STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.3.R.28	C-1	11

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

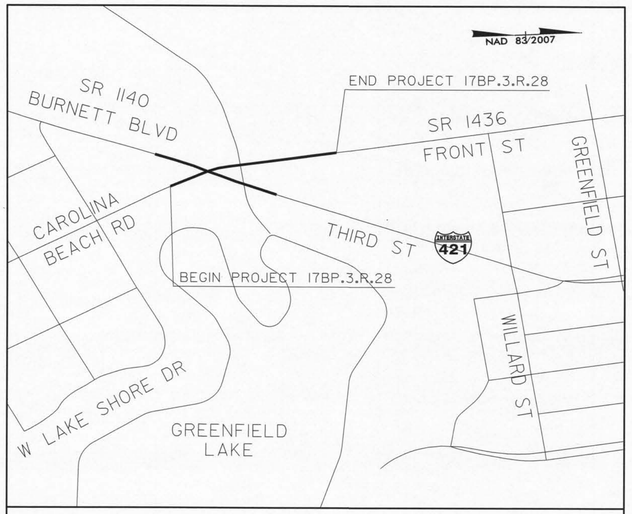
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STRUCTURE PLANS

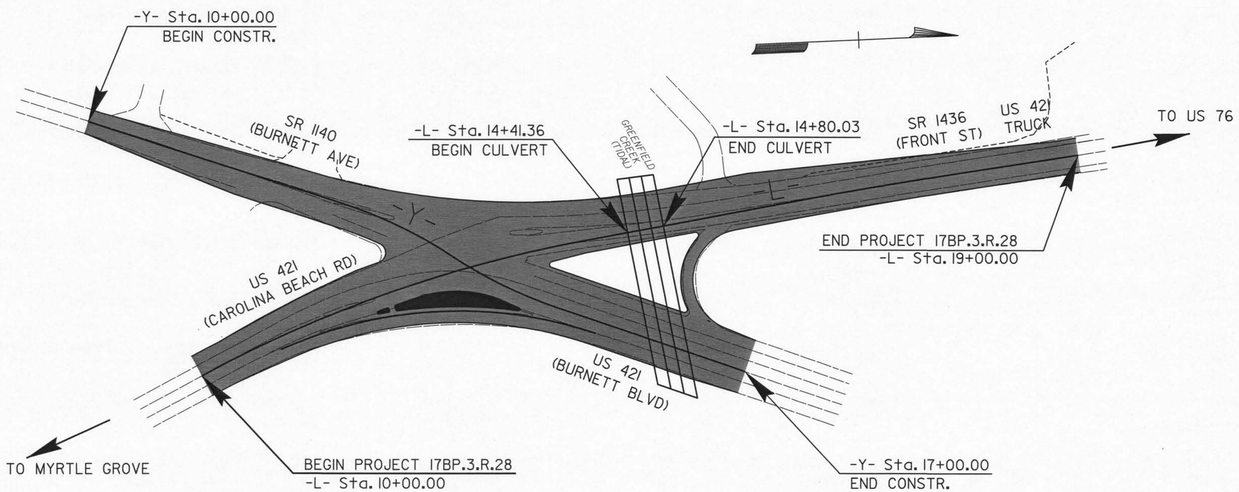
NEW HANOVER

LOCATION: INTERSECTION OF SR 1436 /US 421 TRUCK (FRONT STREET) AND SR 1140 (BURNETT BOULEVARD) SOUTH OF WILLARD STREET

TYPE OF WORK: GRADING, DRAINAGE, PAVING, RESURFACING, STRUCTURES, SIGNING AND SIGNALS



VICINITY MAP



CULVERT

DESIGN DATA

ADT 2012 = 20,000

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT 17BP.3.R.28 = 0.134 MILES
LENGTH STRUCTURE PROJECT 17BP.3.R.28 = 0.006 MILES
TOTAL LENGTH PROJECT 17BP.3.R.28 = 0.140 MILES

NCDOT CONTACT:
AMANDA GLYNN, PE
DIVISION BRIDGE PROGRAM MANAGER
5501 BARBADOS BLVD.
CASTLE HAYNE, NC 28429
(910) 341-2000

Prepared In the Office of:
ATKINS
1616 East Millbrook Road, Raleigh, NC 27609
for the North Carolina Division of Highways

2012 STANDARD SPECIFICATIONS

LETTING DATE:
AUGUST 7, 2014

DAVID BASS, PE
PROJECT ENGINEER

MATTHEW PAYNE, PE
PROJECT DESIGN ENGINEER

STRUCTURES ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 030046 6-20-2014 ENGINEER MATTHEW PAYNE

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT: 17BP.3.R.28

CONTRACT: DC00078

20-JUN-2014 15:00
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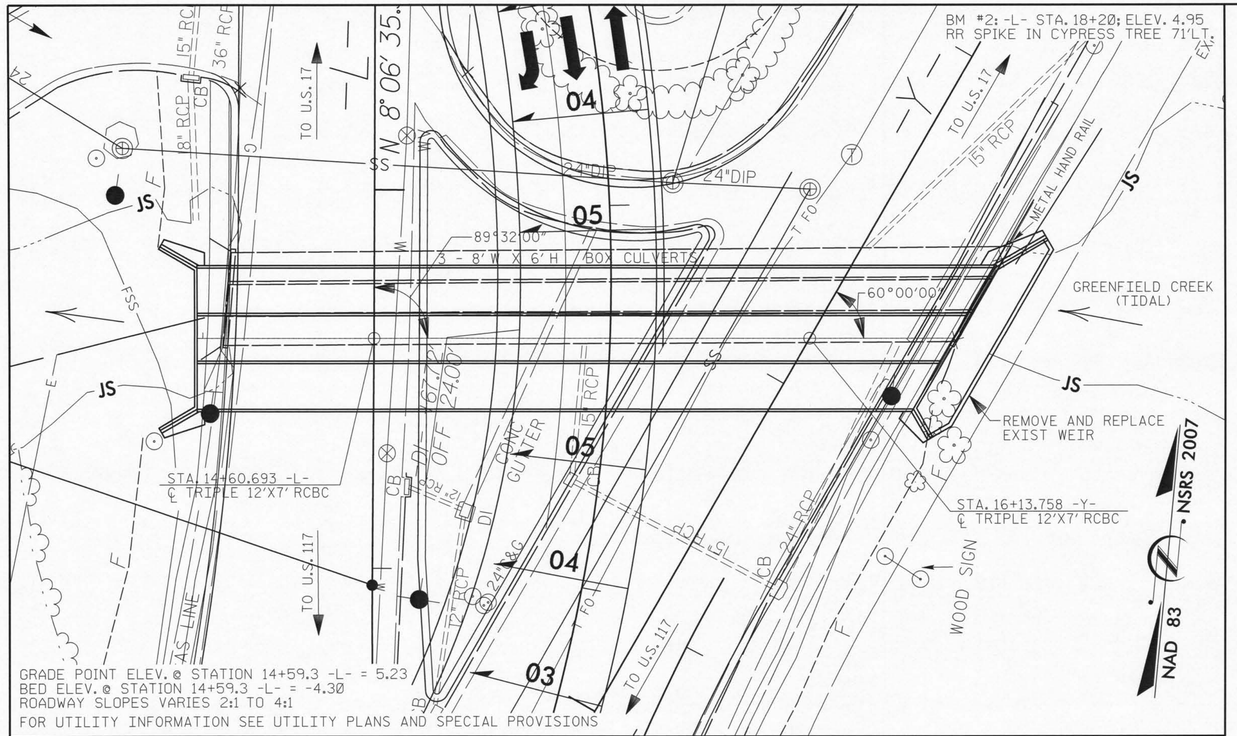
$$$$USERNAME$$$$



LOCATION SKETCH

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @ 3.79	CY/FT	759.16	C.Y.
WING ETC.		29.53	C.Y.
TOTAL		788.69	C.Y.
REINFORCING STEEL			
BARREL		123,092	LBS.
WINGS ETC.		2229	LBS.
TOTAL		125,064	LBS.
CULVERT EXCAVATION		3440	TONS
FOUNDATION CONDITIONING MATERIAL		546	TONS

HYDRAULIC DATA

DESIGN DISCHARGE = 3000 CFS
FREQUENCY OF DESIGN FLOOD = 50 YR.
DESIGN HIGH WATER ELEVATION = 6.8 FT.
DRAINAGE AREA = 4.0 SQ. MI.
BASE DISCHARGE (Q100) = 3300 CFS
BASE HIGH WATER ELEVATION = 6.89 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = <1700 CFS
FREQUENCY OF OVERTOPPING FLOOD = <5 YR.
OVERTOPPING FLOOD ELEVATION = 5.4 FT.

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

DESIGN FILL = 1.5 FEET

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET SN.

THE 18 INCH DIAMETER PIPE, AND 15 INCH DIAMETER PIPE THROUGH THE SIDEWALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECESSARY TO CLEAR PIPES.

THE 36 INCH DIAMETER PIPE, AND 15 INCH DIAMETER PIPE THROUGH THE WING WALLS SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECESSARY TO CLEAR PIPES.

TRAFFIC ON FRONT STREET AND BURNETT BOULEVARD SHALL BE MAINTAINED AT VARIOUS STAGES OF CONSTRUCTION. IN ORDER TO MAINTAIN TRAFFIC, THE CULVERT SHALL BE CONSTRUCTED IN SECTIONS AS DIRECTED BY THE ENGINEER, AND IN ACCORDANCE WITH THE TRAFFIC CONTROL PLANS.

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF THE STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

ONE PERMITTED CONSTRUCTION JOINT WILL BE ALLOWED IN THE END CURTAIN WALL.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

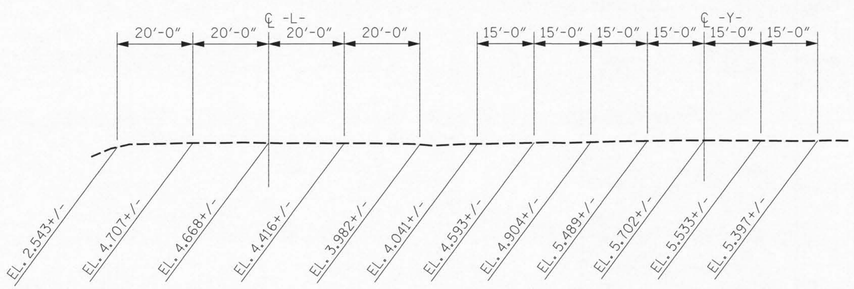
FOR CULVERT DIVERSION DETAILS AND PAY ITEMS, SEE EROSION CONTROL PLANS.

A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

BED MATERIAL PLACED BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL BETWEEN THE LOWER SILLS. THE MATERIAL SHALL BE EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY LINE THE LOWER SILLS. RIPRAP MAY BE USED TO SUPPLEMENT NATIVE MATERIAL IN THE HIGH SILL BARREL. IF RIPRAP IS USED, NATIVE MATERIAL SHALL BE PLACED TO FILL ALL VOIDS AND PROVIDE A LEVEL SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

THE ENGINEER SHALL CHECK THE LENGTH OF THE CULVERT BEFORE STAKING IT OUT TO VERIFY THAT IT WILL PROPERLY TAKE CARE OF THE FILL.



PROFILE ALONG ℄ CULVERT

NOTES (CONTINUED):

DIMENSIONS FOR THE WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL SHOWN ON WING SHEETS.

3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE SCOUR CRITICAL ELEVATION IS THE AS-BUILT BOTTOM OF CULVERT FLOOR SLAB ELEVATION. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND CULVERT FLOOR SLAB INCLUDING 4 INCHES OF VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS TO FULL HEIGHT.
3. ROOF SLABS AND HEAD WALLS.
4. CONSTRUCTION JOINTS SHALL BE PERMITTED IN ORDER TO CONSTRUCT CULVERT IN ACCORDANCE WITH THE VARIOUS TRAFFIC CONTROL STAGES.

CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL, A DETAILED DEMOLITION PLAN FOR THE REMOVAL OF THE EXISTING CONCRETE CULVERT.

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

NORTH CAROLINA PROFESSIONAL SEAL 030046 ENGINEER MATTHEW PAYNE 6-20-2014

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 7 FT.
CONCRETE BOX CULVERT
90°(-L-) 60°(-Y-) SKEW

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS
2			4			11

DRAWN BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014

20-JUN-2014 15:00
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$$$$USERNAME$$$$

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.13	--	1.75	1.28	3	TOP SLAB	38.67	1.13	3	TOP SLAB	38.67	
		HL-93 (OPERATING)	N/A		1.47	--	1.35	1.66	3	TOP SLAB	38.67	1.47	3	TOP SLAB	38.67	
		HS-20 (INVENTORY)	36.000	(2)	1.19	42.84	1.75	1.19	3	TOP SLAB	38.67	1.49	3	TOP SLAB	38.67	
		HS-20 (OPERATING)	36.000		1.55	55.80	1.35	1.55	3	TOP SLAB	38.67	1.93	3	TOP SLAB	38.67	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.93	39.56	1.40	2.93	3	TOP SLAB	38.67	3.61	3	TOP SLAB	38.67	
		SNGARBS2	20.000		2.27	45.40	1.40	2.27	3	TOP SLAB	38.67	3.10	3	TOP SLAB	38.67	
		SNAGRIS2	22.000		2.17	47.74	1.40	2.17	3	TOP SLAB	38.67	3.27	3	TOP SLAB	38.67	
		SNCOTTS3	27.250		1.39	37.88	1.40	1.52	3	TOP SLAB	38.67	1.39	3	TOP SLAB	38.67	
		SNAGGRS4	34.925		1.50	52.39	1.40	1.50	3	TOP SLAB	38.67	1.61	3	TOP SLAB	38.67	
		SNS5A	35.550		1.55	55.10	1.40	1.59	3	TOP SLAB	38.67	1.55	3	TOP SLAB	38.67	
		SNS6A	39.950		1.51	60.32	1.40	1.51	3	TOP SLAB	38.67	1.57	3	TOP SLAB	38.67	
		SNS7B	42.000		1.51	63.42	1.40	1.51	3	TOP SLAB	38.67	1.54	3	TOP SLAB	38.67	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.96	64.68	1.40	1.96	2	TOP SLAB	13.33	2.44	3	TOP SLAB	38.67	
		TNT4A	33.075		1.58	52.26	1.40	1.58	3	TOP SLAB	38.67	1.73	3	TOP SLAB	38.67	
		TNT6A	41.600		1.45	60.32	1.40	1.45	3	TOP SLAB	38.67	1.49	3	TOP SLAB	38.67	
		TNT7A	42.000		1.45	60.90	1.40	1.45	3	TOP SLAB	38.67	1.57	3	TOP SLAB	38.67	
		TNT7B	42.000		1.62	68.04	1.40	1.62	3	TOP SLAB	38.67	1.62	3	TOP SLAB	38.67	
		TNAGRIT4	43.000		1.38	59.34	1.40	1.38	3	TOP SLAB	38.67	1.59	3	TOP SLAB	38.67	
		TNAGT5A	45.000		1.39	62.55	1.40	1.39	3	TOP SLAB	38.67	1.57	3	TOP SLAB	38.67	
		TNAGT5B	45.000	(3)	1.21	54.45	1.40	1.21	3	TOP SLAB	38.67	1.54	3	TOP SLAB	38.67	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

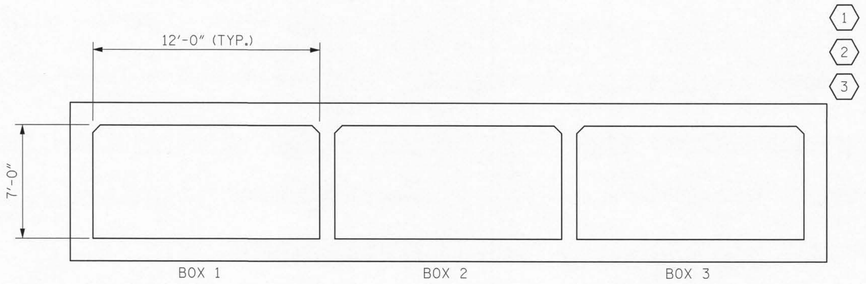
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

CULVERT WAS DESIGNED AS SINGLE BOX FOR PHASE I CONSTRUCTION, WITH FINAL RATING BASED ON TRIPLE BARREL CONFIGURATION.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING
(1) DESIGN LOAD RATING (HL-93)
(2) DESIGN LOAD RATING (HS-20)
(3) LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

NORTH CAROLINA PROFESSIONAL SEAL 030046 ENGINEER MATTHEW PAYNE 6-20-2014

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(NON-INTERSTATE TRAFFIC)

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			11

DRAWN BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014

20-JUN-2014 14:00
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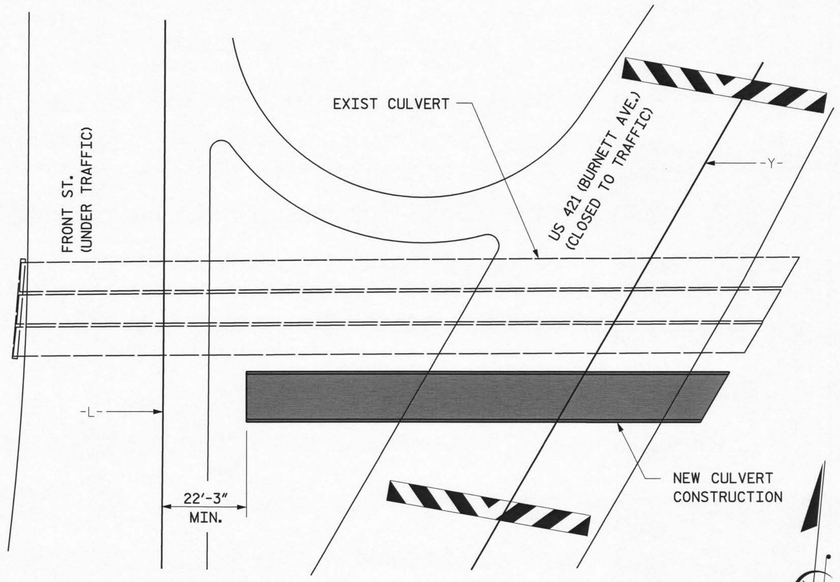
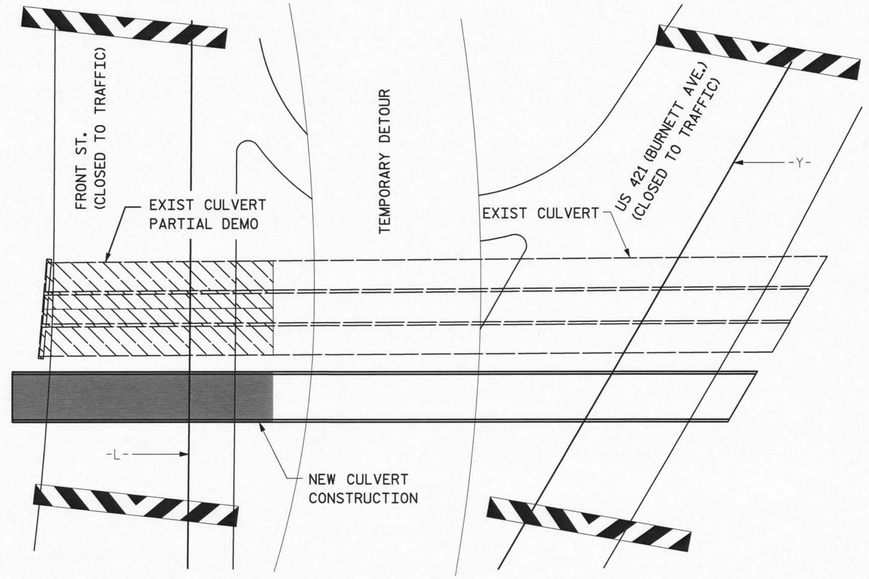
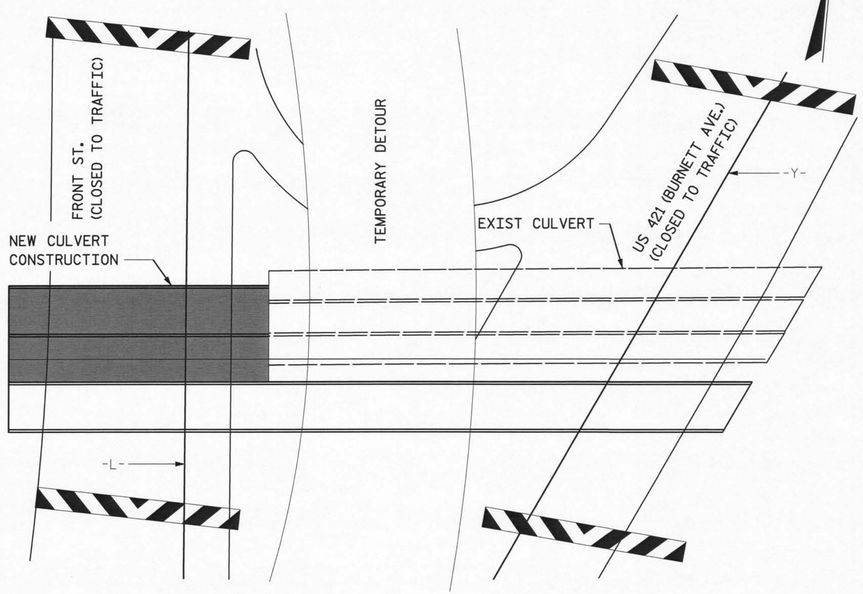
$$$$USERNAME$$$$



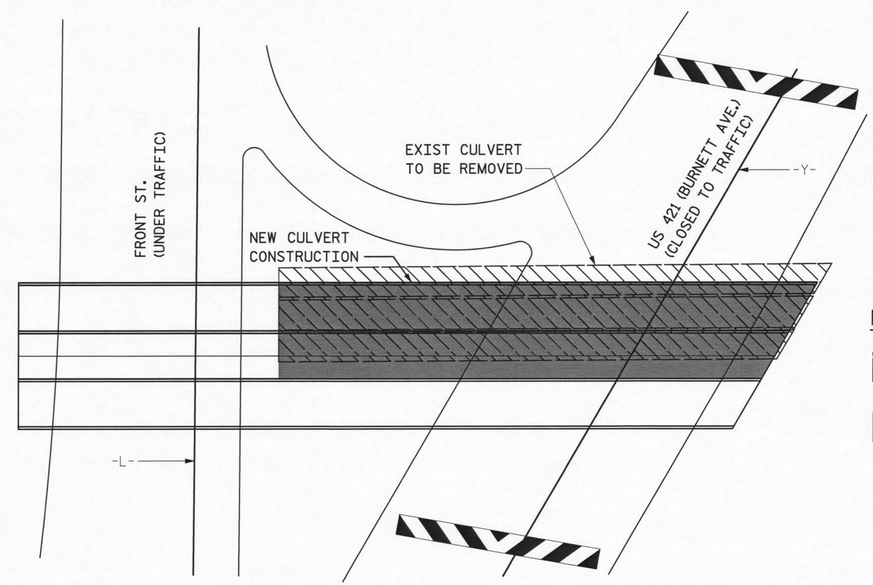
PHASE I CULVERT CONSTRUCTION



PHASE II CULVERT CONSTRUCTION AND DEMOLITION



PHASE III CULVERT CONSTRUCTION



PHASE IV CULVERT DEMOLITION AND CONSTRUCTION

PHASE I:

COMPLETE PHASE I TRAFFIC CONTROL. SEE TRAFFIC CONTROL PLANS.

PLACE TEMPORARY SHORING AND BEGIN CULVERT CONSTRUCTION OF SOUTHERN SINGLE BARREL, INCLUDING INLET WING WALL AND WEIR.

PROVIDE EROSION CONTROL TO PREVENT FLOW INTO EXCAVATION AND COMPLETED CULVERT, SEE EROSION CONTROL PLANS.

PHASE II:

COMPLETE PHASE II TRAFFIC CONTROL. SEE TRAFFIC CONTROL PLANS.

COMPLETE CONSTRUCTION OF SOUTHERN SINGLE BARREL CULVERT, INCLUDING OUTLET WING WALL.

PROVIDE EROSION CONTROL PER EROSION CONTROL PLANS. UPON APPROVAL BY THE ENGINEER, DIVERT FLOW INTO NEW SINGLE BARREL CULVERT.

PROVIDE ENGINEER WITH DEMOLITION PLANS, INCLUDING METHODS FOR PROTECTION OF TRAFFIC, FOR APPROVAL. UPON APPROVAL BY THE ENGINEER, BEGIN PARTIAL DEMOLITION OF EXISTING CULVERT.

PROVIDE ERROSION CONTROL TO PREVENT DEMOLITION MATERIALS FROM ENTERING ACTIVE CREEK.

PHASE III:

CONSTRUCT NEW CULVERT (NORTHERN BARRELS) TO LIMITS SHOWN, INCLUDING OUTLET WING WALLS.

PHASE IV:

COMPLETE REMOVAL OF TEMPORARY DETOUR, SEE TRAFFIC CONTROL PLANS.

COMPLETE REMOVAL OF EXISTING CULVERT IN ACCORDANCE WITH APPROVED DEMOLITION PLANS.

CONSTRUCT REMAINING PORITON OF NEW CONCRETE CULVERT, INCLUDING CONCRETE WING WALLS AND WIER.

REMOVE TEMPORARY EROSION CONTROL MEASURES AND ALLOW FLOW THROUGH COMPLETED CULVERT IN ACCORDANCE WITH THE EROSION CONTROL PLANS.

NOTE:

EXISTING STRUCTURE TO BE REMOVED

NEW CULVERT CONSTRUCTION

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

NORTH CAROLINA PROFESSIONAL SEAL 030046 6-20-14 ENGINEER MATTHEW PAYNE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 7 FT.
CONCRETE BOX CULVERT
90°(-L-) 60°(-Y-) SKEW

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			11

DRAWN BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014

20-JUN-2014 14:00
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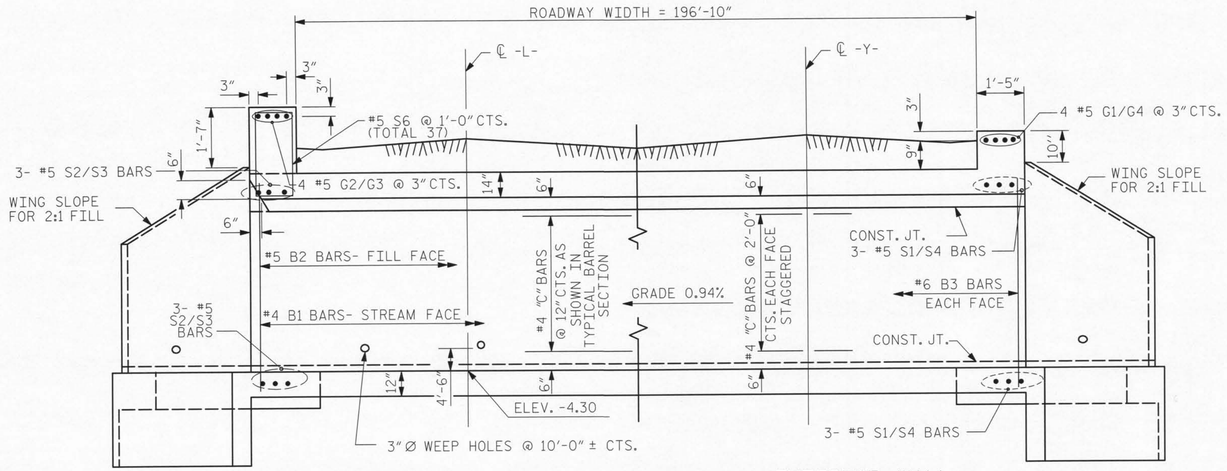
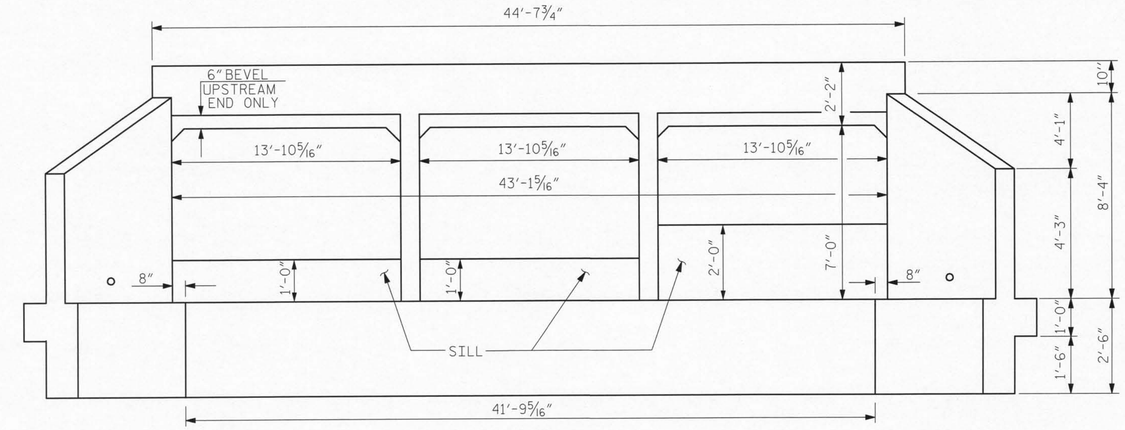
$$$$USERNAME$$$$



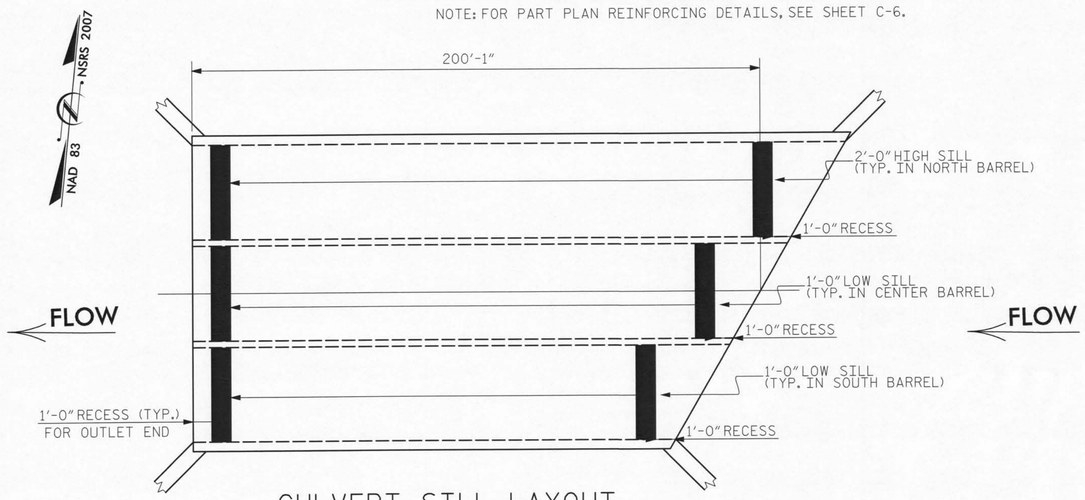
CULVERT SECTION NORMAL TO ROADWAY

NOTE: FOR PART PLAN REINFORCING DETAILS, SEE SHEET C-6.

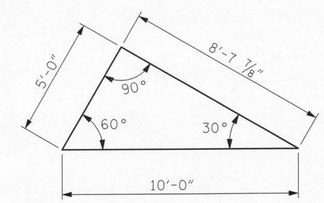


END ELEVATION

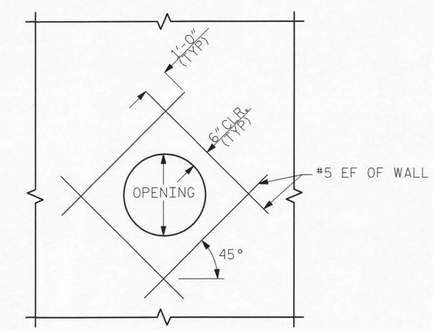
(LOOKING DOWNSTREAM)



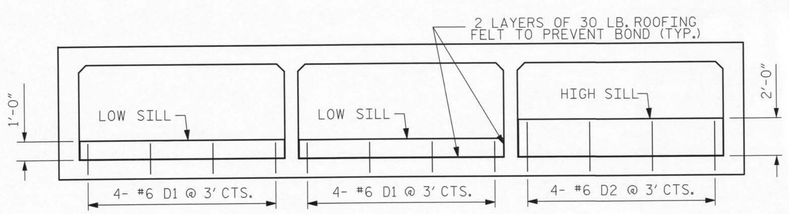
CULVERT SILL LAYOUT



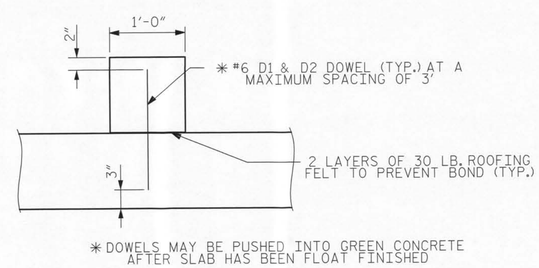
SKEW TRIANGLE



REINFORCEMENT AROUND OPENINGS



ELEVATION - LOOKING DOWNSTREAM



SECTION THROUGH SILL

CULVERT SILL DETAILS

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

NORTH CAROLINA PROFESSIONAL SEAL 030046 ENGINEER MATTHEW PAYNE 6-20-2014

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 7 FT. CONCRETE BOX CULVERT 90°(-L-) 60°(-Y-) SKEW

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

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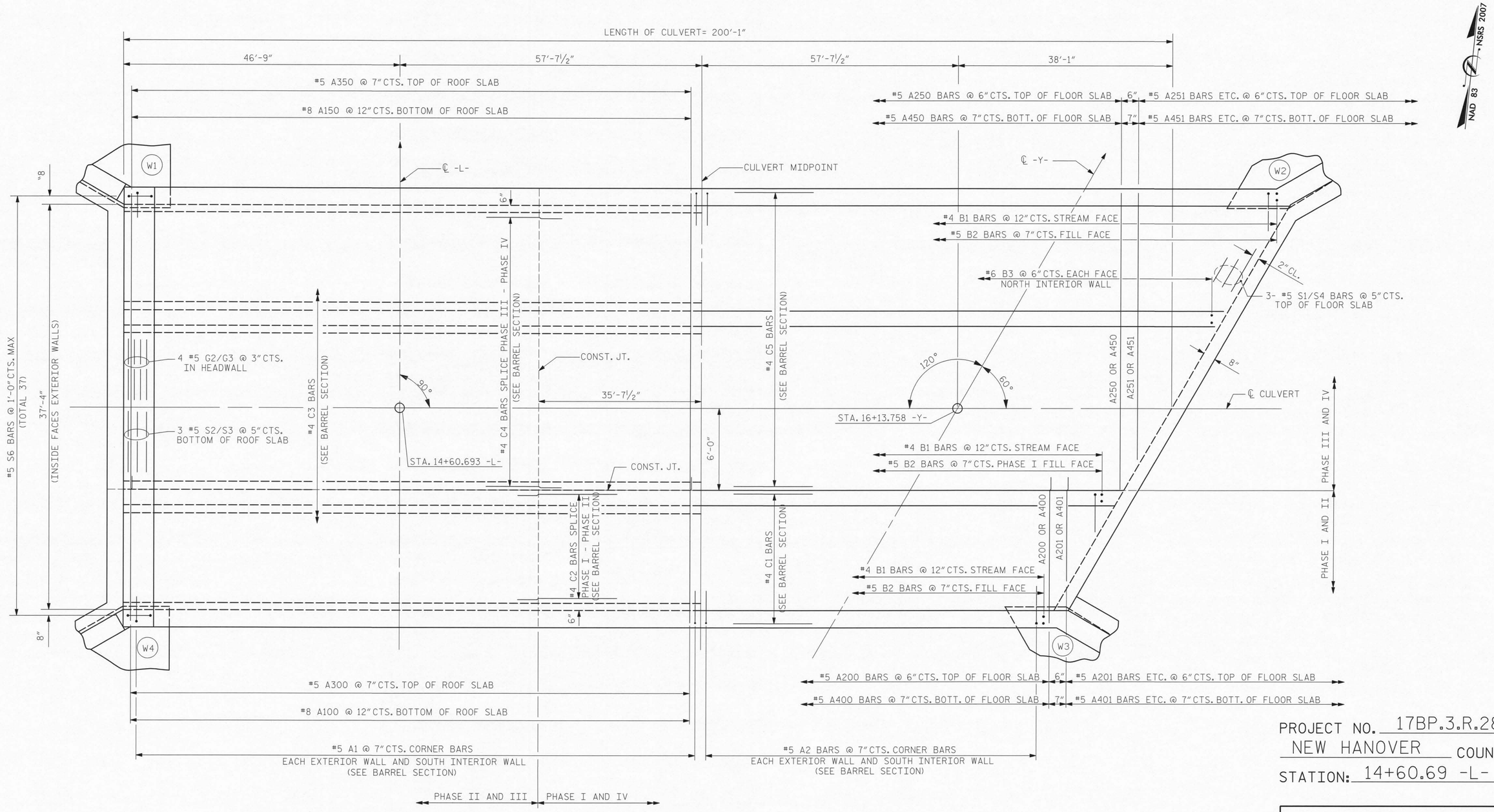
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
****USERNAME****



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

PROJECT NO. 17BP.3.R.28

NEW HANOVER COUNTY

STATION: 14+60.69 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 7 FT. CONCRETE BOX CULVERT 90°(-L-) 60°(-Y-) SKEW

NORTH CAROLINA PROFESSIONAL SEAL 030046 6-20-2014 ENGINEER MATTHEW PAYNE

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6
1			3			TOTAL SHEETS
2			4			11

DRAWN BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014

20-JUN-2014 14:00
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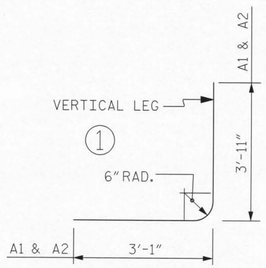
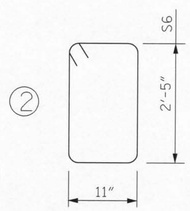
$$$$USERNAME$$$$

BAR TYPES

BAR DIMENSIONS ARE OUT TO OUT





SPLICE LENGTH CHART	
BAR	SPLICE LENGTH
#4	2'-0"
#5	2'-7"
#8	7'-7"

NOTES

1. BAR DIMENSIONS ARE OUT TO OUT
2. ALL REINFORCING STEEL AND BAR SUPPORTS SHALL BE EPOXY COATED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. C2 BARS ARE THE LONGITUDINAL EXTENSION FOR PHASE I INTO PHASE II.

PHASE I

REINFORCING STEEL BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	422	5	1	7'-0"	3081
A2	422	5	1	7'-0"	3081
A100	121	8	STR	16'-9"	5411
A101	1	8	STR	15'-0"	40
A102	1	8	STR	13'-3"	35
A103	1	8	STR	11'-6"	31
A104	1	8	STR	9'-9"	26
A105	1	8	STR	8'-1"	22
A106	1	8	STR	6'-4"	17
A200	241	5	STR	16'-2"	4064
A201	1	5	STR	15'-3"	16
A202	1	5	STR	14'-5"	15
A203	1	5	STR	13'-6"	14
A204	1	5	STR	12'-8"	13
A205	1	5	STR	11'-10"	12
A206	1	5	STR	10'-11"	11
A207	1	5	STR	10'-1"	11
A208	1	5	STR	9'-2"	10
A209	1	5	STR	8'-4"	9
A210	1	5	STR	7'-6"	8
A211	1	5	STR	6'-7"	7
A212	1	5	STR	5'-9"	6
A300	206	5	STR	16'-2"	3474
A301	1	5	STR	15'-1"	16
A302	1	5	STR	14'-1"	15
A303	1	5	STR	13'-1"	14
A304	1	5	STR	12'-1"	13
A305	1	5	STR	11'-1"	12
A306	1	5	STR	10'-1"	11
A307	1	5	STR	9'-1"	9
A308	1	5	STR	8'-1"	8
A309	1	5	STR	7'-0"	7
A310	1	5	STR	6'-0"	6
A400	206	5	STR	16'-2"	3474
A401	1	5	STR	15'-1"	16
A402	1	5	STR	14'-1"	15
A403	1	5	STR	13'-1"	14
A404	1	5	STR	12'-1"	13
A405	1	5	STR	11'-1"	12
A406	1	5	STR	10'-1"	11
A407	1	5	STR	9'-1"	9
A408	1	5	STR	8'-1"	8
A409	1	5	STR	7'-0"	7
A410	1	5	STR	6'-0"	6
B1	248	4	STR	7'-6"	1242
B2	424	5	STR	6'-8"	2948
C1	200	4	STR	27'-2"	3629
C2	50	4	STR	29'-2"	974
D1	4	6	STR	1'-7"	10
G1	4	5	STR	18'-8"	78
S1	6	5	STR	18'-8"	117

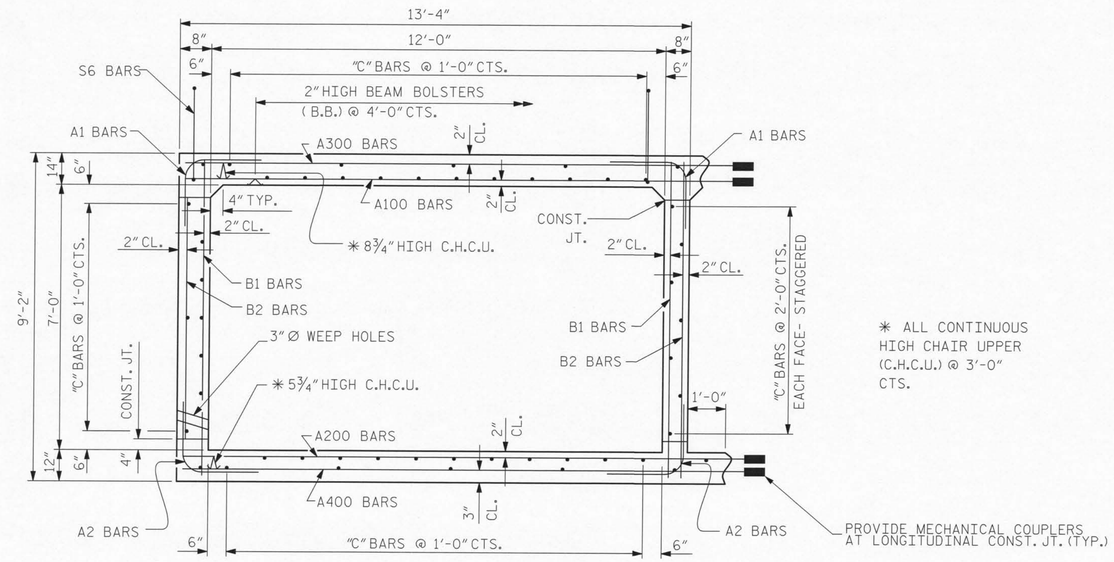
PHASE I TOTAL
REINFORCING STEEL = 32,108 LBS

PHASE II

REINFORCING STEEL BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	236	5	1	7'-0"	1723
A2	236	5	1	7'-0"	1723
A100	68	8	STR	16'-9"	3041
A200	137	5	STR	16'-2"	2310
A300	118	5	STR	16'-2"	1990
A400	118	5	STR	16'-2"	1990
B1	136	4	STR	7'-6"	681
B2	236	5	STR	6'-8"	1641
C3	150	4	STR	24'-3"	2430
D1	4	6	STR	1'-7"	10
G2	4	5	STR	16'-2"	67
S2	6	5	STR	16'-2"	101
S6	12	5	2	6'-8"	83

PHASE II TOTAL
REINFORCING STEEL = 17,790 LBS



✱ ALL CONTINUOUS HIGH CHAIR UPPER (C.H.C.U.) @ 3'-0" CTS.

RIGHT ANGLE SECTION OF BARREL FOR PHASE I AND II

THERE ARE 50 "C" BARS IN SECTION OF BARREL.

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

NORTH CAROLINA PROFESSIONAL SEAL 030046 ENGINEER MATTHEW PAYNE
6-20-2014

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 7 FT.
CONCRETE BOX CULVERT
90°(-L-) 60°(-Y-) SKEW

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-7
1			3			TOTAL SHEETS
2			4			11

DRAWN BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014

20-JUN-2014 14:00
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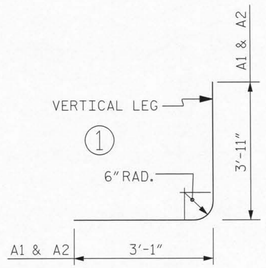
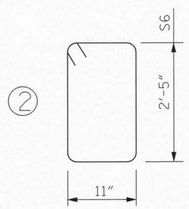
$$$$USERNAME$$$$

BAR TYPES

BAR DIMENSIONS ARE OUT TO OUT





SPLICE LENGTH CHART	
BAR	SPLICE LENGTH
#4	2'-0"
#5	2'-7"
#8	7'-7"

NOTES

1. BAR DIMENSIONS ARE OUT TO OUT
2. ALL REINFORCING STEEL AND BAR SUPPORTS SHALL BE EPOXY COATED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. C4 BARS ARE THE LONGITUDINAL EXTENSION FOR PHASE III INTO PHASE IV.

PHASE III

REINFORCING STEEL BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	118	5	1	7'-0"	862
A2	118	5	1	7'-0"	862
A150	68	8	STR	25'-0"	4539
A250	137	5	STR	25'-0"	3572
A350	118	5	STR	25'-0"	3077
A450	118	5	STR	25'-0"	3077
B1	68	4	STR	7'-6"	341
B2	118	5	STR	6'-8"	820
B3	274	6	STR	8'-9"	3601
C3	156	4	STR	24'-3"	2527
C4	78	4	STR	26'-3"	1368
D1	4	6	STR	1'-7"	10
D2	4	6	STR	2'-7"	16
G3	4	5	STR	25'-0"	104
S3	6	5	STR	25'-0"	156
S6	25	5	2	6'-8"	174

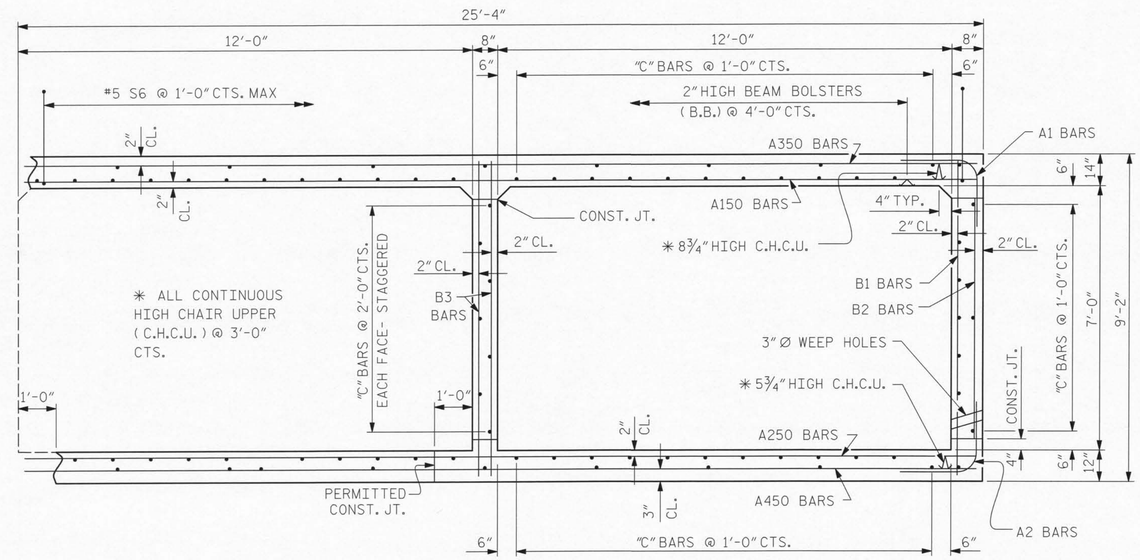
PHASE III TOTAL
REINFORCING STEEL = 25,106 LBS

PHASE IV

REINFORCING STEEL BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	241	5	1	7'-0"	1760
A2	241	5	1	7'-0"	1760
A150	128	8	STR	25'-0"	8544
A151	1	8	STR	24'-6"	65
A152	1	8	STR	22'-9"	61
A153	1	8	STR	21'-1"	56
A154	1	8	STR	19'-4"	52
A155	1	8	STR	17'-7"	47
A156	1	8	STR	15'-10"	42
A157	1	8	STR	14'-1"	38
A158	1	8	STR	12'-5"	33
A159	1	8	STR	10'-8"	28
A160	1	8	STR	8'-11"	24
A161	1	8	STR	7'-2"	19
A162	1	8	STR	5'-5"	14
A163	1	8	STR	3'-9"	10
A250	256	5	STR	25'-0"	6675
A251	1	5	STR	24'-6"	26
A252	1	5	STR	23'-8"	25
A253	1	5	STR	22'-9"	24
A254	1	5	STR	21'-11"	23
A255	1	5	STR	21'-1"	22
A256	1	5	STR	20'-2"	21
A257	1	5	STR	19'-4"	20
A258	1	5	STR	18'-5"	19
A259	1	5	STR	17'-7"	18
A260	1	5	STR	16'-9"	17
A261	1	5	STR	15'-10"	17
A262	1	5	STR	15'-0"	16
A263	1	5	STR	14'-1"	15
A264	1	5	STR	13'-3"	14
A265	1	5	STR	12'-5"	13
A266	1	5	STR	11'-6"	12
A267	1	5	STR	10'-8"	11
A268	1	5	STR	9'-9"	10
A269	1	5	STR	8'-11"	9
A270	1	5	STR	8'-1"	8
A271	1	5	STR	7'-2"	7
A272	1	5	STR	6'-4"	7
A273	1	5	STR	5'-5"	6
A274	1	5	STR	4'-7"	5
A275	1	5	STR	3'-9"	4
A276	1	5	STR	2'-10"	3
A350	219	5	STR	25'-0"	5710
A351	1	5	STR	24'-3"	25
A352	1	5	STR	23'-2"	24
A353	1	5	STR	22'-2"	23
A354	1	5	STR	21'-2"	22
A355	1	5	STR	20'-2"	21
A356	1	5	STR	19'-2"	20
A357	1	5	STR	18'-2"	19
A358	1	5	STR	17'-2"	18
A359	1	5	STR	16'-2"	17
A360	1	5	STR	15'-2"	16
A361	1	5	STR	14'-2"	15
A362	1	5	STR	13'-1"	14
A363	1	5	STR	12'-1"	13
A364	1	5	STR	11'-1"	12
A365	1	5	STR	10'-1"	11
A366	1	5	STR	9'-1"	19
A367	1	5	STR	8'-0"	8
A368	1	5	STR	7'-0"	7
A369	1	5	STR	6'-1"	6
A370	1	5	STR	5'-0"	5
A371	1	5	STR	4'-0"	4
A372	1	5	STR	3'-0"	3

PHASE IV TOTAL
REINFORCING STEEL = 49,085 LBS



PHASE III AND IV
RIGHT ANGLE SECTION OF BARREL

THERE ARE 78 "C" BARS IN SECTION OF BARREL.

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 7 FT.
CONCRETE BOX CULVERT
90°(-L-) 60°(-Y-) SKEW

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-8
1			3			TOTAL SHEETS
2			4			11

DRAWN BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014

20-JUN-2014 14:00
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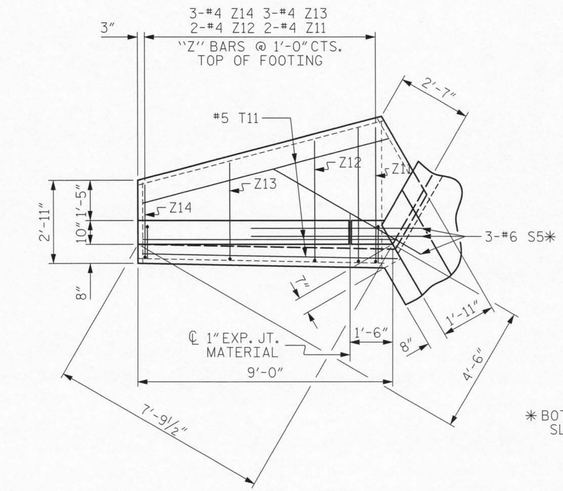
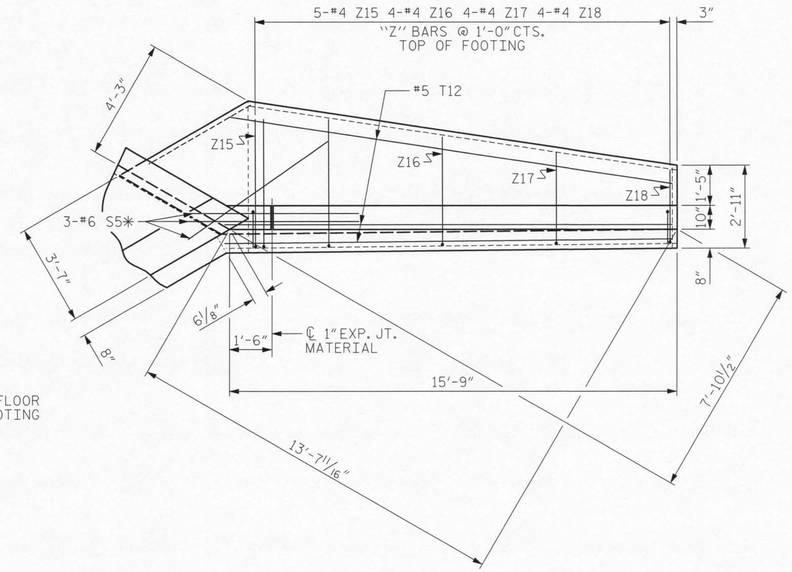
$$$$USERNAME$$$$

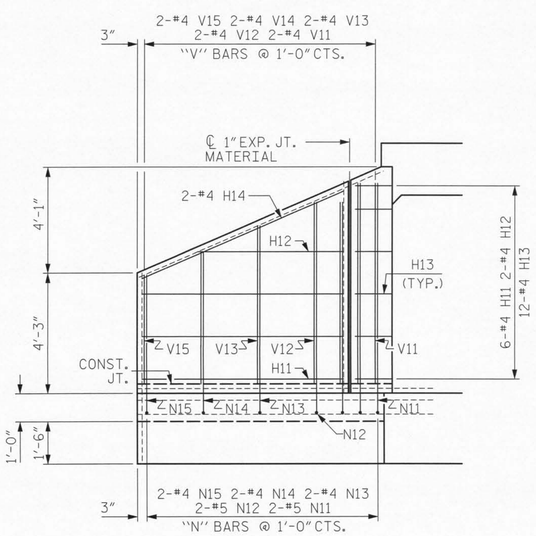


PLAN W3

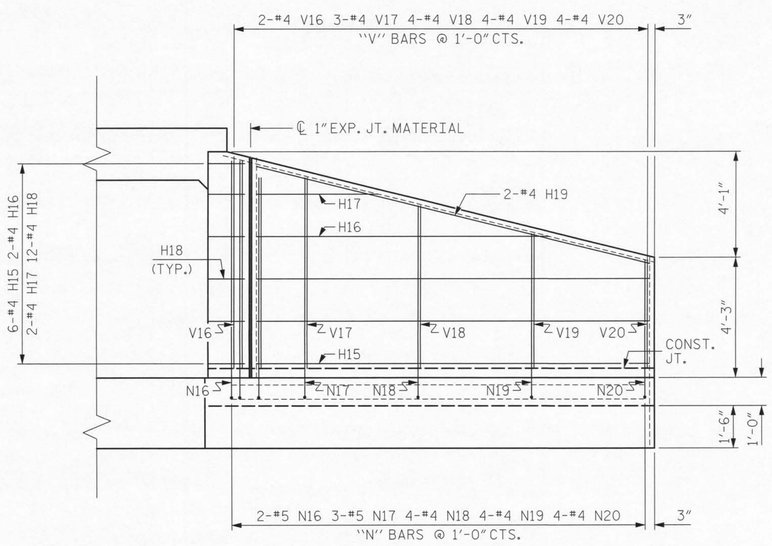


* BOTTOM OF FLOOR SLAB & FOOTING

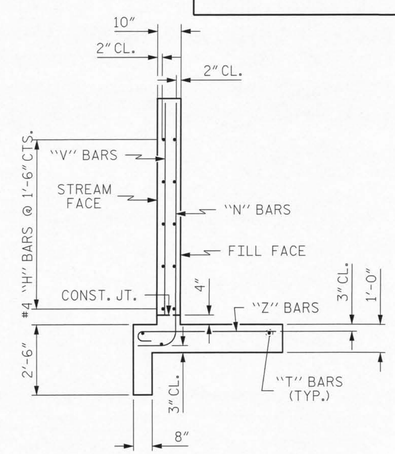
PLAN W2



ELEVATION W3



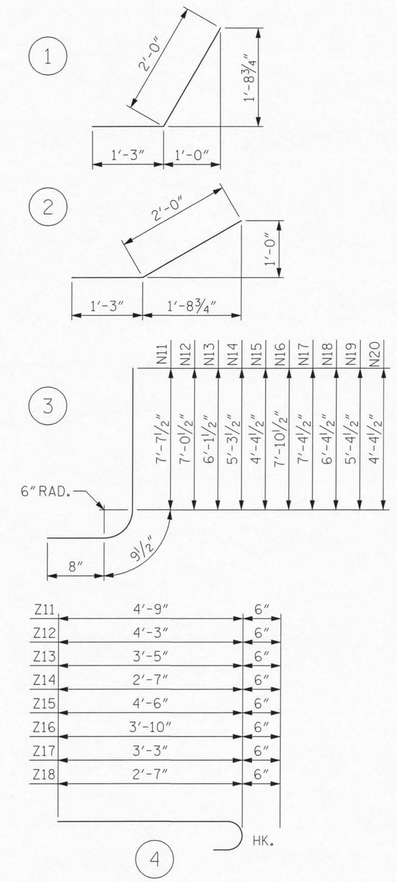
ELEVATION W2



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H11	6	#4	STR	7'-1"	28
H12	2	#4	STR	5'-2"	7
H13	12	#4	1	3'-3"	26
H14	2	#4	STR	7'-9"	10
H15	6	#4	STR	13'-10"	55
H16	2	#4	STR	10'-4"	14
H17	2	#4	STR	4'-3"	6
H18	12	#4	2	3'-3"	26
H19	2	#4	STR	14'-3"	19
N11	2	#5	3	9'-1"	19
N12	2	#5	3	8'-6"	18
N13	2	#4	3	7'-7"	10
N14	2	#4	3	6'-9"	9
N15	2	#4	3	5'-10"	8
N16	2	#5	3	9'-4"	19
N17	3	#5	3	8'-10"	28
N18	4	#4	3	7'-10"	21
N19	4	#4	3	6'-10"	18
N20	4	#4	3	5'-10"	16
S5	6	#6	STR	6'-0"	54
T11	3	#5	STR	9'-0"	28
T12	3	#5	STR	15'-9"	49
V11	2	#4	STR	7'-1"	9
V12	2	#4	STR	6'-5"	9
V13	2	#4	STR	5'-7"	7
V14	2	#4	STR	4'-8"	6
V15	2	#4	STR	3'-10"	5
V16	2	#4	STR	7'-4"	10
V17	3	#4	STR	6'-9"	14
V18	4	#4	STR	5'-9"	15
V19	4	#4	STR	4'-9"	13
V20	4	#4	STR	3'-10"	10
Z11	2	#4	4	5'-3"	7
Z12	2	#4	4	4'-9"	6
Z13	3	#4	4	3'-11"	8
Z14	3	#4	4	3'-1"	6
Z15	5	#4	4	5'-0"	17
Z16	4	#4	4	4'-4"	12
Z17	4	#4	4	3'-9"	10
Z18	4	#4	4	3'-1"	8

REINFORCING STEEL FOR 2 WINGS	660	LBS
CLASS A CONCRETE		
2 WINGS	9.9	CY
1 HEADWALLS	1.4	CY
1 END CURTAIN WALLS	2.6	CY
TOTAL	14.1	CY

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 7'-0" SLOPE = 2:1
60° SKEW

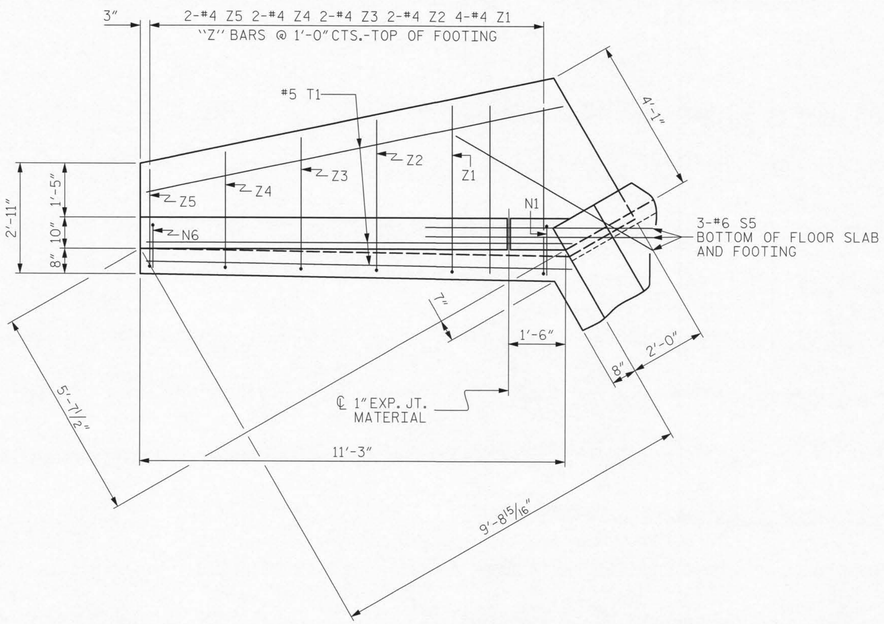
NORTH CAROLINA PROFESSIONAL SEAL 030046 6-20-2014 ENGINEER MATTHEW PAYNE

ASSEMBLED BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014
DRAWN BY : CCJ 11/99
CHECKED BY : RWW 03/00

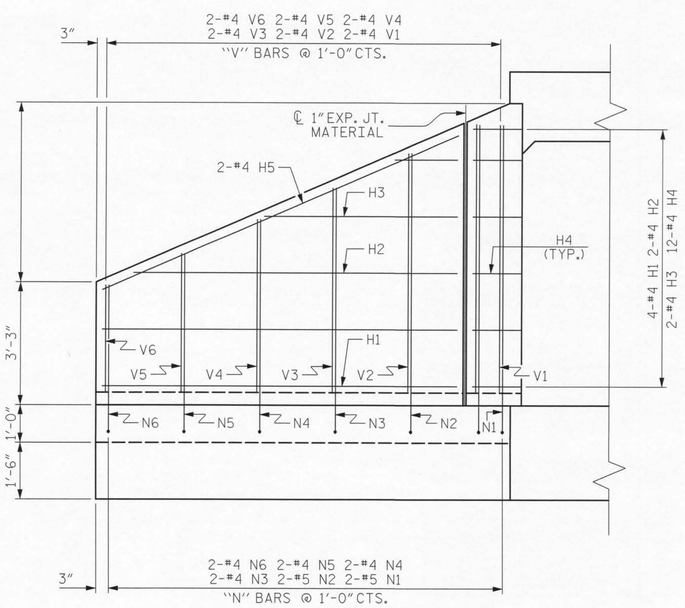
ATKINS 1616 E. MILLBROOK ROAD, SUITE #310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-9
1			3			TOTAL SHEETS 11
2			4			

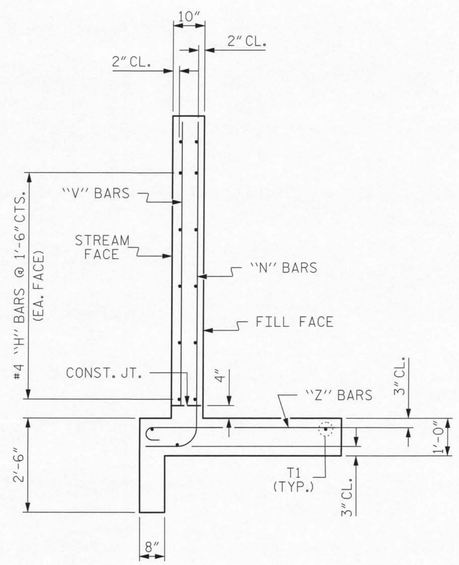
STD. NO. CW6007



PLAN W1, W4



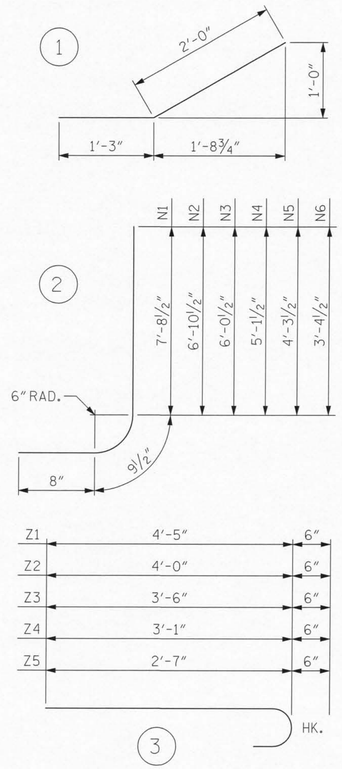
ELEVATION W1, W4



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-4"	50
H2	4	#4	STR	8'-6"	23
H3	4	#4	STR	5'-1"	14
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	10'-3"	27
N1	4	#5	2	9'-2"	38
N2	4	#5	2	8'-4"	35
N3	4	#4	2	7'-6"	20
N4	4	#4	2	6'-7"	18
N5	4	#4	2	5'-9"	15
N6	4	#4	2	4'-10"	13
S5	6	#6	STR	6'-0"	54
T1	6	#5	STR	11'-3"	70
V1	4	#4	STR	7'-1"	19
V2	4	#4	STR	6'-4"	17
V3	4	#4	STR	5'-5"	14
V4	4	#4	STR	4'-7"	12
V5	4	#4	STR	3'-8"	10
V6	4	#4	STR	2'-10"	8
Z1	8	#4	3	4'-11"	26
Z2	4	#4	3	4'-6"	12
Z3	4	#4	3	4'-0"	11
Z4	4	#4	3	3'-7"	10
Z5	4	#4	3	3'-1"	8

TOTAL REINFORCING STEEL
FOR 2 WINGS 572 LBS

CLASS A CONCRETE
2 WINGS 8.6 CY
1 HEADWALLS 1.4 CY
1 END CURTAIN WALLS 2.3 CY
TOTAL 12.3 CY

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

NORTH CAROLINA PROFESSIONAL SEAL 030046 ENGINEER MATTHEW PAYNE 6-24-2014

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

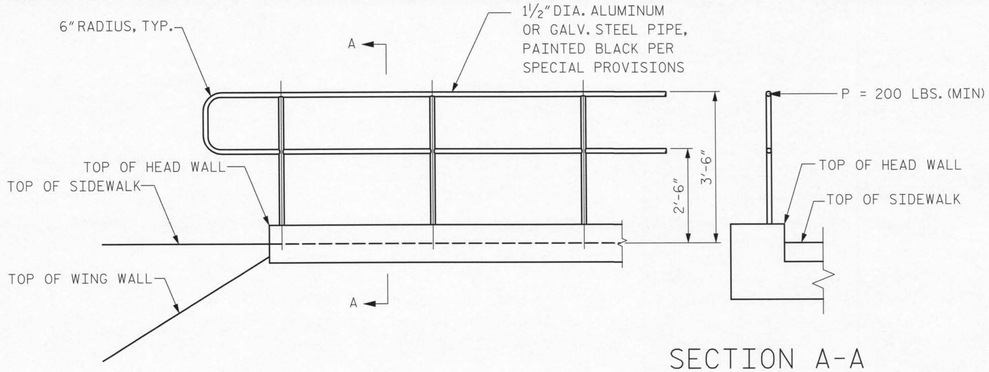
STANDARD WINGS
FOR
CONCRETE BOX CULVERT
H = 7'-0" SLOPE = 2:1
90° SKEW

ASSEMBLED BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014
DRAWN BY : CCJ 10/99
CHECKED BY : RWW 03/00

ATKINS 1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-10
1			3			TOTAL SHEETS
2			4			11

STD. NO. CW9007

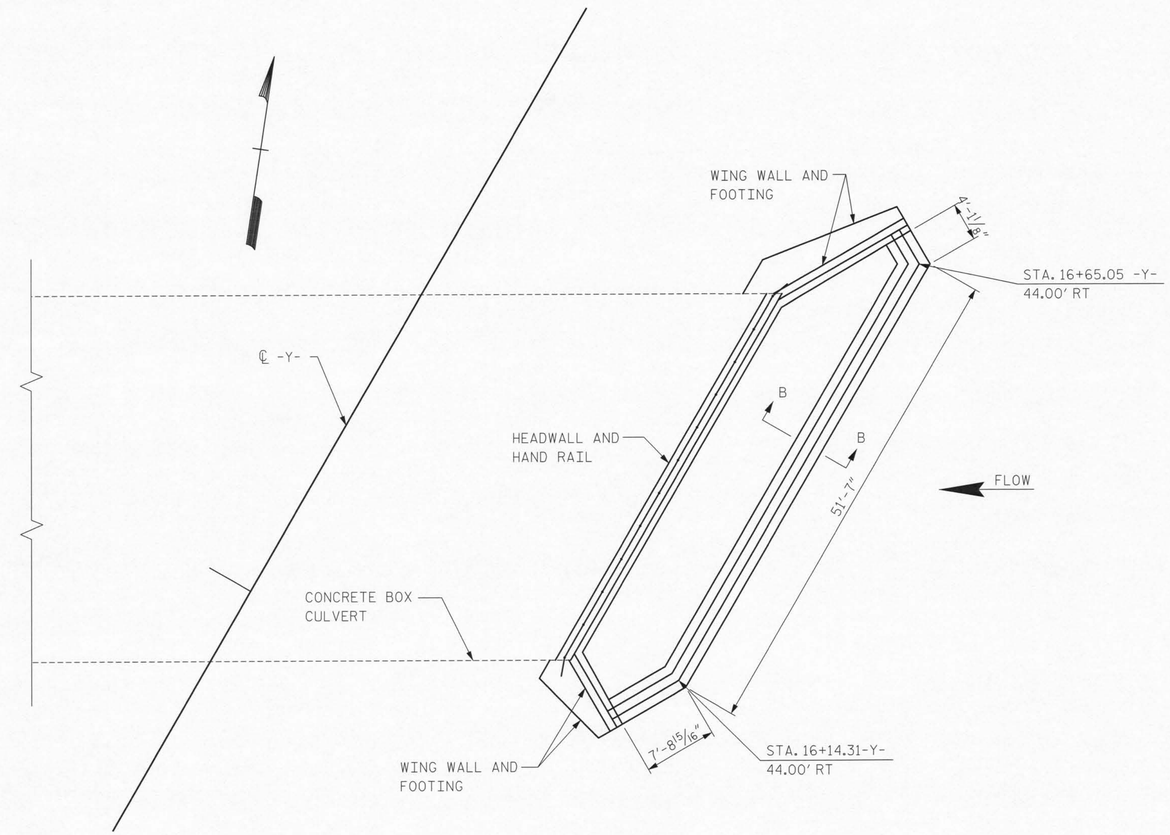


SECTION A-A

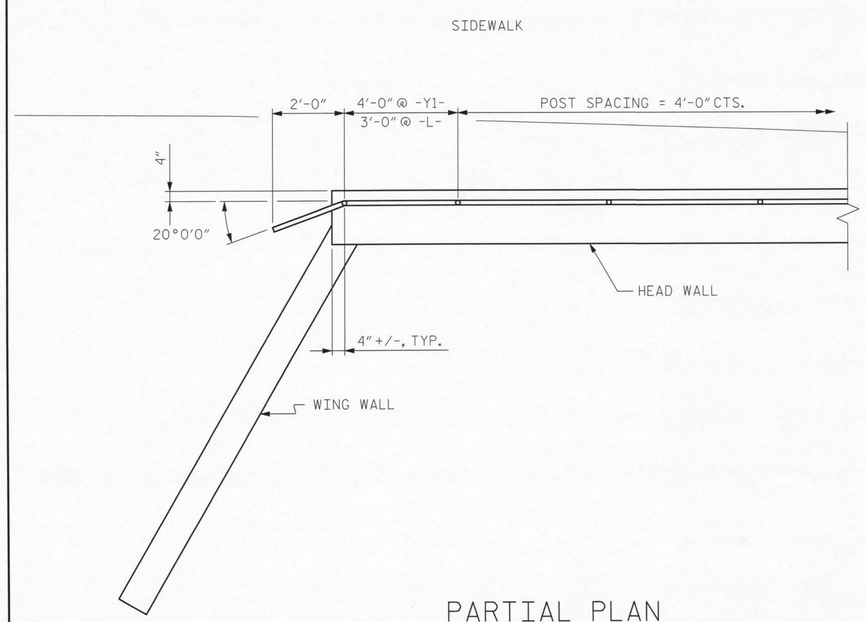
RAILING ELEVATION

NOTE: CONTRACTOR SHALL PROVIDE DESIGN OF RAILING TO MEET DIMENSIONS SHOWN. DESIGN SHALL INCLUDE CONNECTION TO HEADWALL TO RESIST THE APPLIED LOAD OF 200 LBS. AT ANY LOCATION ALONG THE RAILING. SUBMIT FINAL DESIGN TO ENGINEER FOR APPROVAL.

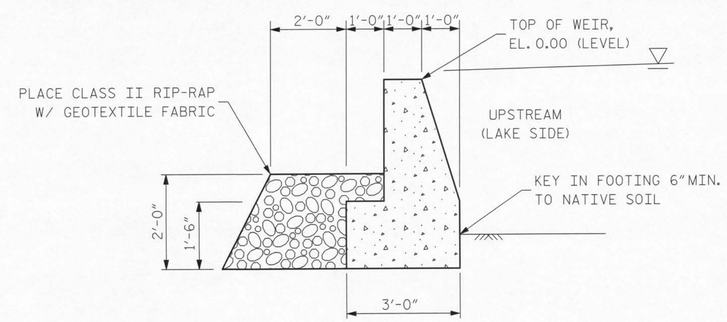
RAILING SHOULD BE LOCATED AT BOTH OUTLET AND INLET ENDS OF THE CULVERT.



WEIR PLAN



PARTIAL PLAN



WEIR SECTION B-B

PROJECT NO. 17BP.3.R.28
NEW HANOVER COUNTY
STATION: 14+60.69 -L-

NORTH CAROLINA PROFESSIONAL SEAL 030046 6-20-2014 ENGINEER MATTHEW PAYNE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

MISCELLANEOUS DETAILS

ATKINS
1616 E. MILLBROOK ROAD, SUITE #310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-11
1			3			TOTAL SHEETS
2			4			11

DRAWN BY : C. DESROCHERS DATE : MAY 2014
CHECKED BY : M. PAYNE DATE : MAY 2014

20-JUN-2014 14:00
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$