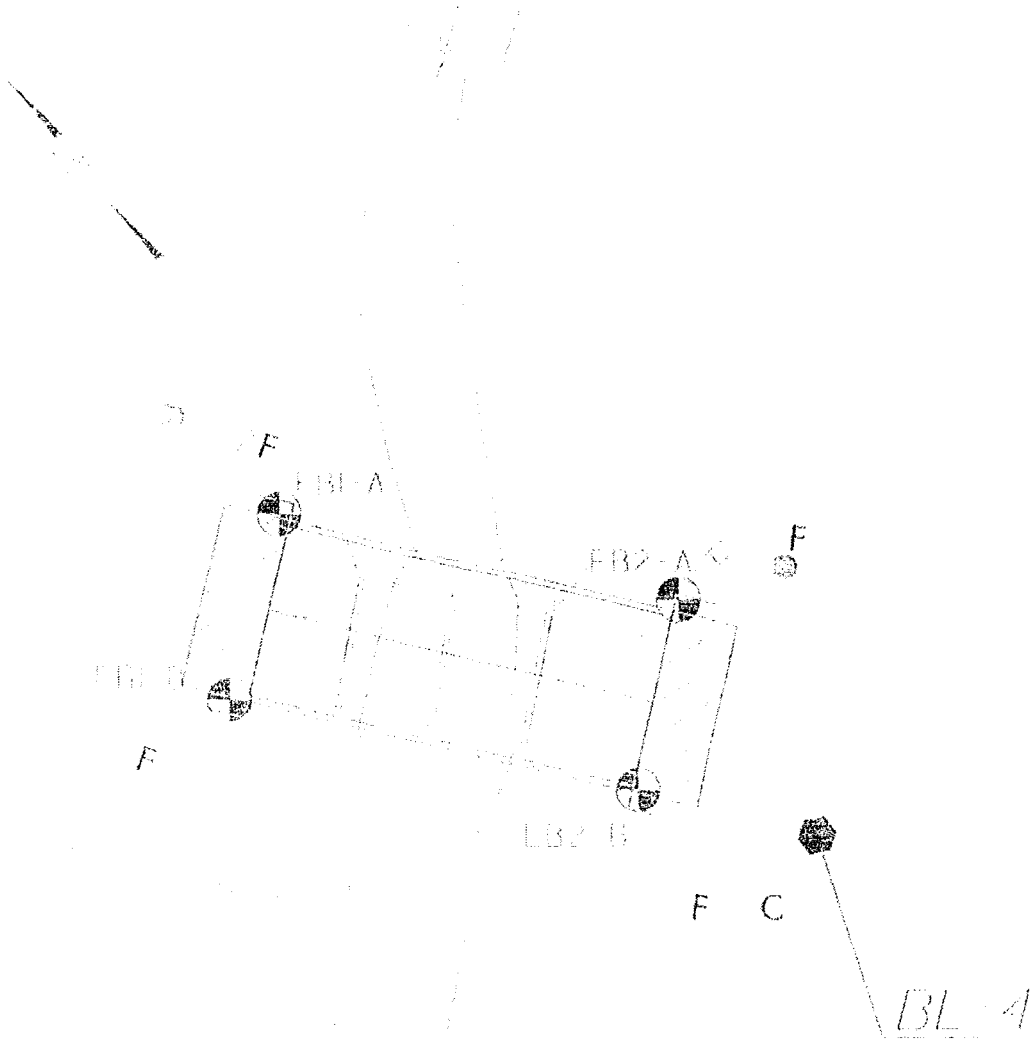
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SITE PLAN
Bridge 341, Chatham Co.



SCALE 30:1

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.8.R.9	TIP 17BP.8.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 - Chatham County			GROUND WTR (ft)
BORING NO. EB1-A	STATION 12+61	OFFSET 16 ft LT	ALIGNMENT -L-
COLLAR ELEV. 518.0 ft	TOTAL DEPTH 14.0 ft	NORTHING 700,684	EASTING 1,847,513
DRILL RIG/HAMMER EFF./DATE SUM3359 CME 450 8/% 9/02/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP NO	MOI	LOG	SOIL AND ROCK DESCRIPTION Elev. (ft)	Depth (ft)
520											
518										518.0 GROUND SURFACE	0.0
	514.0	4.0	5	3	5			M		ROADWAY EMBANKMENT Red Brown, SILTY CLAY (A-7), With Some Gravel	
516										514.0	4.0
	508.5	9.5	3	4	2			W		RESIDUAL Orange-Brown and Gray, SILTY CLAY (A-7), With Trace Rock Fragments and Sand	
514										507.5	10.5
										WEATHERED ROCK (Metavolcanic)	
512	504.0	14.0	50/0.0							504.0	14.0
										CRYSTALLINE ROCK (Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 504.0 ft on Crystalline Rock (Metavolcanic)	
										Harder drilling at 10.4 feet was interpreted as the top of weathered rock	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.8.R.9	TIP 17BP.8.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 - Chatham County			GROUND WTR (ft)
BORING NO. FB1-B	STATION 12+84	OFFSET 18 ft RT	ALIGNMENT -L-
COLLAR ELEV. 518.5 ft	TOTAL DEPTH 12.9 ft	NORTHING 700,665	EASTING 1,847,485
DRILL RIG/HAMMER EFF./DATE SPT/CME 550 87% 07/22/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

0 HR. Dry
24 HR. FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOWS PER 6 IN (0-50)	BLOWS PER 6 IN (50-100)	BLOWS PER 6 IN (100-150)	BLOWS PER FOOT 0 25 50 75 100	SAMP NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION DESCRIPTION	DEPTH (ft)
520											
										518.5 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Red-Brown, SILTY CLAY (A-7) With Some Gravel	
515	514.7	3.8	4	3	4			M		515.0	3.5
										RESIDUAL Brown, SILTY CLAY (A-7) With Little Sand	
										512.5	6.0
										Orange-Brown and Gray, Fine SANDY CLAY (A-6), With Little Rock Fragments	
510	509.7	8.8	5	16	43			M			
										502.5	11.0
	505.7	12.8	50/0.1							501.0	12.5
										WEATHERED ROCK (Metavolcanic)	
										CRYSTALLINE ROCK (Metavolcanic)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 505.6 ft on Crystalline Rock (Metavolcanic)	
										Harder drilling at 11.3 feet was interpreted as the top of weathered rock.	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.6.R.9	TIP 17BP.6.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 - Chatham County			GROUND WTR (ft)
BORING NO. EB2-A	STATION 13+57	OFFSET 15 ft LT	ALIGNMENT -L-
COLLAR ELEV. 517.8 ft	TOTAL DEPTH 10.8 ft	NORTHING 700,627	EASTING 1,847,557
DRILL RIG/HAMMER EFF./DATE SUM3350 CME-450 87% 07/22/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

GROUND WTR (ft): 0 HR. Dry; 24 HR. FIAD

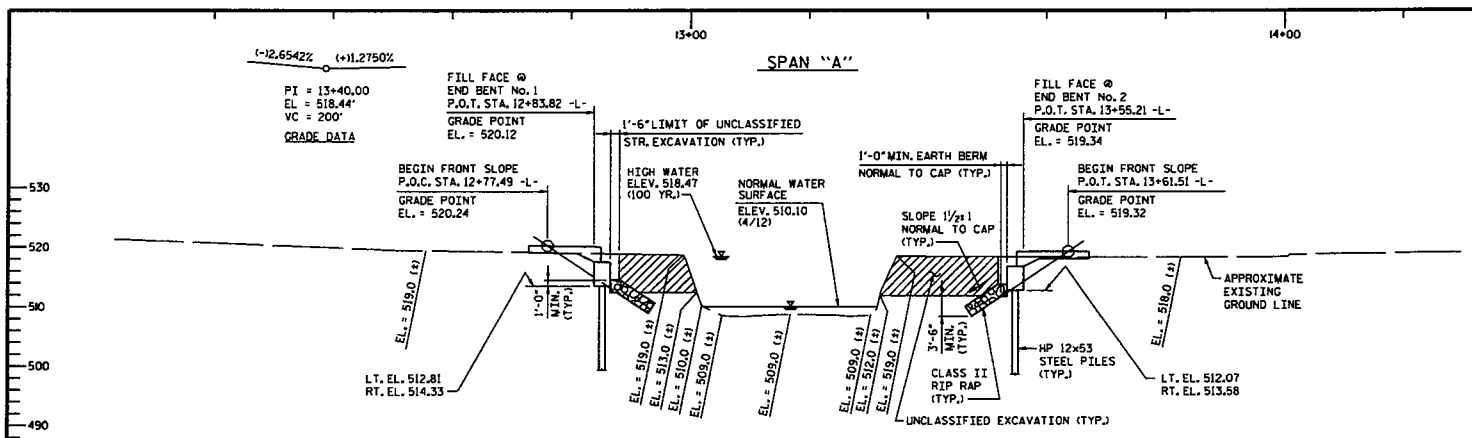
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP NO	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
520											
517.8										GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Red-Brown, SILTY CLAY (A-7), With Little Gravel and Trace Organics	
	513.8	4.0	4	7	5	12		M			
510										RESIDUAL Orange-Brown and Gray, SANDY CLAY (A-6)	
	508.8	9.0	21	100/0.4							
	507.0	10.8	50/0.0							WEATHERED ROCK (Metavolcanic)	10.8
										CRYSTALLINE ROCK (Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 507.0 ft on Crystalline Rock (Metavolcanic)	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.8.R.9	TIP 17BP.8.R.9	COUNTY CHATHAM	GEOLOGIST Brett Smith
SITE DESCRIPTION Bridge# 341 Chatham County			GROUND WTR (ft)
BORING NO. EB2-B	STATION 13+55	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 518.4 ft	TOTAL DEPTH 10.9 ft	NORTHING 700,606	EASTING 1,847,530
DRILL RIG/HAMMER EFF./DATE SUM3359 CME450 67% 07/27/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 07/03/12	COMP. DATE 07/03/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
520										
518.4										GROUND SURFACE 0.0
	516.1	2.3	4	5	7			M		ROADWAY EMBANKMENT Brown to Orange-Brown, SILTY CLAY (A-7) With Some Gravel
510	509.5	8.9	5	20	76/0.4	100/0.0				507.0 RESIDUAL Orange-Brown and Gray, SANDY CLAY (A-6) 509.3 2.4
	507.5	10.9	50/0.0							507.5 WEATHERED ROCK (Metavolcanic) 10.9
										CRYSTALLINE ROCK (Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 507.5 ft on Crystalline Rock (Metavolcanic)

NCDOT SOIL SHEET LIBRARY - CHATHAM COUNTY.GPJ - NCDOT GEOT 2012



SECTION ALONG ℄ SURVEY -L-

(BENTS ON SECTION AT RIGHT ANGLES TO BENTS)

HORIZONTAL CURVE DATA

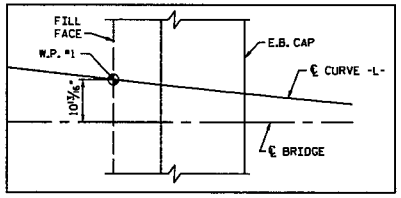
PI STA. 12+47.42	PI STA. 15+59.52
Δ = 36°33'24.1" (LT)	Δ = 48°49'34.8" (LT)
D = 19°05'54.9"	D = 19°05'54.9"
L = 191.41'	L = 255.65'
T = 99.09'	T = 136.17'
R = 300.00'	R = 300.00'

HYDRAULIC DATA

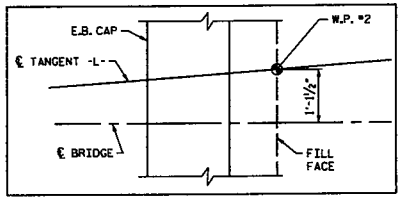
DESIGN DISCHARGE	1300 CFS
FREQUENCY OF DESIGN FLOOD	25 YR.
DESIGN HIGH WATER ELEVATION	516.00
DRAINAGE AREA	4.10 SQ. MI.
BASE DISCHARGE (Q 100)	1,786 CFS
BASE HIGH WATER ELEVATION	517.46

OVERTOPPING FLOOD DATA

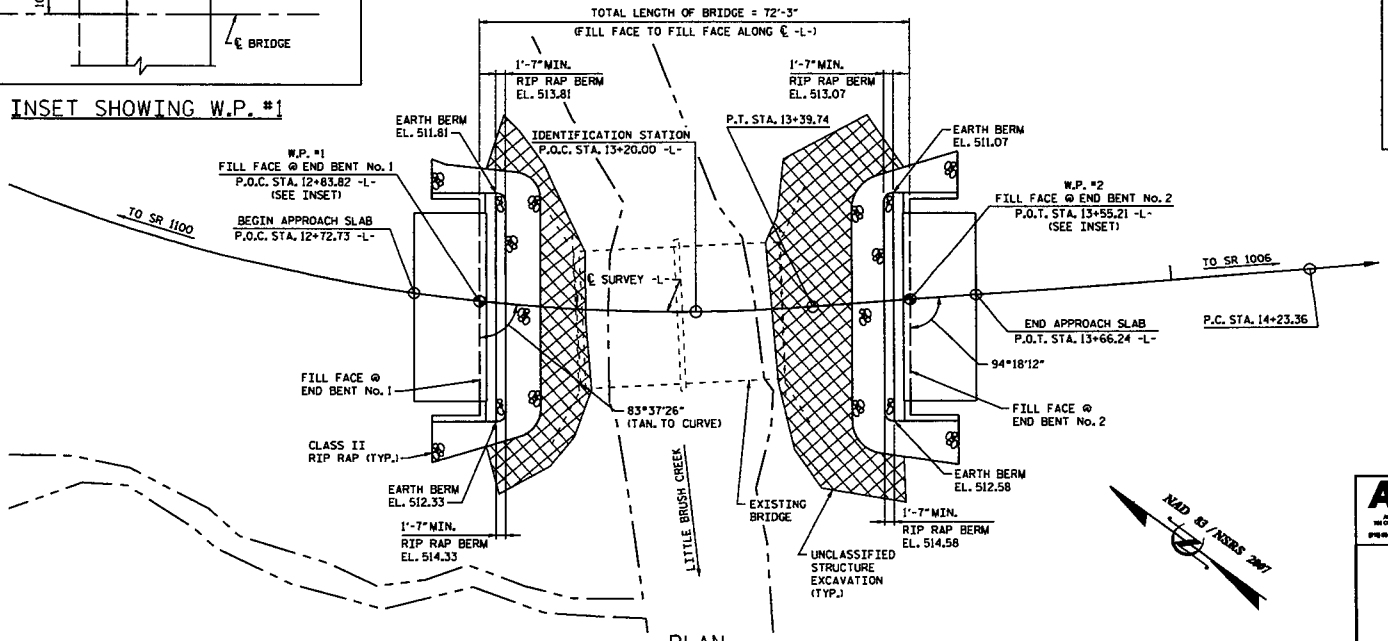
OVERTOPPING DISCHARGE	2825 CFS
FREQUENCY OF OVERTOPPING FLOOD	500+ YR.
OVERTOPPING FLOOD ELEVATION	519.70



INSET SHOWING W.P. #1



INSET SHOWING W.P. #2



PLAN

(PILES NOT SHOWN FOR CLARITY)

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROJECT NO. 17BP.8.R.9
CHATHAM COUNTY
STATION: 13+20.00 -L-

SHEET 1 OF 2 REPLACES BRIDGE NO. 341

AECOM

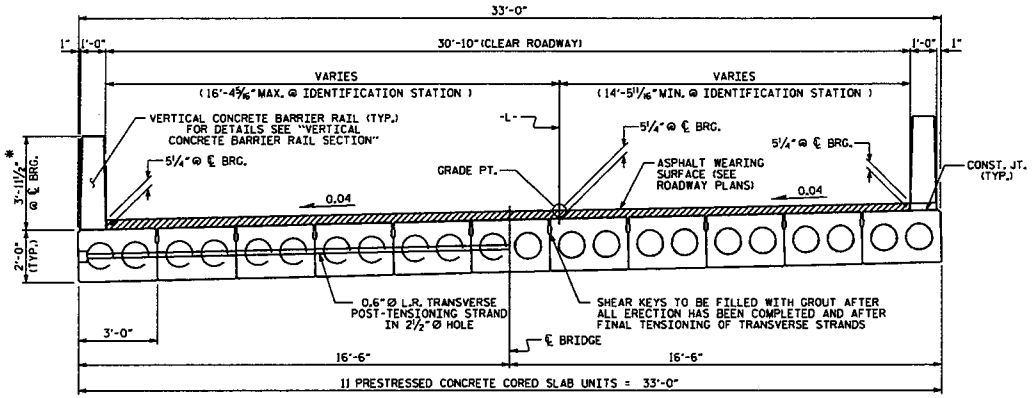
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON SR 1130
OVER LITTLE BRUSH CREEK
BETWEEN SR 1100 & SR 1006

30'-10" CLEAR ROADWAY - 90° SKEW

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-01
1			3					TOTAL SHEETS
2			4					13

DRAWN BY : MTB DATE : 09/12
CHECKED BY : JCM DATE : 09/12



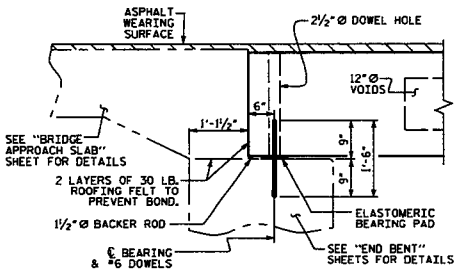
HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

TYPICAL SECTION

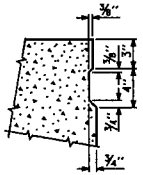
HALF SECTION
THROUGH VOIDS

* - THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

FIXED END

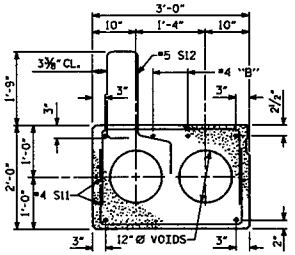


SECTION AT END BENT



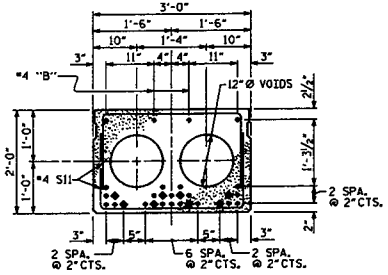
SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.



EXTERIOR SLAB SECTION

(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)



INTERIOR SLAB SECTION (70' UNIT)

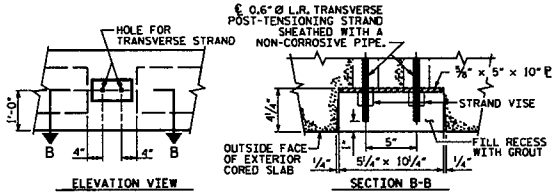
(28 STRANDS REQUIRED)

0.6" Ø LOW RELAXATION STRAND LAYOUT

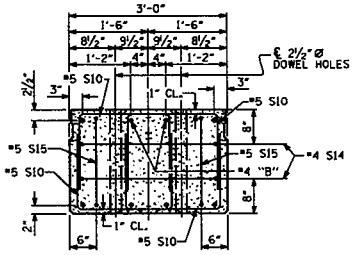
◆ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 12'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

◉ OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND



GROUTED RECESS AT END OF POST-TENSIONED STRAND-CORED SLABS



END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROJECT NO. 17BP.8.R.9
CHATHAM COUNTY
STATION: 13+20.00 -L-

SHEET 1 OF 3

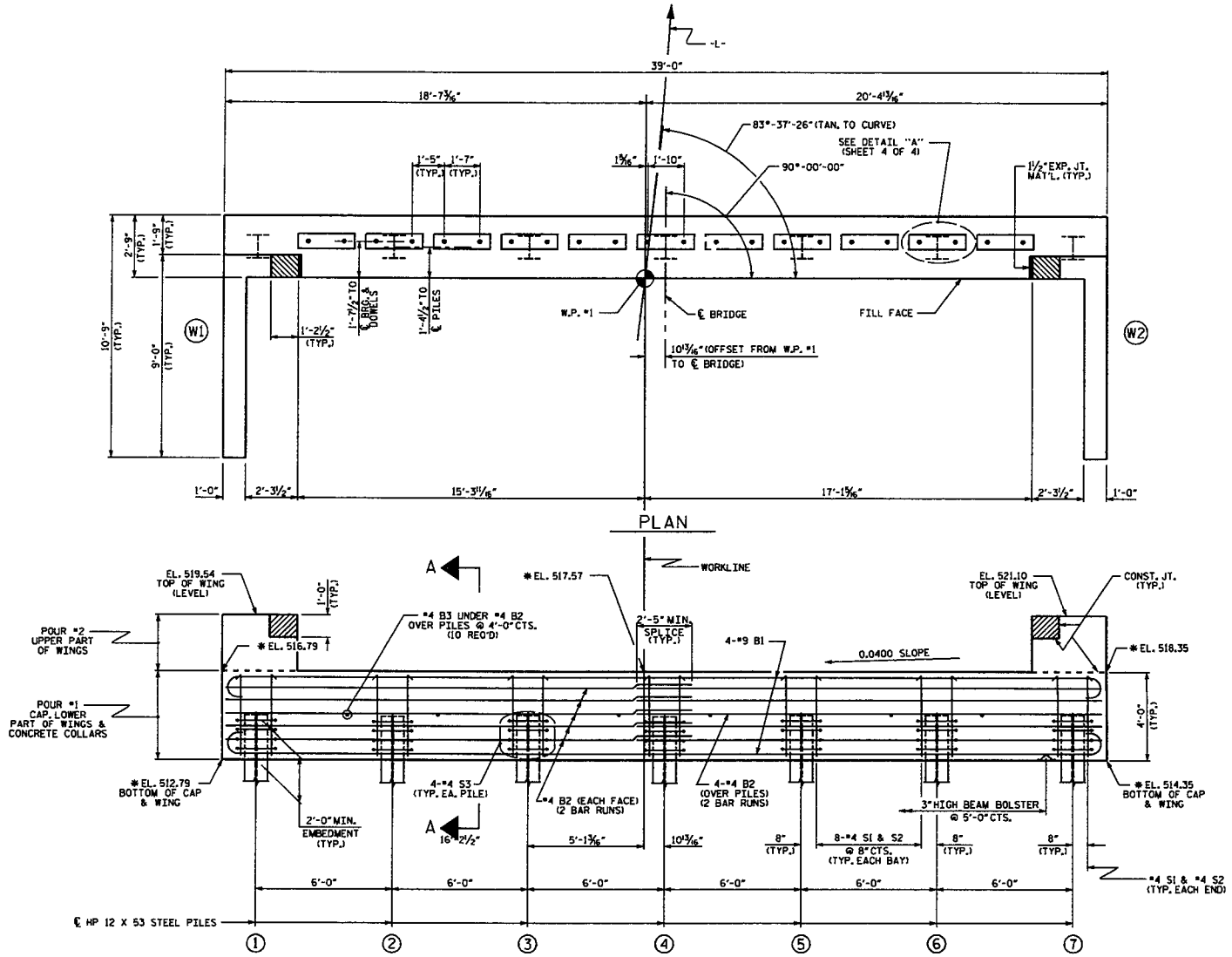
AECOM

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 2'-0"
PRESTRESSED CONCRETE
CORED SLAB UNIT

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S-04
								TOTAL SHEETS 13

DRAWN BY : MTB DATE : 09/12
CHECKED BY : JCM DATE : 09/12



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TOP OF PILE ELEVATIONS	
1	514.85
2	515.09
3	515.33
4	515.57
5	515.81
6	516.05
7	516.29

*ELEVATIONS PROJECTED ALONG ℄ BEARINGS.

PROJECT NO. 17BP.8.R.9
CHATHAM COUNTY
STATION: 13+20.00 -L-
SHEET 1 OF 4

AECOM

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1

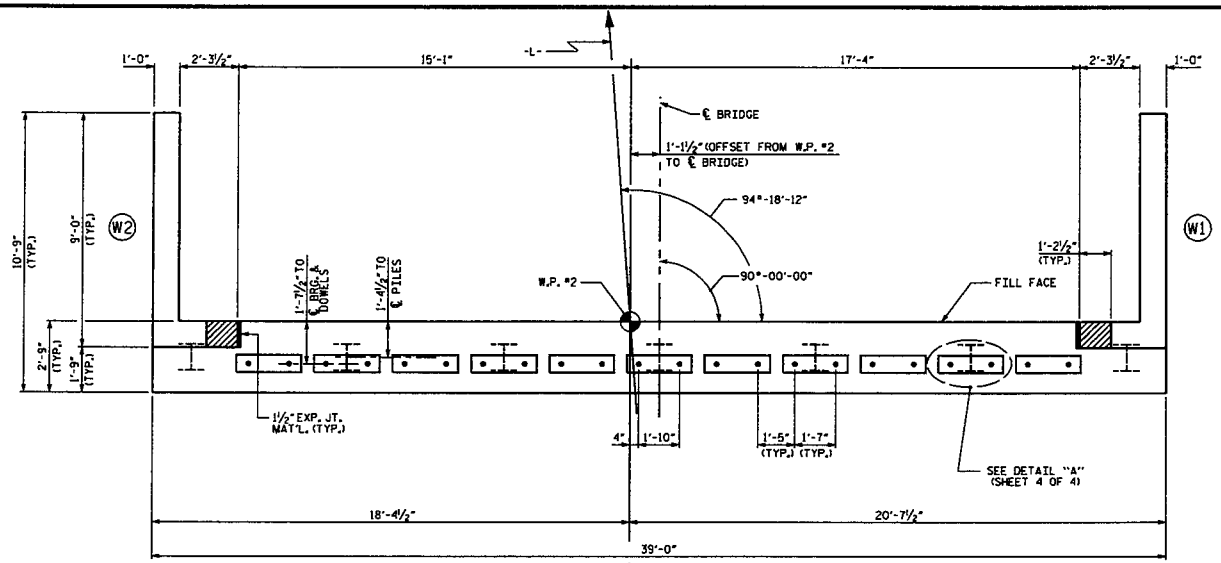
ASSEMBLED BY : MTB	DATE : 09/12
CHECKED BY : JCM	DATE : 09/12
DRAWN BY : WJH 12/11	
CHECKED BY : AAC 12/11	

REVISIONS

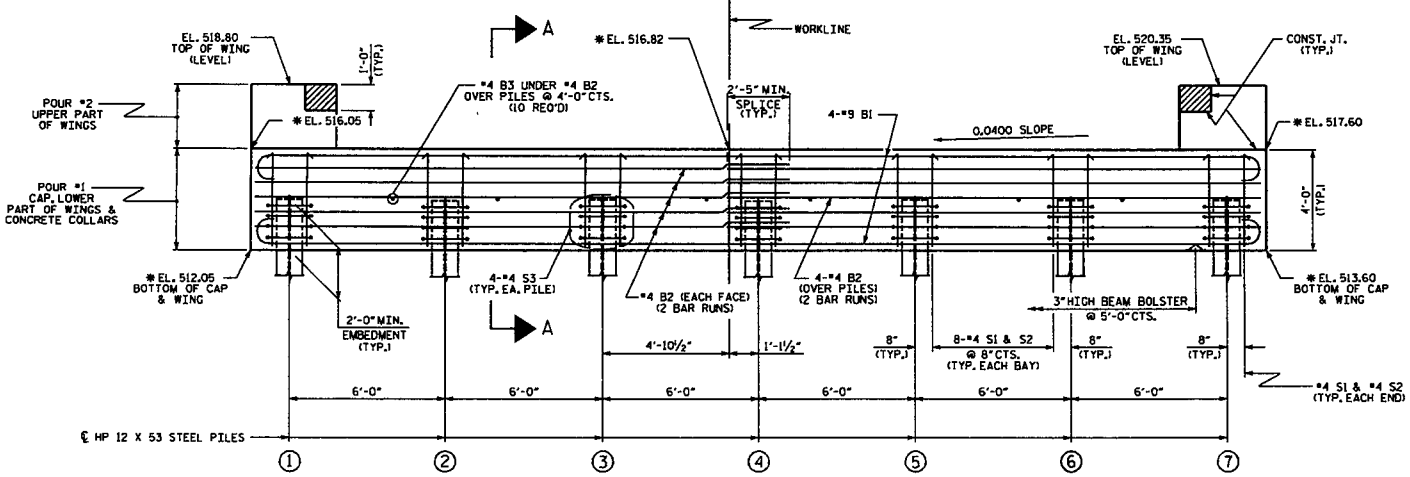
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-08
TOTAL SHEETS 13

STD. NO. EB.33.90S4



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TOP OF PILE ELEVATIONS	
1	514.11
2	514.35
3	514.59
4	514.83
5	515.07
6	515.31
7	515.55

*ELEVATIONS PROJECTED ALONG ℄ BEARINGS.

PROJECT NO. 17BP.8.R.9
CHATHAM COUNTY
STATION: 13+20.00 -L-
SHEET 2 OF 4

AECOM

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 2

ASSEMBLED BY : MTB	DATE : 09/12
CHECKED BY : JCM	DATE : 09/12
DRAWN BY : WJH 12/11	
CHECKED BY : AAC 12/11	

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO. S-09	TOTAL SHEETS 13
1			3				
2			4				

STD. NO. EB.33.9054