

DATE: 2/27/2020
TIME: 4:05:52 PM

POST-TENSIONING SYSTEM CONSTRUCTION SEQUENCE

1. THIS SEQUENCE APPLIES TO BENTS 1 THRU 4.
2. USE A SAW TO CUT OUT THE STAY-IN-PLACE STEEL FORMWORK AT EACH END OF THE CAP AT THE LOCATION OF THE ANCHORAGE. MAINTAIN A BLADE DEPTH THAT DOES NOT CUT INTO THE EXISTING CONCRETE SUBSTRATE. PHOTOGRAPH THE CONCRETE SUBSTRATE AND DOCUMENT ITS CONDITION. SUBMIT THE PHOTOGRAPHS AND CONDITION REPORT TO THE ENGINEER. COMPLETE THE REMOVAL OF THE COLUMN STAY-IN-PLACE FORM AND EVALUATION OF THE BENT COLUMN CONCRETE IN PARALLEL WITH THIS STEP.
3. USING GROUND PENETRATING RADAR (GPR), DETERMINE THE LOCATION OF THE EXISTING REINFORCEMENT IN THE BENT IN THE VICINITY OF THE ANCHORAGE.
4. USING THE RESULTS OF THE GPR, DETERMINE THE PRECISE LOCATION OF ANCHORAGES THAT WILL BE DRILLED INTO THE EXISTING STRUCTURE. CONTRACTOR MAY PROPOSE TO ADJUST THE HORIZONTAL AND VERTICAL ANCHORAGE SPACING TO MISS EXISTING REINFORCEMENT.
5. SUBMIT SHOP DRAWINGS AND ERECTION METHODOLOGY FOR REVIEW BY THE ENGINEER. ALL CONTRACTOR PROPOSED CHANGES TO THE ANCHORAGE SHALL BE SUBMITTED WITH THE SHOP DRAWINGS FOR REVIEW.
6. FOLLOWING REVIEW AND ACCEPTANCE OF THE SHOP DRAWINGS, DRILL HOLES INTO THE BENT USING A SEPARATE METAL TEMPLATE FOR EACH LOCATION. CONTRACTOR SHALL USE A DRILL BIT CAPABLE OF PENETRATING CONCRETE THAT IS NOT CAPABLE OF PENETRATING REINFORCING STEEL. CONTRACTOR SHALL CLEARLY MARK THE LOCATION AND ORIENTATION OF EACH TEMPLATE TO ENSURE THE HOLES WILL BE PROPERLY DRILLED FOR EACH ANCHORAGE. IF REINFORCEMENT IS ENCOUNTERED, STOP WORK AND REPORT TO THE ENGINEER.
7. INSTALL ALL ADHESIVE ANCHORS FOR THE ANCHORAGE.
8. USING A HYDRAULIC TEST JACK, PROOF LOAD EACH ADHESIVE ANCHOR TO 10 KIPS OF TENSION.
9. FOLLOWING THE COMPLETION OF DRILLING, INSTALLATION, AND PROOF LOADING OF ALL ADHESIVE ANCHORS, FABRICATE THE SOLE PLATES, CORBELS, JACK BEARINGS, AND POST-TENSIONING BARS. ANCHORAGE HOLES IN SOLE PLATES AND CORBELS SHALL BE SHOP DRILLED USING THE TEMPLATE THAT WAS USED TO DRILL THE HOLES IN THE BENT CAP.
10. INTENTIONALLY ROUGHEN THE CONCRETE SUBSTRATE OF THE BENT CAP AT THE LOCATION OF THE GROUT PAD TO AN AMPLITUDE OF 1/4".
11. PLACE A 1/4" THICK EXPANDED POLYSTYRENE SLEEVE AROUND THE ADHESIVE ANCHORS AT THE LOCATION OF THE GROUT PAD TO PREVENT BOND WITH GROUT DURING INSTALLATION.
12. PLACE THE ANCHORAGE AGAINST THE BENT CAP IN A LEVEL POSITION, SQUARE TO THE CAP. SET THE ANCHORAGE AT THE SPECIFIED DISTANCE AWAY FROM THE BENT TO ENSURE THE CORRECT GROUT PAD THICKNESS USING ADJUSTABLE SHIMS OR LUGS ON THE FACE OF THE ANCHORAGE. PLACEMENT AND SPACING METHODOLOGY SHALL BE SHOWN IN SHOP AND ERECTION DRAWINGS. LOCATE LUGS OR SHIMS TO PREVENT OVERSTRESS IN THE ANCHORAGE AND BENT CAP CONCRETE DURING THE STRESSING OF ADHESIVE ANCHORS PRIOR TO THE PLACEMENT OF THE GROUT PAD.
13. USING A HYDRAULIC JACK, PRETENSION AND LOCK OFF EACH ADHESIVE ANCHOR AT A TENSION OF 1 KIP. CONTRACTOR MAY PROPOSE STRESSING A SPECIFIC NUMBER OF ADHESIVE ANCHORS RATHER THAN ALL OF THE ANCHORS. STRESSING OF ADHESIVE ANCHORS SHALL BE SUFFICIENT TO FIX THE ANCHORAGE IN PLACE DURING INSTALLATION OF THE GROUT PAD BETWEEN THE ANCHORAGE AND THE BENT CAP, WITHOUT THE AID OF ANY EXTERNAL SUPPORTS.
14. INSTALL THE GROUT PAD BETWEEN THE ANCHORAGE AND THE BENT. PUMP THE GROUT FROM THE BOTTOM OF THE ANCHORAGE, AND ENSURE ADEQUATE PLACEMENT AND CONSOLIDATION OF THE GROUT USING WEEP HOLES AT THE TOP OF THE ANCHORAGE. CLOSE THE WEEP HOLES AFTER THE GROUT IS ALLOWED TO FLOW THROUGH THE HOLE.
15. ENSURE ADEQUATE CURE TIME FOR THE GROUT PAD TO REACH SPECIFIED STRENGTH BASED ON THE GROUT MANUFACTURER'S PUBLISHED CURE TIMES.
16. INSTALL THE 4-1 3/4" Ø POST-TENSIONING BARS, INCLUDING NUTS AND ANCHOR PLATES. TIGHTEN ALL NUTS TO HAND TIGHT CONDITION.
17. STRESS THE POST-TENSIONING BARS IN THE ORDER SHOWN IN THE "POST-TENSIONING STRESSING ORDER" DETAIL.
 - a. INITIALLY STRESS ALL BARS TO A TENSION OF 5 KIPS.
 - b. STRESSING THEN SHALL PROCEED IN INCREMENTS OF 25 KIPS UP TO THE FINAL TENSION IN THE BARS, 235 KIPS PER BAR AFTER LOCK OFF.
 - c. NO BAR SHALL HAVE A LOAD THAT IS 25 KIPS GREATER OR LESS THAN THE LOADING IN ANY OTHER POST-TENSIONING BARS.
 - d. CONTRACTOR SHALL OBSERVE THE BENTS AND THE ANCHORAGES CONTINUOUSLY DURING STRESSING OPERATIONS. IF ANY DISTRESS IN THE BENT OR ANCHORAGE IS OBSERVED DURING STRESSING OPERATIONS, CONTRACTOR SHALL CEASE STRESSING OPERATIONS AND REPORT TO THE ENGINEER.
18. USING A HYDRAULIC JACK, PRETENSION AND LOCK OFF EACH ADHESIVE ANCHOR AT A SERVICE TENSION OF 1 KIP.
19. INSTALL SILICONE SEALANT AROUND THE EDGES OF THE ANCHORAGE THAT FACE THE BENT CAP.
20. INSTALL COVER ON TOP OF THE ANCHORAGE TO PREVENT WATER INTRUSION.

BENT COLUMN CONCRETE EVALUATION SEQUENCE

IN PARALLEL WITH THE INSTALLATION OF THE POST-TENSIONING SYSTEM AT THE BENT CAPS, THE CONTRACTOR AND THE ENGINEER SHALL EVALUATE THE CONCRETE IN THE COLUMNS. THE CONTRACTOR SHALL DRILL TWO 2" DIAMETER HOLES THRU THE STAY-IN-PLACE FORMWORK IN EACH COLUMN. ONE HOLE SHALL BE LOCATED AT A DISTANCE OF APPROXIMATELY 5'-0" BELOW THE SOFFIT OF THE CAP AND THE SECOND HOLE SHALL BE LOCATED APPROXIMATELY 5'-0" ABOVE THE GROUND SURFACE. USE THE FOLLOWING SEQUENCE TO DRILL THE HOLES AND PERFORM THE INSPECTION:

1. THE ENGINEER SHALL SOUND THE FORMS AND CHOOSE THE LOCATION OF THE HOLE. THE HOLE LOCATIONS SHALL BE CHOSEN AT A POINT WHERE THE FORMWORK SOUNDS TO BE DELAMINATED FROM THE CONCRETE SUBSTRATE.
2. THE CONTRACTOR SHALL DRILL THE HOLE THRU THE STAY-IN-PLACE FORM WITHOUT DAMAGING THE CONCRETE SUBSTRATE.
3. THE ENGINEER SHALL INSPECT THE CONCRETE SUBSTRATE ONCE THE HOLE HAS BEEN DRILLED. THE CONTRACTOR SHALL PHOTOGRAPH THE HOLE AND CONCRETE SUBSTRATE AND DOCUMENT THE CONDITION OF THE CONCRETE.
4. THE CONTRACTOR SHALL SUBMIT THE PHOTOGRAPHS AND CONDITION REPORT TO THE ENGINEER FOLLOWING THE EVALUATION.
5. UPON ACCEPTANCE OF THE SUBSTRATE BY THE ENGINEER, THE CONTRACTOR SHALL SEAL WELD A 3" DIAMETER X 1/2" THICK STEEL PLATE AROUND THE 2" DIAMETER HOLE.
6. COMPLETE THIS SEQUENCE IN PARALLEL WITH THE REMOVAL OF THE CAP STAY-IN-PLACE FORMWORK. NO SEPARATE PAYMENT SHALL BE MADE FOR THIS SEQUENCE, BUT PAYMENT SHALL BE INCLUDED IN THE POST-TENSIONING ANCHORAGE PAY ITEM.

POST-TENSIONING GENERAL NOTES

FOR FURTHER DETAILS, SEE POST-TENSIONING SYSTEM SPECIAL PROVISIONS.

PT = POST-TENSIONING

EDGES OF STEEL PLATES IN THE PT ANCHORAGE THAT BEAR AGAINST THE SURFACES OF OTHER PLATES SHALL BE TIGHT FIT WITH AN ANSI ROUGHNESS HEIGHT VALUE NOT GREATER THAN 500.

USE ASTM A193 316 B8M CLASS II UNDERCUT ANCHORS.

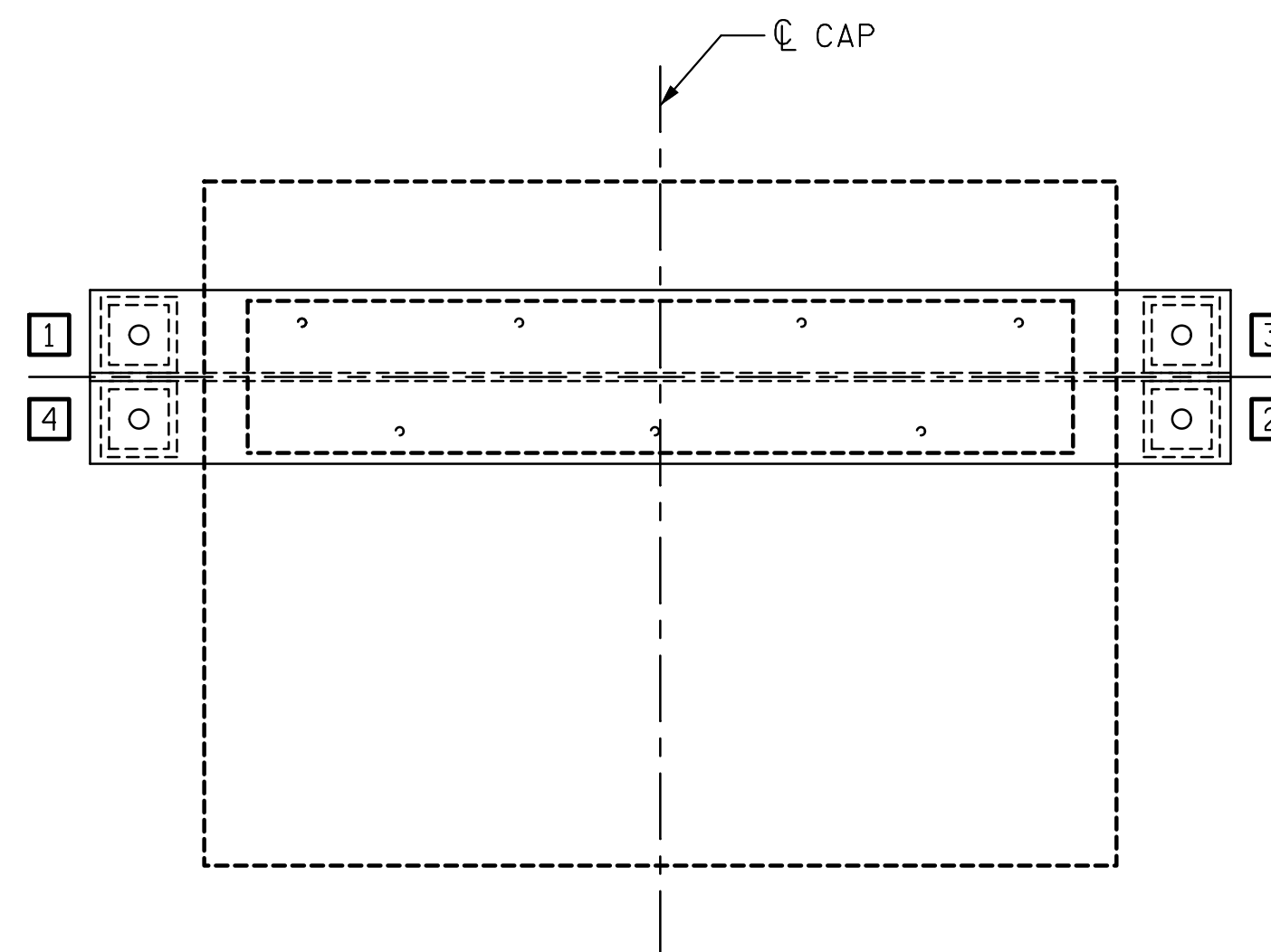
PLACE A CUSTOM COVERING OVER THE PT ANCHORAGE TO PREVENT WATER FROM COLLECTING ON THE ANCHORAGE.

POST-TENSIONING BARS SHALL BE METALLIZED. FOR FURTHER DETAILS, SEE SPECIAL PROVISIONS.

ALL PHOTOGRAPHS OF THE CONCRETE SUBSTRATE SHALL BE SUBMITTED IN JPEG FORMAT.

BILL OF MATERIAL

PAY ITEMS	PAY UNIT	STEEL WEIGHT
PT BARS	LUMP SUM	11,654 LBS.
PT BAR ANCHORAGE STRUCTURAL STEEL	LUMP SUM	58,479 LBS.
PT BAR CORROSION PROTECTION	LUMP SUM	N/A

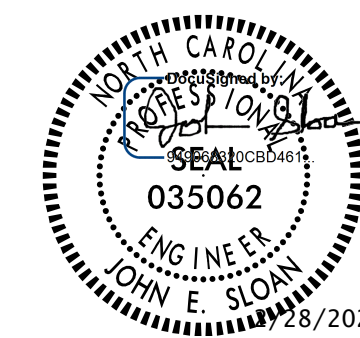


POST-TENSION STRESSING ORDER

PROJECT NO. 15BPR.20
HENDERSON COUNTY
 STATION: 35+30.22 -L-

SHEET 1 OF 7

 <small>AECOM TECHNICAL SERVICES OF NC, INC. 701 CORPORATE CENTER DRIVE, SUITE 475 RALEIGH, NC 27607 (919) 854-6200 www.aecom.com AECOM License No. F-0342</small>		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUBSTRUCTURE BENTS 1-4 POST-TENSIONING SYSTEM			
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-117 TOTAL SHEETS 129					



DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

DRAWN BY : M.K. TOM	DATE : 2/2019
CHECKED BY : J.E. SLOAN	DATE : 2/2019
DESIGNED BY : J.E. SLOAN	DATE : 2/2019
DESIGN CHECKED BY : D. TUTTLE	DATE : 2/2019

USER: Merch Research
 DN: R:\Structures\04 Drawings\01_219_15BPR20_SML\Bldg