PROJECT: 43832

CONTRACT: DA00196

STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

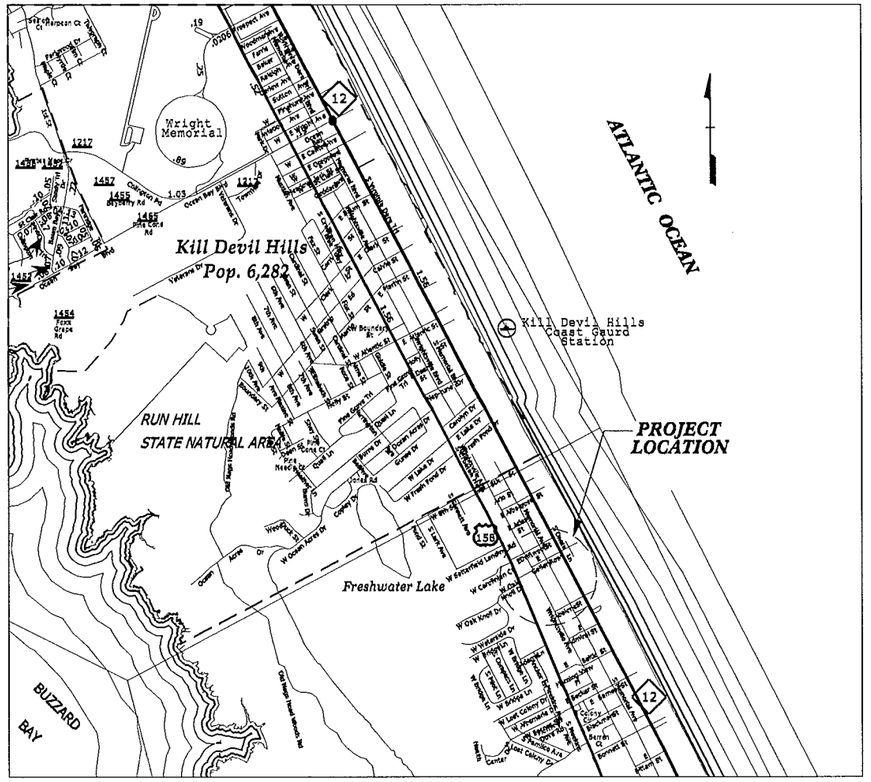
DARE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	43832	1	7

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
43832		P.E.
43832		CONST.

LOCATION: KILL DEVIL HILLS STORMWATER OUTFALL.

TYPE OF WORK: EXTENSION OF EXISTING STORMWATER PIPE.



VICINITY MAP

DESIGN DATA

PROJECT LENGTH

Prepared In the Office of:

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

STRUCTURES MANAGEMENT UNIT - PRESERVATION & REPAIR GROUP
1000 BIRCH RIDGE DR. RALEIGH, N.C. 27610

TIMOTY M. SHERRILL, P.E.
PROJECT ENGINEER

2012 STANDARD SPECIFICATIONS

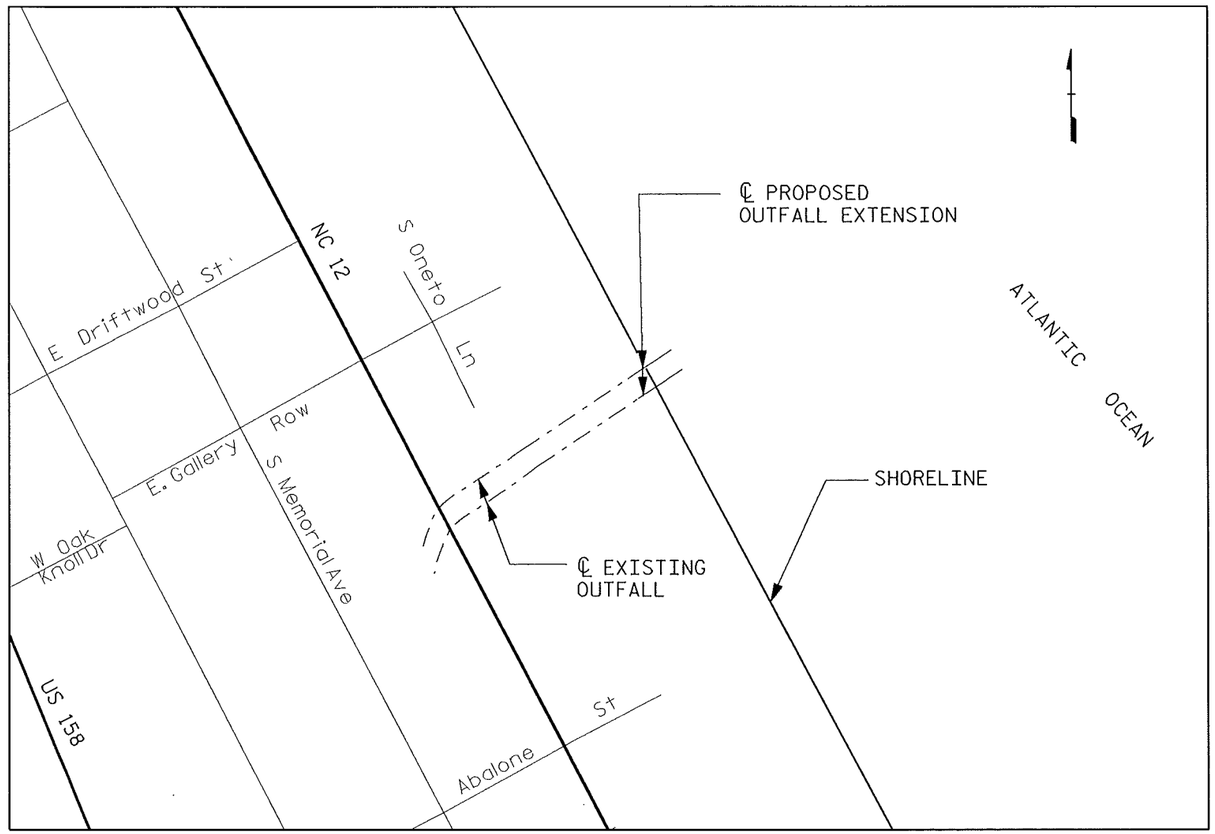
LETTING DATE:

JULY 16, 2014

NORTH CAROLINA PROFESSIONAL SEAL 40257 ENGINEER W. MATTHEW CLARKE

6-17-2014

W. MATTHEW CLARKE, P.E.
PROJECT DESIGN ENGINEER



LOCATION SKETCH

TOTAL BILL OF MATERIAL

CLASS AA CONCRETE	EPOXY COATED REINFORCING STEEL	20" PRESTRESSED CONCRETE PILES	PARTIAL REMOVAL OF EXISTING STRUCTURE	POLYETHYLENE PIPE	PRECAST PILE CAP	STAINLESS STEEL ROD ASSEMBLY
CU. YDS.	LBS.	LIN. FT.	LUMP SUM	LIN. FT.	EA.	EA.
9.3	404	660	LUMP SUM	260	10	60

NOTES

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORRKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 N.C. DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES."

EXISTING PIPE AND PIPE EXTENSION DETAILS INDICATED ON THE PLANS ARE FROM THE BEST INFORMATION AVAILABLE. THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING PIPING AND EXTENSION DETAILS SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

THE DISTANCES AND ELEVATIONS ARE DERIVED FROM THE THE BEST INFORMATION AVAILABLE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE DIAMETER, SPACING, SLOPE, AND ELEVATION OF THE EXISTING PIPES.

THE CONTRACTOR SHALL VERIFY THAT THE PROPOSED PIPE EXTENSION LENGTH IS ADEQUATE TO ACCOMODATE THE PROPOSED WIDTH OF THE SHORELINE.

THE CONTRACTOR SHALL VERIFY THAT THE PROPOSED PIPE IS ALIGNED PARALLEL WITH AND ON A SIMILAR SLOPE TO THE EXISTING PIPE PRIOR TO CASTING THE PIPE COLLAR. SECURE THE PIPES BEFORE CONCRETE PLACEMENT TO PROHIBIT PIPE MOVEMENT.

THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THE PRECAST PIPE COLLARS WILL FIT THE PROPOSED PIPES.

ALL REINFORCING STEEL SHALL BE GRADE 60 EPOXY COATED.

ALL BAR SUPPORTS USED SHALL BE EPOXY COATED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

MAINTAIN 3" MIN. CL. TO ALL REINFORCING STEEL UNLESS OTHERWISE SPECIFIED.

CHAMFER ALL CORNERS ¾".

FOR POLYETHYLENE PIPE, SEE SPECIAL PROVISIONS.

PLACE PILES SO AS TO MAINTAIN SLOPE OF THE EXISTING PIPE.

FOR PRECAST PILE CAP, SEE SPECIAL PROVISIONS.

FOR PARTIAL REMOVAL OF EXISTING STRUCTURE, SEE SPECIAL PROVISIONS.

CONTRACTOR SHALL SUPPLY PILE COLLAR TO MAINTAIN GROUT VOID BETWEEN PRE-CAST CAP AND PILE.

THE CONCRETE IN THE PIPE COLLARS, PILE CAPS AND PILES SHALL CONTAIN SILICA FUME. SILICA FUME SHALL BE SUBSTITUTED FOR 5% OF THE PORTLAND CEMENT BY WEIGHT. IF THE OPTION OF ARTICLE 1024-1 OF THE STANDARD SPECIFICATIONS TO PARTIALLY SUBSTITUTE CLASS F FLY ASH FOR PORTLAND CEMENT IS EXERCISED, THEN THE RATE OF FLY ASH SUBSTITUTION SHALL BE REDUCED TO 1.0 LB OF FLY ASH PER 1.0 LB OF CEMENT. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR STAINLESS STEEL ROD ASSEMBLY, SEE SPECIAL PROVISIONS.

CONCRETE PILE CAPS AND PILES SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR. SEE STANDARD SPECIFICATIONS FOR CALCIUM NITRITE CORROSION INHIBITOR.

CLASS AA CONCRETE SHALL BE USED IN ALL PILE CAPS AND SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR. SEE STANDARD PROVISION FOR CALCIUM NITRITE INHIBITOR.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. 43832

DARE COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL NOTES AND LOCATION SKETCH

NORTH CAROLINA PROFESSIONAL SEAL 40257 ENGINEER MATTHEW CLARKE

6-17-2014

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

DRAWN BY : S. T. SANDOR DATE : 04/2014
CHECKED BY : W. M. CLARKE DATE : 04/2014
DESIGN ENGINEER OF RECORD: W. M. CLARKE DATE : 04/2014

17-JUN-2014 08:45
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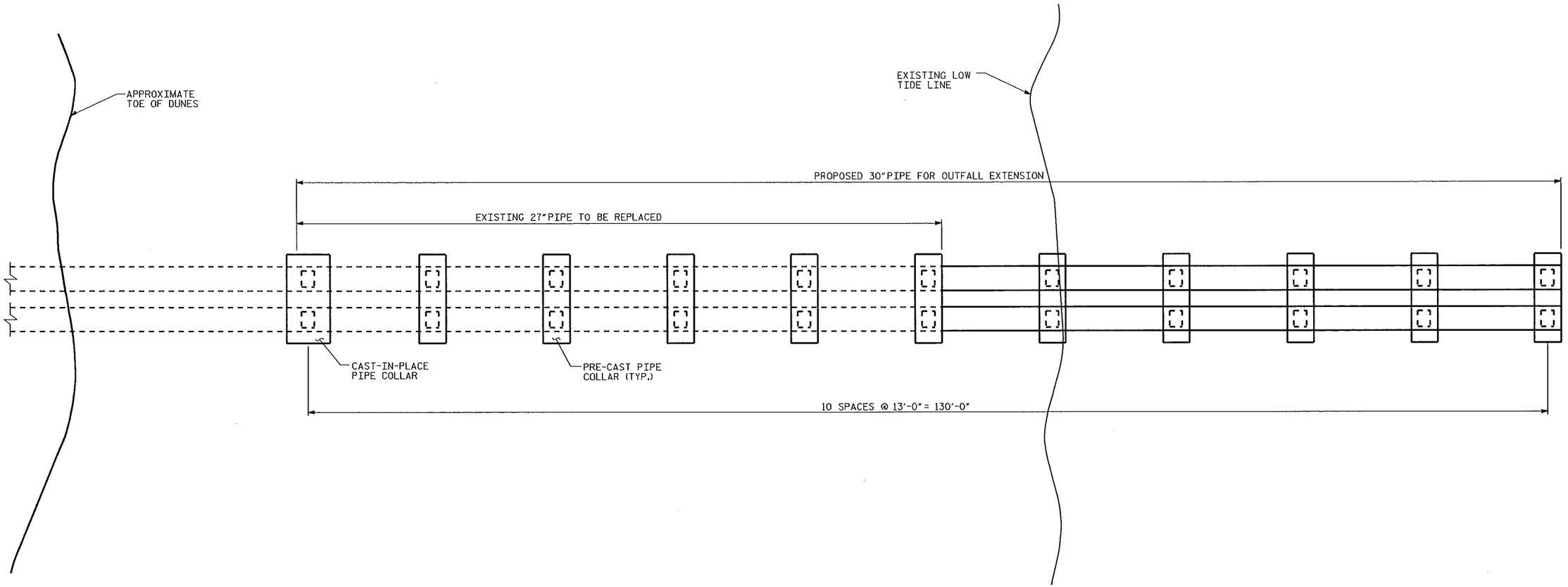
ssandor



PROJECT NO. 43832

DARE COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF OUTFALL

NORTH CAROLINA PROFESSIONAL SEAL 40257 ENGINEER W. MATTHEW CLARKE

6-17-2014

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

DRAWN BY : S. T. SANDOR DATE : 04/2014
CHECKED BY : W. M. CLARKE DATE : 04/2014
DESIGN ENGINEER OF RECORD: W. M. CLARKE DATE : 04/2014

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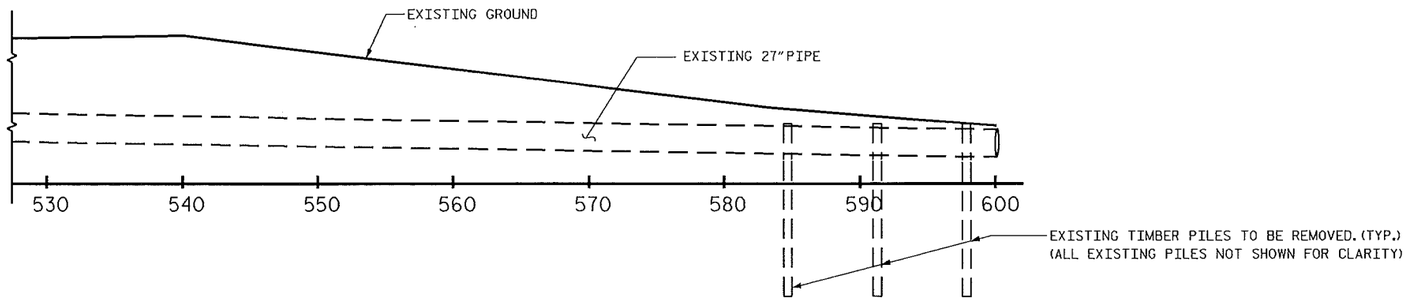
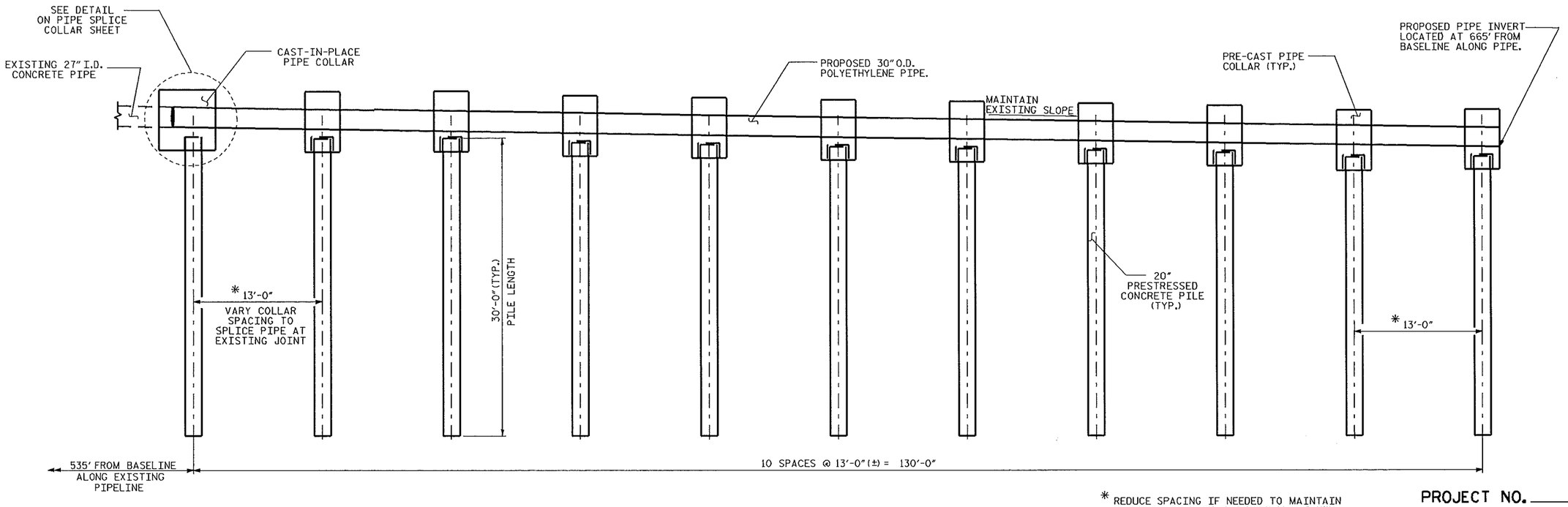


EXISTING OUTFALL ELEVATION



* REDUCE SPACING IF NEEDED TO MAINTAIN PROPOSED PIPE INVERT. PIPE MAY EXTEND A MAXIMUM OF 2'-0" BEYOND FACE OF COLLAR.

PROPOSED OUTFALL ELEVATION

PROJECT NO. 43832

DARE COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LAYOUT AND ELEVATION

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

NORTH CAROLINA PROFESSIONAL SEAL 40257 ENGINEER W. MATTHEW CLARKE

6-17-2014

DRAWN BY : S. T. SANDOR DATE : 04/2014
CHECKED BY : W. M. CLARKE DATE : 04/2014
DESIGN ENGINEER OF RECORD: W. M. CLARKE DATE : 04/2014

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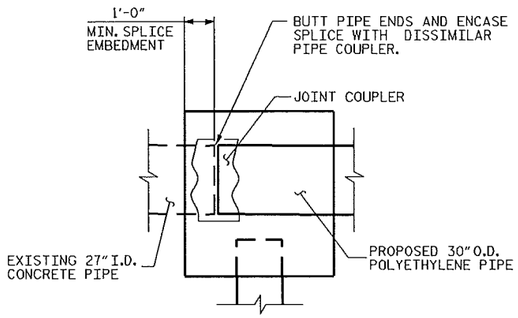
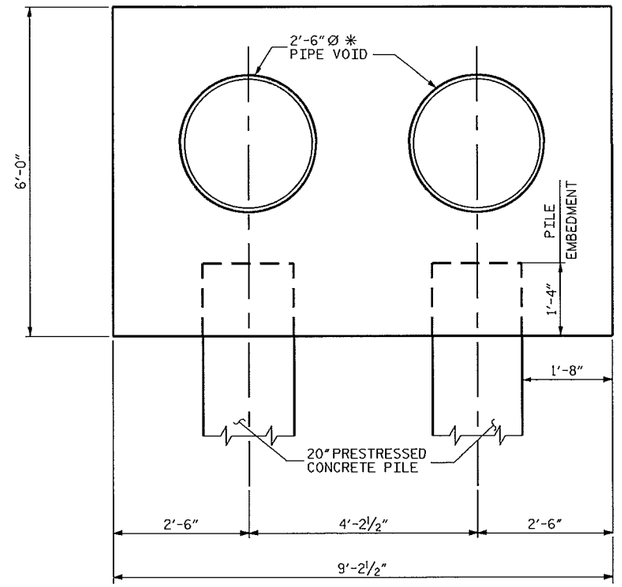
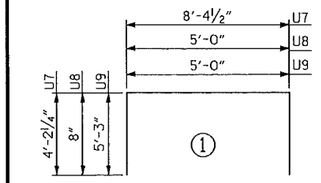


CAST-IN-PLACE SPLICE COLLAR DETAIL



CAST-IN-PLACE COLLAR

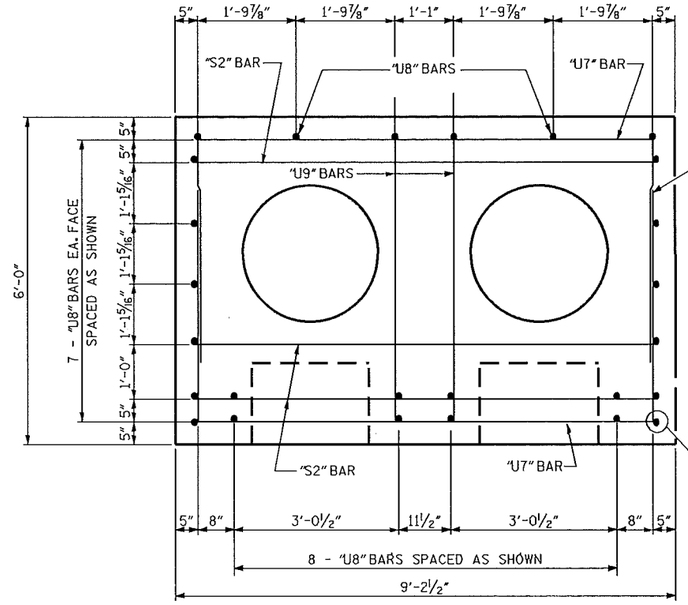
BAR TYPES



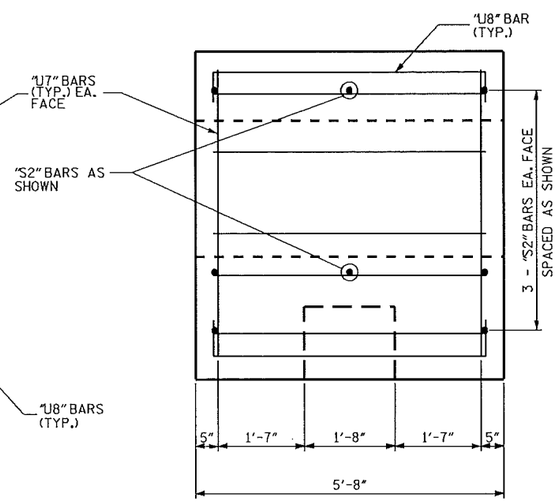
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
1 COMPLETE ASSEMBLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱S2	8	#6	STR	8'-6"	102
✱U7	4	#8	1	16'-9"	179
✱U8	24	#4	1	6'-4"	102
✱U9	2	#4	1	15'-6"	21
EPOXY COATED REINF. STEEL =					404 LBS
CLASS AA CONCRETE				=	9.3 C.Y.



END VIEW



SIDE VIEW

REINFORCING DETAILS

PROJECT NO. 43832
DARE COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PIPE SPLICE COLLAR

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

NORTH CAROLINA PROFESSIONAL SEAL 40257 ENGINEER W. MATTHEW CLARKE
6-17-2014

DRAWN BY : S. T. SANDOR DATE : 04/2014
CHECKED BY : W. M. CLARKE DATE : 04/2014
DESIGN ENGINEER OF RECORD: W. M. CLARKE DATE : 04/2014

16-JUN-2014 14:11
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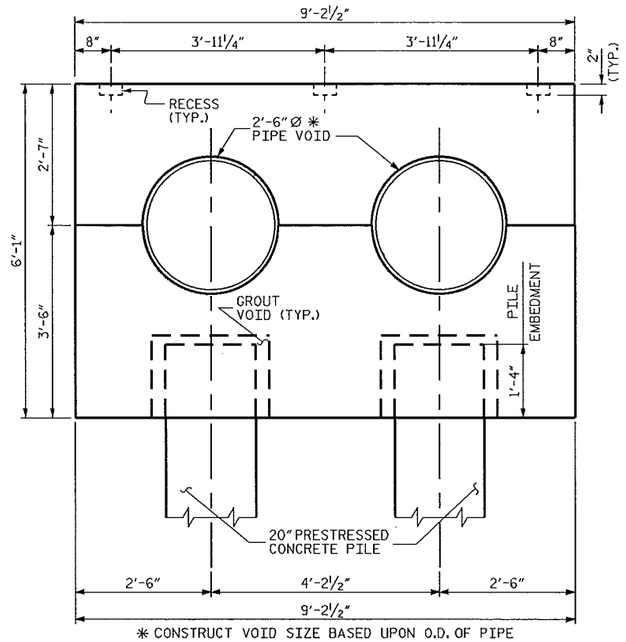
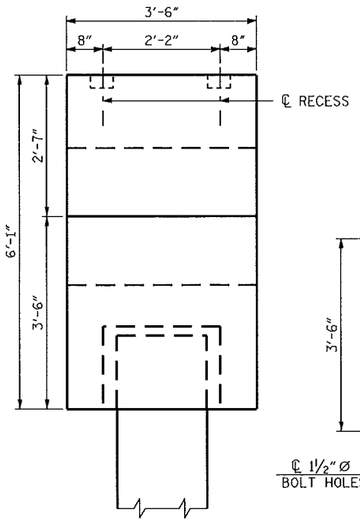
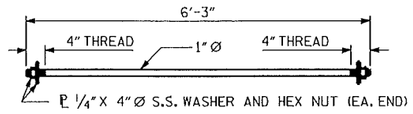


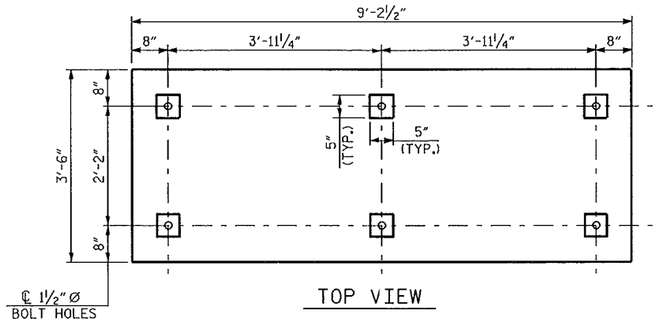
PRECAST PIPE COLLAR



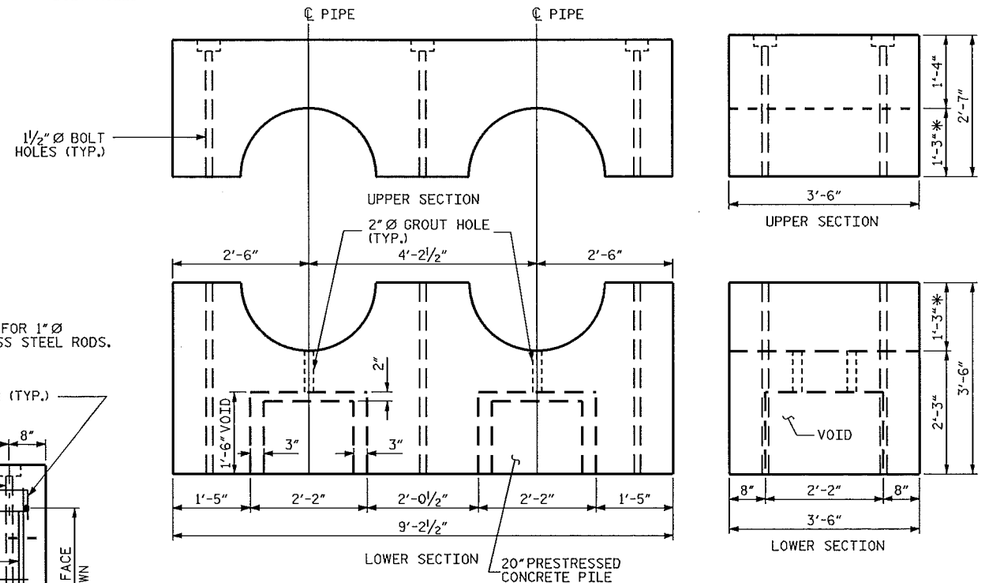


1"Ø S.S. ROD ASSEMBLY

(6 COMPLETE ASSEMBLIES REQ'D FOR EACH COLLAR)



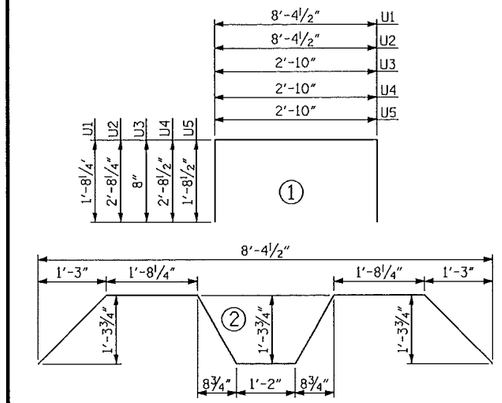
TOP VIEW



END VIEW

SIDE VIEW

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

1 COMPLETE ASSEMBLY

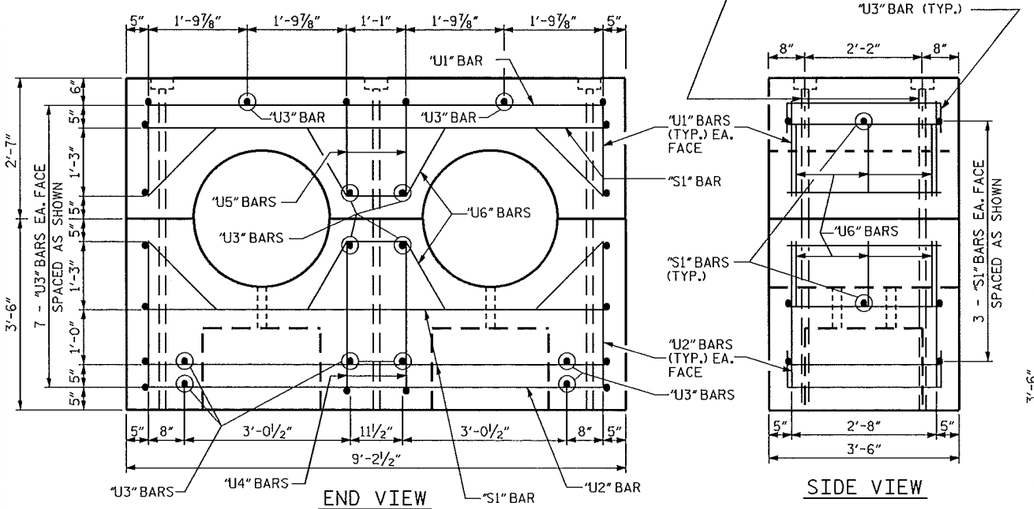
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* S1	8	#6	STR	8'-6"	102
* U1	2	#8	1	11'-9"	62
* U2	2	#8	1	13'-9"	73
* U3	26	#4	1	4'-2"	72
* U4	2	#4	1	8'-3"	11
* U5	2	#4	1	6'-3"	8
* U6	6	#6	2	11'-1"	100
EPOXY COATED REINF. STEEL =				428	LBS
CLASS AA CONCRETE				= 5.4	C.Y.

* CONSTRUCT VOID SIZE BASED ON O.D. OF PIPE.

NOTES

S. S. ROD TO BE RECESSED BELOW TOP OF PIPE COLLAR.

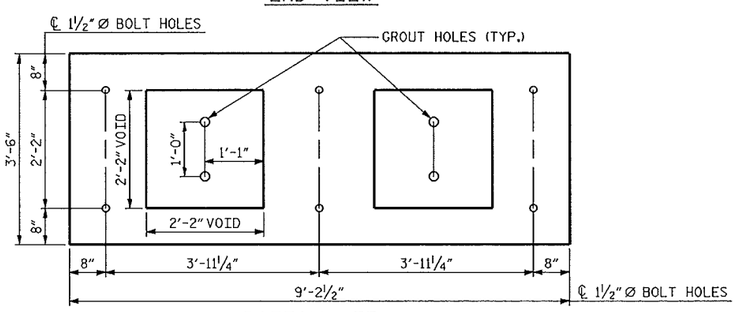
AFTER INSTALATION OF S. S. ROD ASSEMBLY, FILL VOID WITH AN APPROVED WATERPROOF SILICON FINISHED FLUSH WITH TOP OF PILE CAP.



END VIEW

SIDE VIEW

REINFORCING DETAILS



BOTTOM VIEW

PIPE COLLAR DETAILS

PROJECT NO. 43832

DARE COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

OCEAN OUTFALL

PRECAST PILE CAP DUAL PIPES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			7

NORTH CAROLINA PROFESSIONAL SEAL 40257 ENGINEER MATTHEW CLARKE

6-17-2014

DRAWN BY : S. T. SANDOR DATE : 04/2014
CHECKED BY : W. M. CLARKE DATE : 04/2014
DESIGN ENGINEER OF RECORD: W. M. CLARKE DATE : 04/2014

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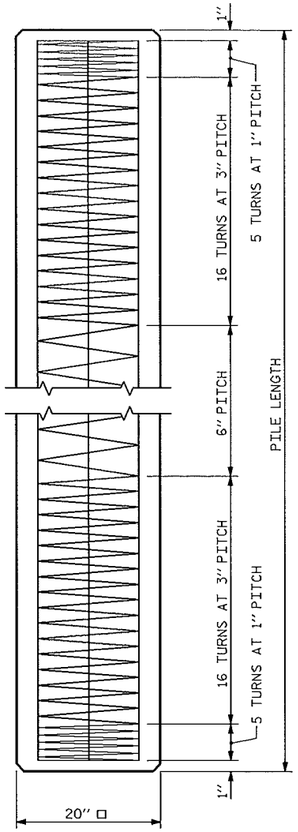
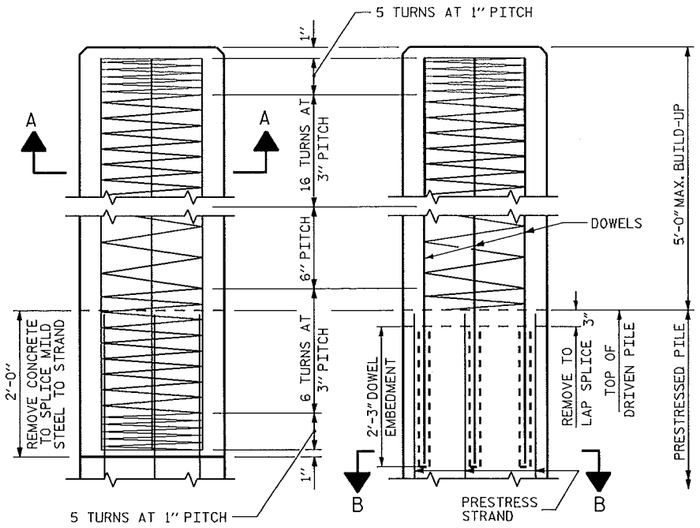
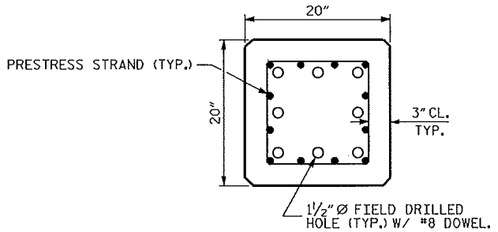


ELEVATION



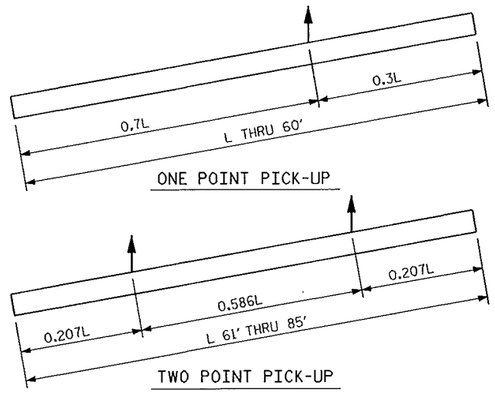
BUILD-UP AND SPIRAL REINFORCING

OPTIONAL BUILD-UP WITH DOWELS



SECTION "B-B"

(AT THE CONTRACTOR'S OPTION, PILE BUILD-UP MAY BE CONSTRUCTED WITH DOWELS.)



PICK-UP POINTS

QUANTITIES FOR ONE 20" SQUARE PILE

LENGTH	CONCRETE CU. YDS.	PILE WT. TONS	ONE POINT PICK-UP 0.3L	ONE POINT PICK-UP 0.7L	TWO POINT PICK-UP 0.207L	TWO POINT PICK-UP 0.586L
25'-0"	2.56	5.18	7'-6"	17'-6"		
30'-0"	3.07	6.22	9'-0"	21'-0"		
35'-0"	3.58	7.26	10'-6"	24'-6"		
40'-0"	4.09	8.29	12'-0"	28'-0"		
45'-0"	4.61	9.33	13'-6"	31'-6"		
50'-0"	5.12	10.36	15'-0"	35'-0"		
55'-0"	5.63	11.40	16'-6"	38'-6"		
60'-0"	6.14	12.44	18'-0"	42'-0"		
65'-0"	6.65	13.47			13'-5½"	38'-1"
70'-0"	7.17	14.51			14'-6"	41'-0"
75'-0"	7.68	15.55			15'-6½"	43'-11"
80'-0"	8.19	16.58			16'-6½"	46'-11"
85'-0"	8.70	17.62			17'-7"	49'-10"

NOTES

PRESTRESSED CONCRETE STRENGTH : f'c= 7,500 PSI

BUILD-UP CONCRETE STRENGTH : f'c= 7,500 PSI

STRAND DATA:

SIZE	GRADE	AREA	ULTIMATE STRENGTH	APPLIED PRESTRESS FORCE
½"	270 L.R.	0.153	41,300# PER STRAND	30,980# PER STRAND
0.6"	270 L.R.	0.217	58,600# PER STRAND	43,940# PER STRAND

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS CONFORMING TO AASHTO M203. STRAND SAMPLING REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, ½" OR 0.6" STRANDS MAY BE USED IN THE STRAND CONFIGURATION SHOWN IN THE TYPICAL SECTION DETAIL. MIXING OF STRAND SIZE IS NOT ALLOWED.

THE SLIP-FORM METHOD OF CASTING PILES WILL NOT BE PERMITTED.

TRANSFER THE LOAD FROM THE ANCHORAGES TO THE PILE AFTER THE CONCRETE HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

IF STRAND STRESS IS RELIEVED BY BURNING, THE STRANDS SHALL BE BURNED IN OPPOSITE PAIRS AS INDICATED IN THE TYPICAL PATTERN SHOWN. FOR ANY NUMBER OF STRANDS, BURN IN OPPOSITE PAIRS AND SYMMETRICALLY ABOUT BOTH THE VERTICAL AND HORIZONTAL AXES, STRANDS 1-1 SHALL BE BURNED BEFORE 2-2, ETC. NOT MORE THAN 4 STRANDS, SAY 5-5 AND 6-6, MAY BE BURNED AT ANY ONE SECTION BEFORE THESE SAME PAIRS OF STRANDS ARE BURNED AT BOTH ENDS OF THE BED AND BETWEEN EACH PAIR OF PILES IN THE BED.

PROPOSED DEVICES FOR LIFTING PILES, RECESS DETAILS, AND PATCHING MATERIAL SHALL BE DETAILED IN SHOP DRAWINGS. AFTER ATTACHMENTS HAVE BEEN REMOVED, OPENINGS SHALL BE REPAIRED SUCH THAT THE APPEARANCE OF THE PILE IS UNIFORM.

WHERE CAST-IN-PLACE LIFTING DEVICES ARE NOT USED, PICK-UP POINTS ARE TO BE INDICATED WITH A 2" WIDE BLACK MARK.

DRIVE PILES USING A METHOD APPROVED BY THE ENGINEER, WHEREBY THE HEAD OF THE PILE IS NOT DAMAGED.

DRIVING OF THE BUILT-UP PILE WILL NOT BE PERMITTED UNTIL THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF 5,000 PSI AND UNTIL A PERIOD OF SEVEN DAYS HAS ELAPSED SINCE CASTING OF THE BUILD-UP.

THE WATER/CEMENT RATIO FOR CONCRETE PILES SHALL NOT EXCEED 0.40.

DOWEL INSTALLATION FOR OPTIONAL BUILD-UP

GROUT COMPRESSIVE STRENGTH: f'c= 5,000 PSI

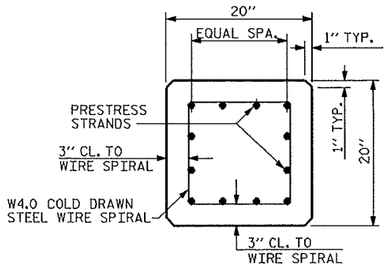
BEFORE DRILLING DOWEL HOLES, REMOVE THE UPPER 3" OF CONCRETE FROM THE TOP OF THE PILE WITHOUT DAMAGE TO THE REINFORCING STEEL. THE REMOVAL PLANE SHOULD BE NORMAL TO THE EDGE OF THE PILE.

DOWEL HOLES SHALL BE POSITIONED TO MAINTAIN ½" CLEAR TO ALL EXISTING PRESTRESSING STRANDS IN THE CONCRETE PILE.

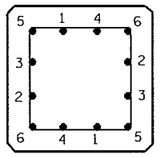
FIELD DRILLED HOLES SHALL BE CLEAN AND FREE OF ANY OBSTRUCTIONS BEFORE GROUTING OF DOWELS. DOWEL BARS SHALL BE INSTALLED AND GROUTED WITH AN APPROVED NON-SHRINK GROUT.

THE SPIRAL REINFORCING IN ALL BUILD-UPS SHALL BE W4.0 COLD DRAWN WIRE WHICH SHALL BE SECURED TO THE LONGITUDINAL REINFORCEMENT TO MAINTAIN PITCH.

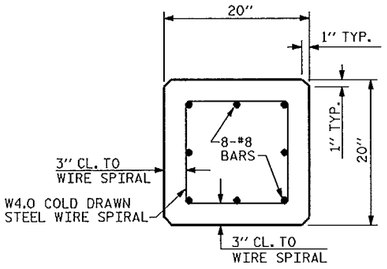
THE SPIRAL REINFORCING IN THE BUILD-UP AND THE PRESTRESSED CONCRETE PILE SHALL BE SPLICED BY OVERLAPPING A MIN. OF ONE TURN.



TYPICAL SECTION



TYPICAL PATTERN FOR BURNING STRANDS



SECTION A-A

½" OR 0.6" Ø GRADE 270 L.R. PRESTRESS STRANDS

PROJECT NO. 43832

DARE COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

20" PRESTRESSED CONCRETE PILE

ASSEMBLED BY :	S. T. SANDOR	DATE :	04/2014
CHECKED BY :	W. M. CLARKE	DATE :	04/2014
DRAWN BY : WJH 1/89	REV. 5/1/06R		TLA/GM
CHECKED BY : CRK 3/89	REV. 11/30/10		WMC/GM
	REV. 10/1/11		MAA/GM

NORTH CAROLINA PROFESSIONAL SEAL 40257 ENGINEER W. MATTHEW CLARKE

6-17-2014

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			7

STD. NO. PCP3

17-JUN-2014 07:08
S:\PRS\PDC\Squad C\Ocean Outfalls\Final\RED_DRUM_SD_S*.dgn
ssandor