



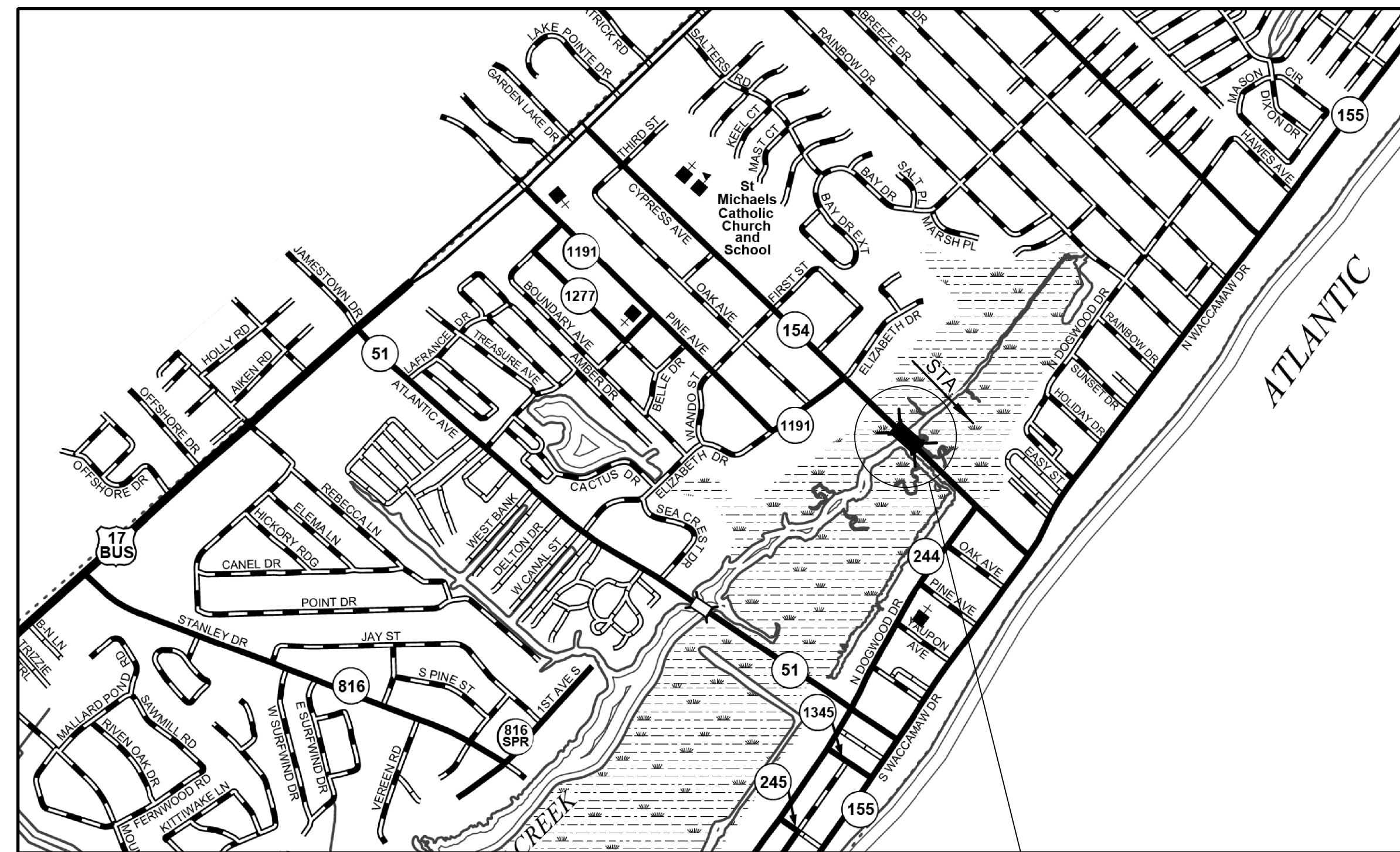
South Carolina Department of Transportation



PROPOSED PLANS FOR HORRY COUNTY PROJECT ID P041158 STATE ROUTE S-26-154 (CYPRESS AVE) REHABILITATE BRIDGE OVER MURRELLS INLET CREEK

INDEX OF SHEETS

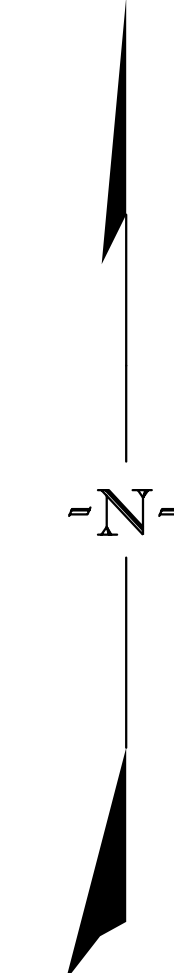
1. TITLE SHEET
2. BRIDGE PLAN AND PROFILE
3. BRIDGE TYPICAL SECTION
4. GALVANIC CATHODIC PROTECTION SYSTEM DETAILS (SHEET 1 OF 2)
5. GALVANIC CATHODIC PROTECTION SYSTEM DETAILS (SHEET 2 OF 2)



Approximate Location of Bridge is

Latitude 33°-35'-01" N

Longitude 78°-59'-53" W



3 DAYS BEFORE DIGGING IN
SOUTH CAROLINA

CALL 811

SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM
ALL UTILITIES MAY NOT BE A MEMBER OF SC811

ASSET ID 9211

TRAFFIC DATA

2025 ADT 2200 V.P.D.

2045* ADT 3200* V.P.D.

TRUCKS 2%

*DESIGN TRAFFIC DATA

NET LENGTH OF ROADWAY	0.000	MILES
NET LENGTH OF BRIDGES	0.013	MILES
NET LENGTH OF PROJECT	0.013	MILES
LENGTH OF EXCEPTIONS	0.000	MILES
GROSS LENGTH OF PROJECT	0.013	MILES

NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF LETTING.

CONSULTING ENGINEERING FIRM

HNTB

HNTB CORPORATION
SC License No. 265
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

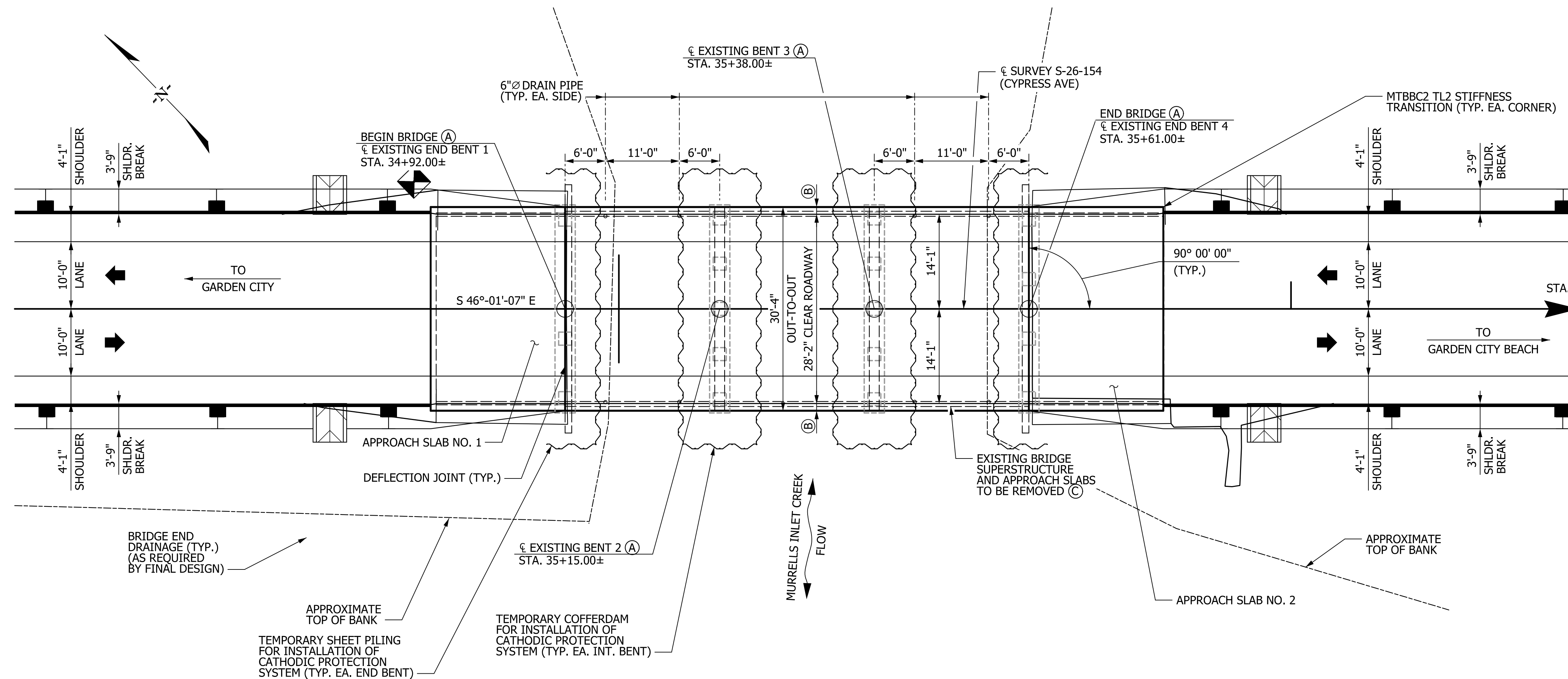
ENGINEER OF RECORD

**CONCEPTUAL
PLANS
NOT FOR
CONSTRUCTION**

FOR CONSTRUCTION : _____ DATE _____

CADD FILE INFORMATION 8:53:34 AM
 PLOTTED DATE: 5/8/2024
 FILE NAME: ...S-26-154 over Murrells Inlet Creek.ts_Microstation.dgn

REVIEWED	DR.	DLH	BY	DATE
				2/24
		BA	CHK	



PLAN

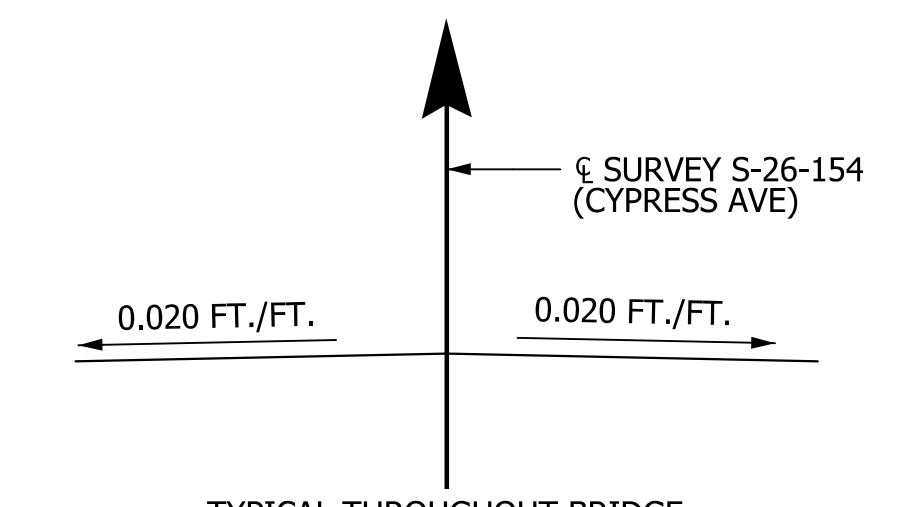
- NOTES:
- (A) A GALVANIC (OR PASSIVE) CATHODIC PROTECTION SYSTEM SHALL BE INSTALLED ON ALL FACES OF BENT CAPS AND ON INTERIOR BENT PILES DOWN TO THE MUDLINE.
 - (B) INCLUDES 1'-0" MASH BARRIER PARAPET AND 1" SLAB EXTENSION.
 - (C) REMOVE AND DISPOSE OF EXISTING 30'-4" X 69' | 3-SPAN CONTINUOUS CONCRETE FLAT SLAB SUPERSTRUCTURE, APPROACH SLABS AND APPURTENANCES IN ACCORDANCE WITH SECTION 202.4.2 OF THE STANDARD SPECIFICATIONS. EXISTING SUBSTRUCTURE TO REMAIN.
 - (D) MHW AND MLW FROM NOAA STATION 8661070

CONTROL POINTS

CP 1
ELEVATION = 9.77'
N 643362.90 E 2608804.76
PSC 1

CP 2
ELEVATION = 5.22'
N 642724.45 E 2609514.86
PSC 2

CP 3
ELEVATION = 4.16'
N 641966.02 E 2610253.95
PSC 3



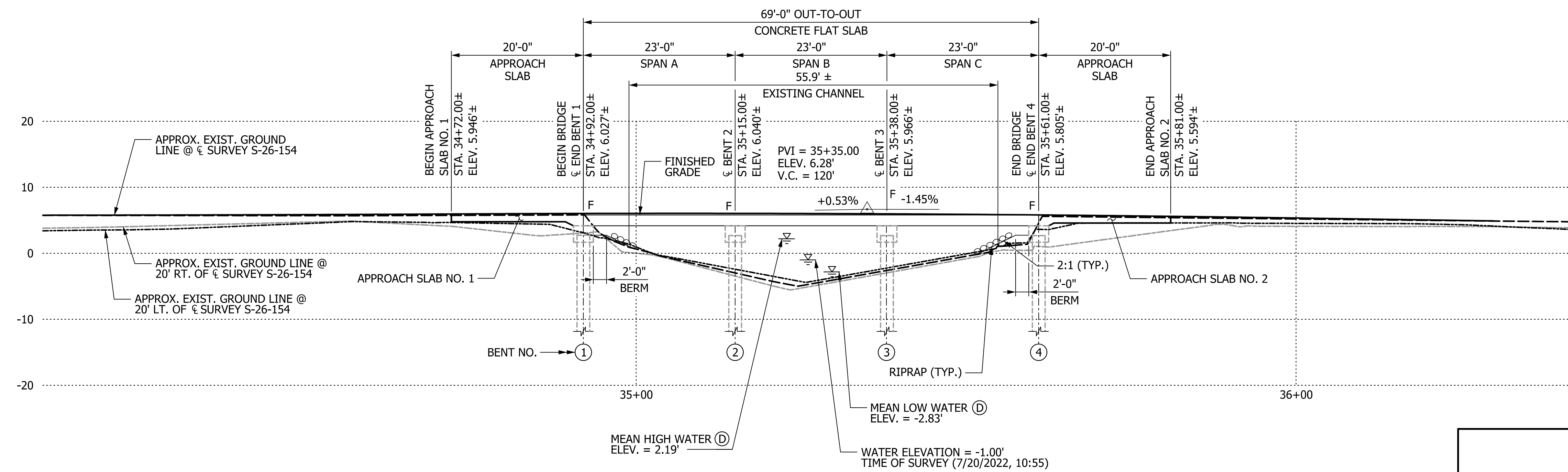
TYPICAL THROUGHOUT BRIDGE SUPERELEVATION SKETCH

VERTICAL CURVE DATA

PVI = 34+15.00 ELEV. 5.65'
V.C. = 120'

PVI = 35+35.00 ELEV. 6.28'
V.C. = 120'

-0.30% +0.53% -1.45%

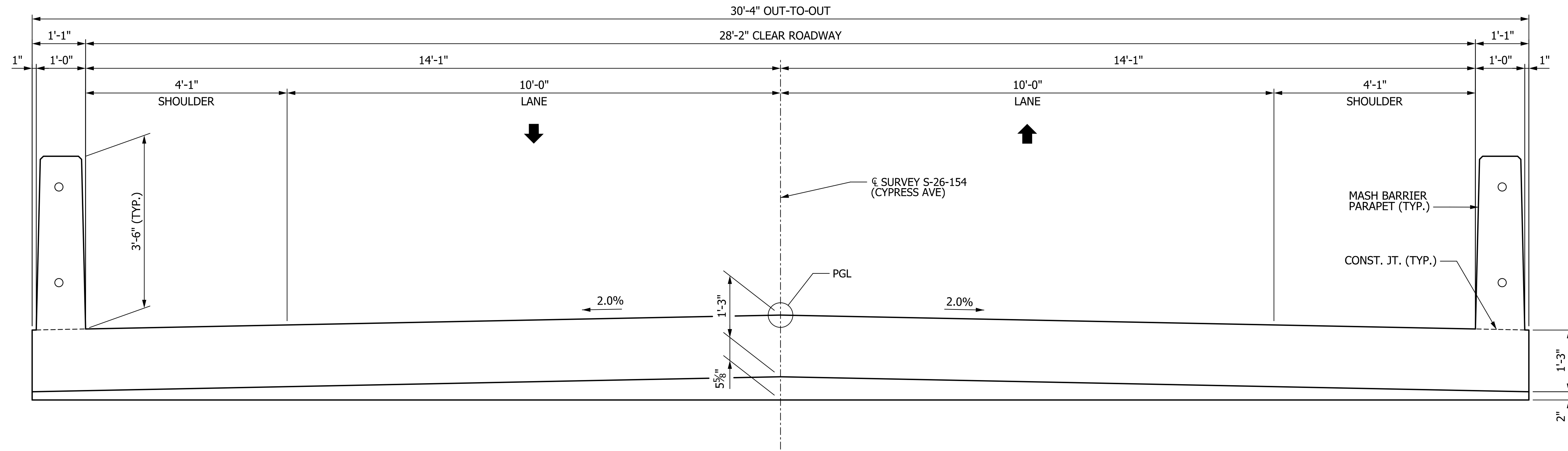


SECTION ALONG SURVEY & S-26-154

NOT FOR CONSTRUCTION

CONCEPTUAL PLANS	HNTB HNTB CORPORATION SC License No. 265 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
	SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
REVIEWED	BRIDGE PLAN AND PROFILE	
	S-26-154 (CYPRESS AVE) BRIDGE SUPERSTRUCTURE REPLACEMENT OVER MURRELLS INLET CREEK	
QUAN.	DR. MEW BJA 2/24	COUNTY Horry ROUTE S-26-154
DES.	BY CHK. DATE	

CADD FILE INFORMATION 8:55:27 AM
 PLOTTED DATE: 5/8/2024
 FILE NAME: ...S-26-154 over Murrells Inlet Creek.bp_Microstation-Rehdb.dgn



TYPICAL SECTION
(LOOKING IN DIRECTION OF STATIONING)

NOTES:

- FLAT SLABS SHALL BE REINFORCED WITH GLASS FIBER REINFORCED POLYMER (GFRP) REINFORCEMENT BARS.
- GLASS FIBER REINFORCED POLYMER REINFORCEMENT BARS SHALL MEET THE REQUIREMENTS OF SCDOT SUPPLEMENTAL TECHNICAL SPECIFICATION SC-M-703.
- FLAT SLAB TOP REINFORCEMENT SHALL HAVE A MINIMUM CLEAR COVER OF 2½" AND BOTTOM REINFORCEMENT SHALL HAVE A MINIMUM CLEAR COVER OF 2".

CADD FILE INFORMATION 8:55:28 AM
 PLOTTED DATE: 5/8/2024
 FILE NAME: ...S-26-154 over Murrells Inlet Creek.sx:Microstation.dgn

NOT FOR CONSTRUCTION	CONCEPTUAL PLANS		HNTB HNTB CORPORATION SC License No. 265 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
	REV.		SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
	REV.		BRIDGE TYPICAL SECTION	
	REV.		S-26-154 (CYPRESS AVE) BRIDGE SUPERSTRUCTURE REPLACEMENT OVER MURRELLS INLET CREEK	
	QUAN.		COUNTY	ROUTE
	DR. MEW BJA 2/24		HORRY	S-26-154

NOTES:

REPAIRS ARE REQUIRED DUE TO CORROSION OF THE STEEL REINFORCEMENT WITHIN THE CONCRETE MEMBERS. PROJECT SCOPE OF WORK INCLUDES THE FOLLOWING:

1. INTERIOR BENT PILES: GALVANIC JACKET CATHODIC PROTECTION SYSTEM
2. END BENT AND INTERIOR BENT CAPS: GALVANIC EMBEDDED CATHODIC PROTECTION ANODES
3. ACCESS FOR INSPECTIONS: PROVIDE ACCESS TO THE WORK AREAS FOR INSPECTION BY OWNER, OWNER'S ENGINEER AND OWNER'S REPRESENTATIVES.

THE OVERALL INTENT OF THE PROJECT IS TO MITIGATE FUTURE CORROSION-DRIVEN DETERIORATION THROUGH INSTALLATION OF GALVANIC CATHODIC PROTECTION JACKETS AND ANODES. CONCRETE PREPARATION AND REPAIR WORK ARE REQUIRED PRIOR TO INSTALLATION OF THE GALVANIC CATHODIC PROTECTION SYSTEM.

BULK ZINC ANODES SHALL NOT BE USED.

CHLORIDE CONTENT, REINFORCING STEEL COVER AND OTHER DETAILS OF EXISTING SUBSTRUCTURE CONDITIONS CAN BE FOUND IN THE "CYPRESS AVENUE OVER MURRELLS INLET CREEK (S-26-154) BRIDGE REHABILITATION-SUBSTRUCTURE EVALUATION" REPORT.

GALVANIC CATHODIC PROTECTION SYSTEM SPECIFICATIONS:

1. SUMMARY DESCRIPTION

INTERIOR BENT PILES - THE PILES SHALL BE PROTECTED WITH A GALVANIC JACKET CATHODIC PROTECTION SYSTEM. GALVANIC JACKETS SHALL COVER THE ENTIRE HEIGHT OF THE PILES FROM THE UNDERSIDE OF THE CAP TO THE MUDLINE. GALVANIC JACKETS SHALL BE BASED ON EITHER EXPANDED ZINC MESH ANODE SECURED TO THE INSIDE OF THE JACKETS OR A DISCRETE ALKALI-ACTIVATED ZINC ANODE SYSTEM SECURED INSIDE OF THE JACKETS.

END BENT AND INTERIOR BENT CAPS - THE END BENT AND INTERIOR BENT CAPS SHALL BE PROTECTED BY EMBEDDED GALVANIC CATHODIC PROTECTION ANODES. THE EMBEDDED ANODES SHALL BE SINGLE-STAGE OR TWO-STAGE CYLINDRICAL GALVANIC ANODES INSTALLED IN HOLES DRILLED INTO THE BENT CAP OR DISTRIBUTED GALVANIC ANODES INSTALLED IN SLOTS CUT INTO THE SURFACE OF THE BENT CAP.

2. DESIGN BASIS

NACE SP0216-2023 GALVANIC CATHODIC PROTECTION OF REINFORCING STEEL IN ATMOSPHERICALLY EXPOSED CONCRETE STRUCTURES

PERFORMANCE REQUIREMENTS

- I. COMPLY WITH AMPP SP21520-2023 ACCEPTANCE CRITERIA FOR CATHODIC PROTECTION OF STEEL IN CONCRETE STRUCTURES
- II. DESIGN SERVICE LIFE OF THE GALVANIC CATHODIC PROTECTION SHALL BE 25 YEARS.

3. SUBMITTALS

QUALIFICATIONS

- I. SYSTEM DESIGNER
- II. QUALITY CONTROL PERSONNEL

GALVANIC CP SYSTEM DESIGN. INCLUDE AT MINIMUM:

- I. DESIGN CRITERIA
- II. CALCULATIONS
- III. SHOP DRAWINGS (INCLUDING STEEL CONNECTION DETAILS)
- IV. PRODUCT DATA
- V. INSTALLATION PROCEDURE
- VI. MONITORING STATION PLAN

QUALITY CONTROL PLAN

COMPLETED QUALITY CONTROL CHECKLISTS AND TEST REPORTS FOR GALVANIC SYSTEM INSTALLATION

COMMISSIONING REPORT, INCLUDING RECOMMENDED MONITORING AND MAINTENANCE ACTIVITIES AND SCHEDULES

AS-BUILT RECORD DRAWINGS

4. QUALITY CONTROL/QUALITY ASSURANCE

DESIGN SHALL BE COMPLETED BY A CATHODIC PROTECTION SPECIALIST (CPS) HAVING ONE OR MORE OF THE FOLLOWING QUALIFICATIONS:

- I. ASSOCIATION FOR MATERIALS PROTECTION AND PERFORMANCE (AMPP) CERTIFICATION OF CATHODIC PROTECTION SPECIALIST (CP-4).
- II. A REGISTERED PROFESSIONAL ENGINEER WITH A MINIMUM OF FIVE YEARS OF VERIFIABLE EXPERIENCE DESIGNING, INSTALLING AND TESTING GALVANIC CP SYSTEMS TO PROTECT STEEL REINFORCED CONCRETE STRUCTURES.
- III. A CORROSION ENGINEERING PRACTITIONER WITH AT LEAST 10 YEARS OF VERIFIABLE EXPERIENCE DESIGNING, INSTALLING AND TESTING GALVANIC CP SYSTEMS TO PROTECT REINFORCED CONCRETE STRUCTURES.

THE CPS SHALL DEVELOP A QUALITY CONTROL PLAN THAT ADDRESSES METHODS AND FREQUENCY OF QC TESTING, INCLUDING:

- I. METHODS FOR LOCATING EXISTING STEEL
- II. TESTING AND ESTABLISHING ELECTRICAL CONTINUITY OF EXISTING REINFORCING
- III. ANODE CONDITIONING AND INSTALLATION
- IV. ANODE WIRING CONNECTIVITY TESTING AND PROTECTION
- V. STAFF RESPONSIBLE FOR QC AND PLANNED SITE VISIT FREQUENCY

NO CP WORK WILL BE ALLOWED IF, AT ANY TIME, AN APPROVED CPS IS NOT ACTIVE OR OTHERWISE INVOLVED IN THE PROJECT.

A TECHNICIAN WITH AMPP CERTIFICATION OF CP TECHNICIAN (CP-2) WITH A MINIMUM OF FIVE VERIFIABLE PROJECT EXPERIENCES IN THE LAST FIVE YEARS IN CP MAY PERFORM FIELD MEASUREMENTS ON BEHALF OF THE CPS.

5. SYSTEM REQUIREMENTS

GALVANIC JACKET CATHODIC PROTECTION SYSTEM

I. THE JACKETS SHALL COMPLETELY COVER THE CONCRETE SURFACE OF THE PILES. THE JACKETS SHALL BE FIBERGLASS REINFORCED PLASTIC AND HAVE INTERLOCKING JOINTS ALONG OPPOSITE SIDES AND BETWEEN VERTICALLY SEGMENTED SECTIONS. JACKET DIMENSIONS SHALL PROVIDE A CONSISTENT THICKNESS ANNULUS BETWEEN INSIDE OF THE JACKET FORM AND THE ORIGINAL SURFACE CONTOURS OF THE PILES.

II. FILL MATERIAL - THE JACKET FILL MATERIAL SHALL BE PORTLAND CEMENT-BASED AND HAVE A MAXIMUM RESISTIVITY OF 15,000 OHM-CM OR PASS A MINIMUM OF 1500 COULOMBS WHEN TESTED ACCORDING TO ASTM C1202 AT AN AGE OF 28 DAYS OR MORE IN A SATURATED CONDITION. A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI IS REQUIRED. THE JACKETS SHALL BE COMPLETELY FILLED AND FREE OF VOIDS.

III. PREPARATION PRIOR TO JACKET INSTALLATION - ON TREATED ELEMENTS, ALL DELAMINATED CONCRETE SHALL BE REMOVED, EXPOSED STEEL CLEANED OF LOOSE CORROSION PRODUCT, AND CONCRETE SURFACES CLEANED OF STAINING, DEBRIS, AND SURFACE CONTAMINANTS THAT INHIBIT BONDING OF JACKET FILL MATERIAL.

IV. JACKET FILL MATERIAL SHALL BE PUMPED FROM PORT STARTING AT BOTTOM OF JACKET. PUMPING PORTS SHALL BE NO MORE THAN 4'-0" APART AND ON OPPOSITE FACES. SEAL PORTS BY CUTTING PORTS FLUSH WITH JACKET AND SEAL WITH EPOXY OR USING A CAP.

V. RINSE PILE AND STEEL CAGE WITH FRESH WATER AND DEWATER FORM PRIOR TO PLACEMENT OF JACKET FILL MATERIAL.

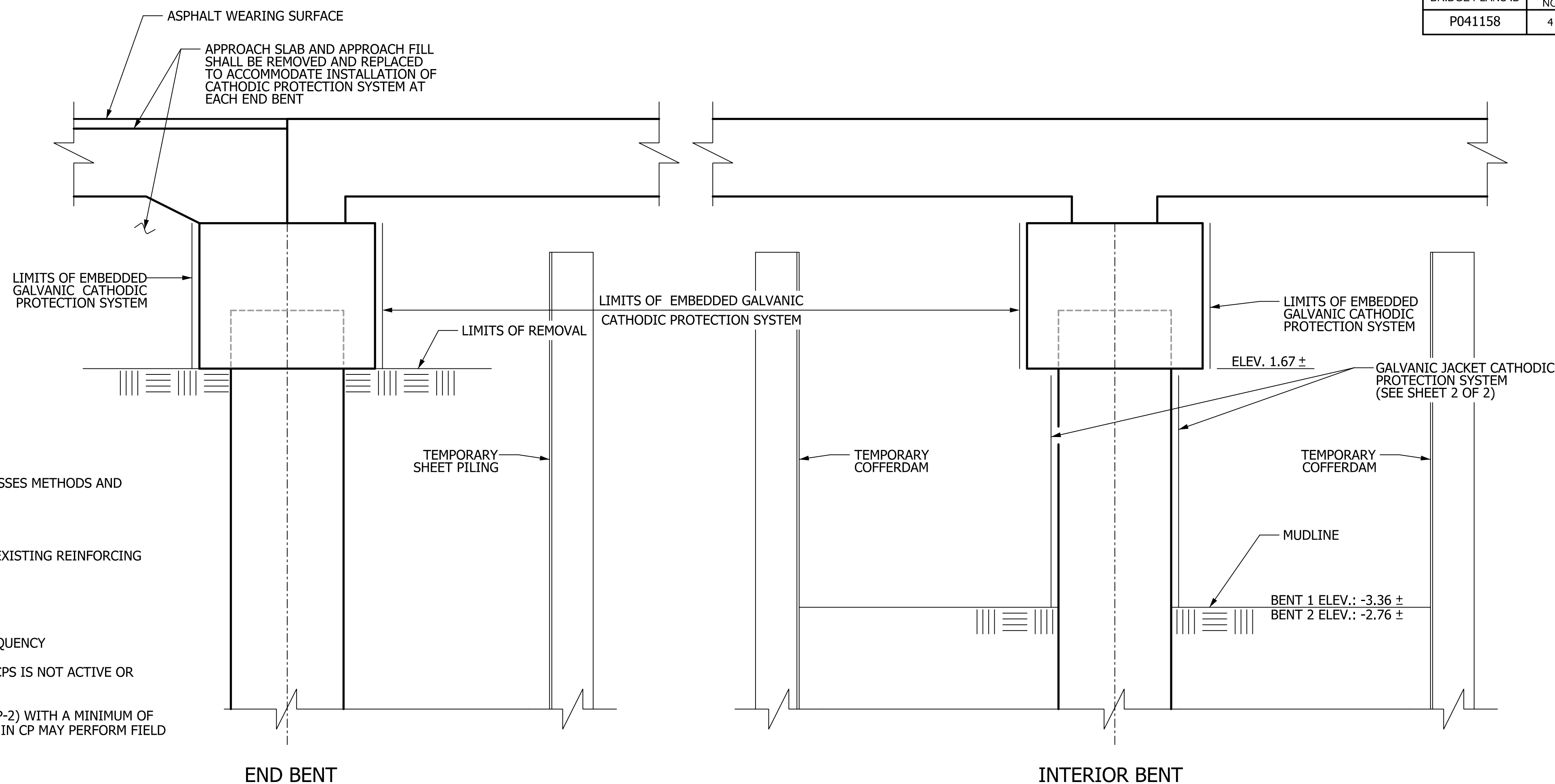
GALVANIC EMBEDDED CATHODIC PROTECTION ANODES

I. PERFORM CONCRETE REMOVAL AS REQUIRED FOR ANODE PLACEMENT WITHIN THE ELEMENT AND FOR INSTALLATION OF ELECTRICAL CONNECTION. PROVIDE ADEQUATE CLEARANCE FOR PLACEMENT OF THE ANODE AND INSTALLATION OF ELECTRICAL CONNECTIONS. DO NOT CUT EXISTING REINFORCING.

II. EMBEDDING MATERIAL - THE ANODE EMBEDDING MATERIAL SHALL HAVE A MAXIMUM RESISTIVITY OF 15,000 OHM-CM OR PASS A MINIMUM OF 1500 COULOMBS WHEN TESTED ACCORDING TO ASTM C1202 AT AN AGE OF 28 DAYS OR MORE IN A SATURATED CONDITION.

ANODE-TO-REINFORCING STEEL CONNECTIONS

- I. VERIFY ELECTRICAL CONTINUITY OF ALL STEEL REINFORCEMENT, INCLUDE REINFORCING STEEL, SPIRAL, STIRRUPS, AND STRANDS, PRIOR TO INSTALLING ANODES. WHERE CONTINUITY IS NOT PRESENT, ESTABLISH CONTINUITY BETWEEN ALL STEEL REINFORCEMENT.
- II. IN NON-INSTRUMENTED ZONES, THE ANODE WIRES SHALL BE MECHANICALLY CONNECTED TO AN EXPOSED SECTION OF EMBEDDED STEEL REINFORCEMENT TO ESTABLISH ELECTRICAL CONNECTION. BRAZING OR SOLDERING CONNECTIONS TO STRAND IS PROHIBITED. COAT CONNECTIONS WITH 100% SOLIDS EPOXY. PROVIDE REDUNDANT (AT LEAST 2) ANODE-TO-REINFORCING STEEL CONNECTIONS.



END BENT

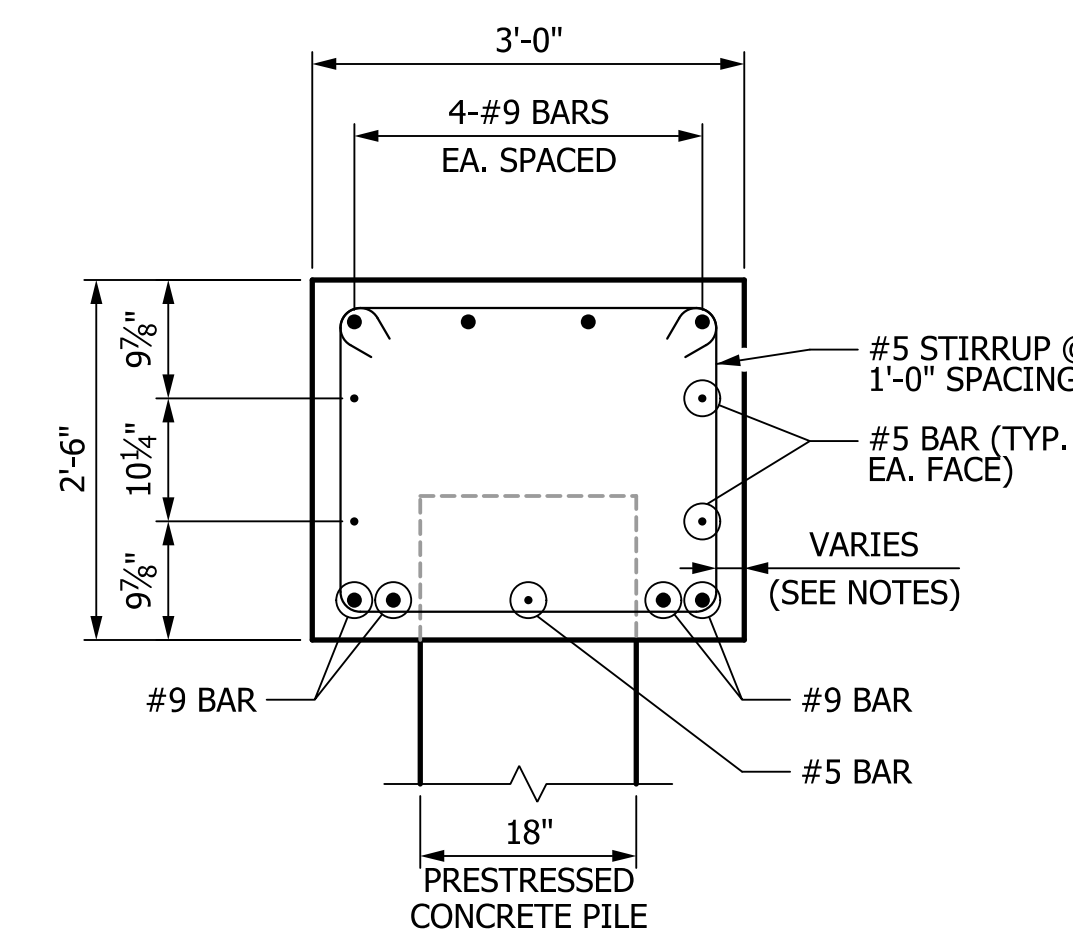
INTERIOR BENT

ELEVATION VIEW

6. INSTRUMENTATION AND COMMISSIONING

INSTALL AN INSTRUMENTED ZONE AT ONE BENT CAP AND ONE PILE FOR MONITORING. ONE EMBEDDED PERMANENT SILVER/SILVER-CHLORIDE REFERENCE ELECTRODE SHALL BE INSTALLED AT EACH INSTRUMENTED ZONE. THE REFERENCE ELECTRODE SHALL BE LOCATED IN THE MOST ANODIC LOCATIONS FOR ELEMENT BASED ON A CORROSION POTENTIAL SURVEY PERFORMED BY THE CONTRACTOR. LEAD WIRES TO THE ANODE AND TO THE REINFORCING STEEL (2 EACH MINIMUM) SHALL BE CONNECTED BY SWITCHED CONNECTION AT A JUNCTION BOX TO BE INSTALLED AT A LOCATION TO BE DETERMINED BY THE ENGINEER. THE JUNCTION BOX SHALL BE A NEMA 4X OUTDOOR ELECTRICAL ENCLOSURE AND INCLUDE LEAD WIRES TO THE EMBEDDED REFERENCE ELECTRODES, TO THE ANODE, AND TO THE REINFORCING STEEL; A SHUNT RESISTOR TO SUPPORT CURRENT MEASUREMENT; AND A WATER-RESISTANT SWITCH. LEAD WIRES SHALL BE PROTECTED IN NON-CORRODING CONDUIT. CONNECTION TO THE REINFORCING STEEL IN THE INSTRUMENTED ZONES SHALL BE MECHANICAL AND COATED WITH 100% SOLIDS EPOXY. BRAZING OR SOLDERING CONNECTIONS TO STRAND IS PROHIBITED. NO SHORTS BETWEEN THE ANODE AND THE REINFORCING STEEL AT A LOCATION OTHER THAN THE JUNCTION BOX SHALL BE ALLOWED.

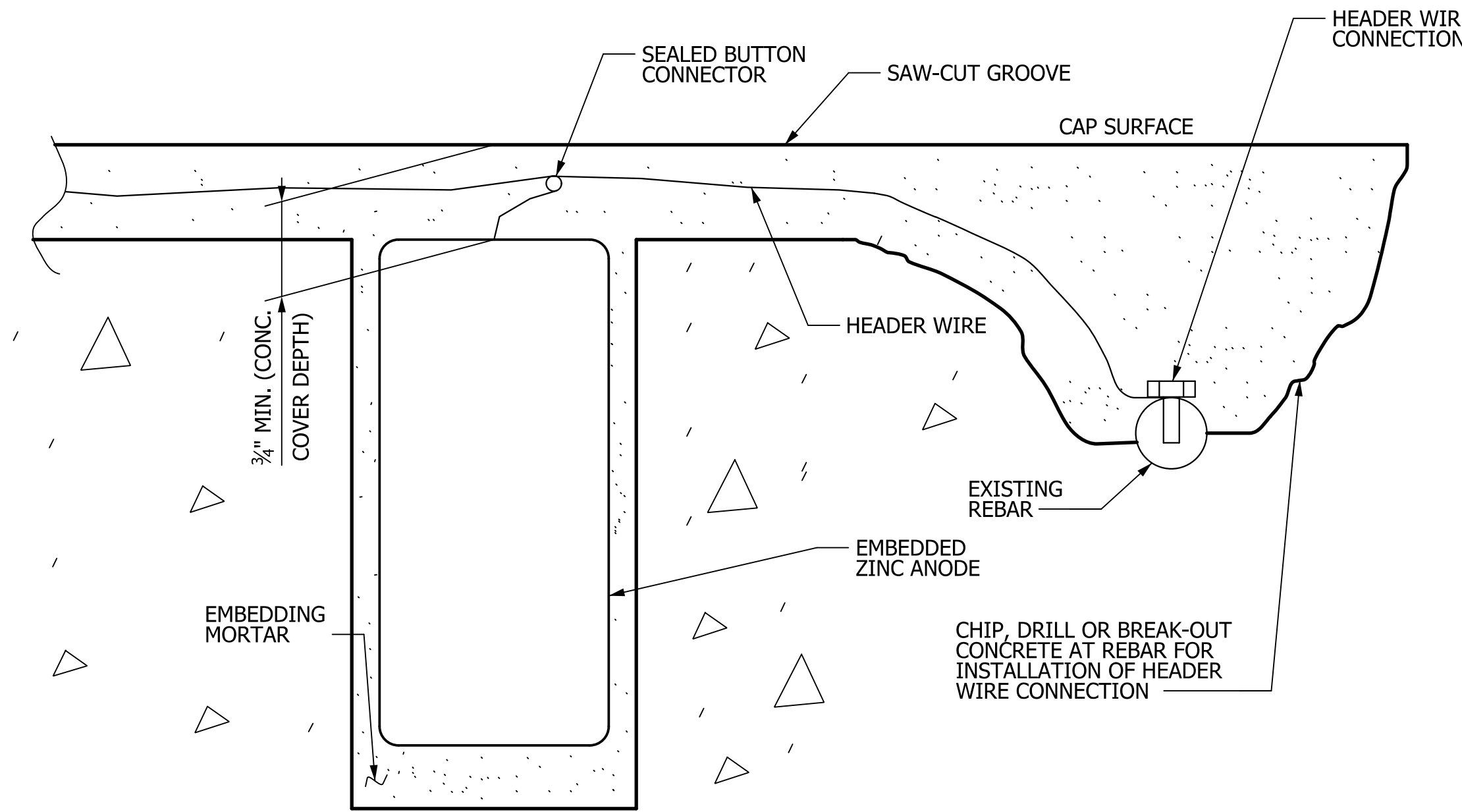
AT COMPLETION OF INSTALLATION OF CP SYSTEMS, COMMISSION THE SYSTEMS AND PREPARE AND SUBMIT A COMMISSIONING REPORT DEMONSTRATING COMPLIANCE WITH PERFORMANCE REQUIREMENTS. THE COMMISSIONING REPORT SHALL INCLUDE FOR EACH INSTRUMENTED ZONE: CONTINUITY TESTING AND CORRECTION (AS REQUIRED), ANODE-TO-STEEL RESISTANCE, REFERENCE ELECTRODE-TO-STEEL RESISTANCE, INITIAL CURRENT, STATIC NATIVE POTENTIAL, AND THE ENERGIZED ON AND INSTANT-OFF POTENTIALS FOR EACH INSTRUMENTED ZONE. REPORTING SHALL INCLUDE RESULTS AND INTERPRETATION RELATIVE TO CRITERIA GIVEN IN THE REFERENCE STANDARD. THE COMMISSIONING REPORT SHALL BE SUBMITTED BY THE CONTRACTOR'S ENGINEER AND SHALL BE SIGNED AND SEALED BY AN ENGINEER LICENSED IN THE STATE OF SOUTH CAROLINA.



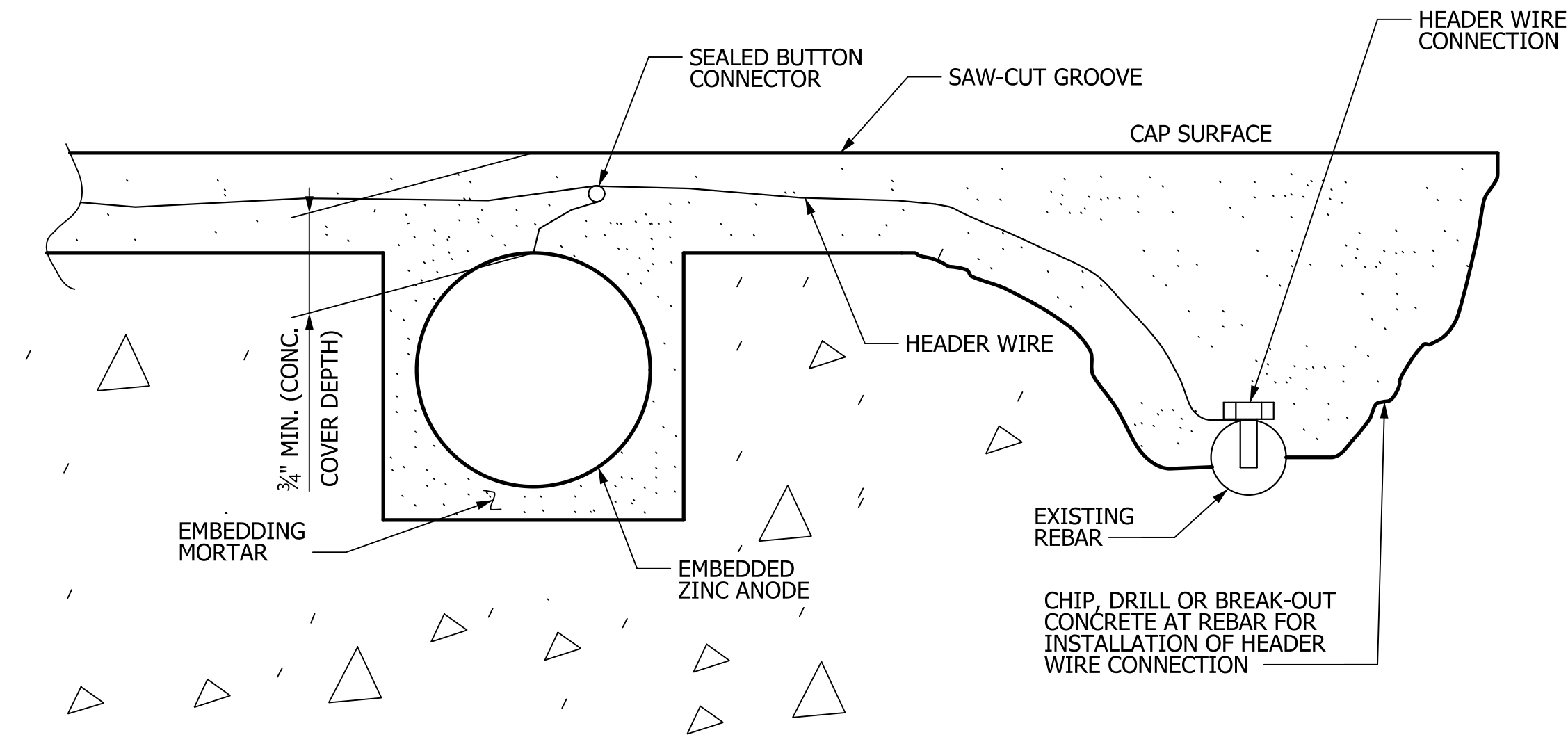
EXISTING END BENT / INT. BENT CAP SECTION VIEW

CADD FILE INFORMATION: 8:55:28 AM
 PLOTTED DATE: 5/8/2024
 FILE NAME: ...S-26-154 over Murrells Inlet Creek.dtl_Microstation.dgn

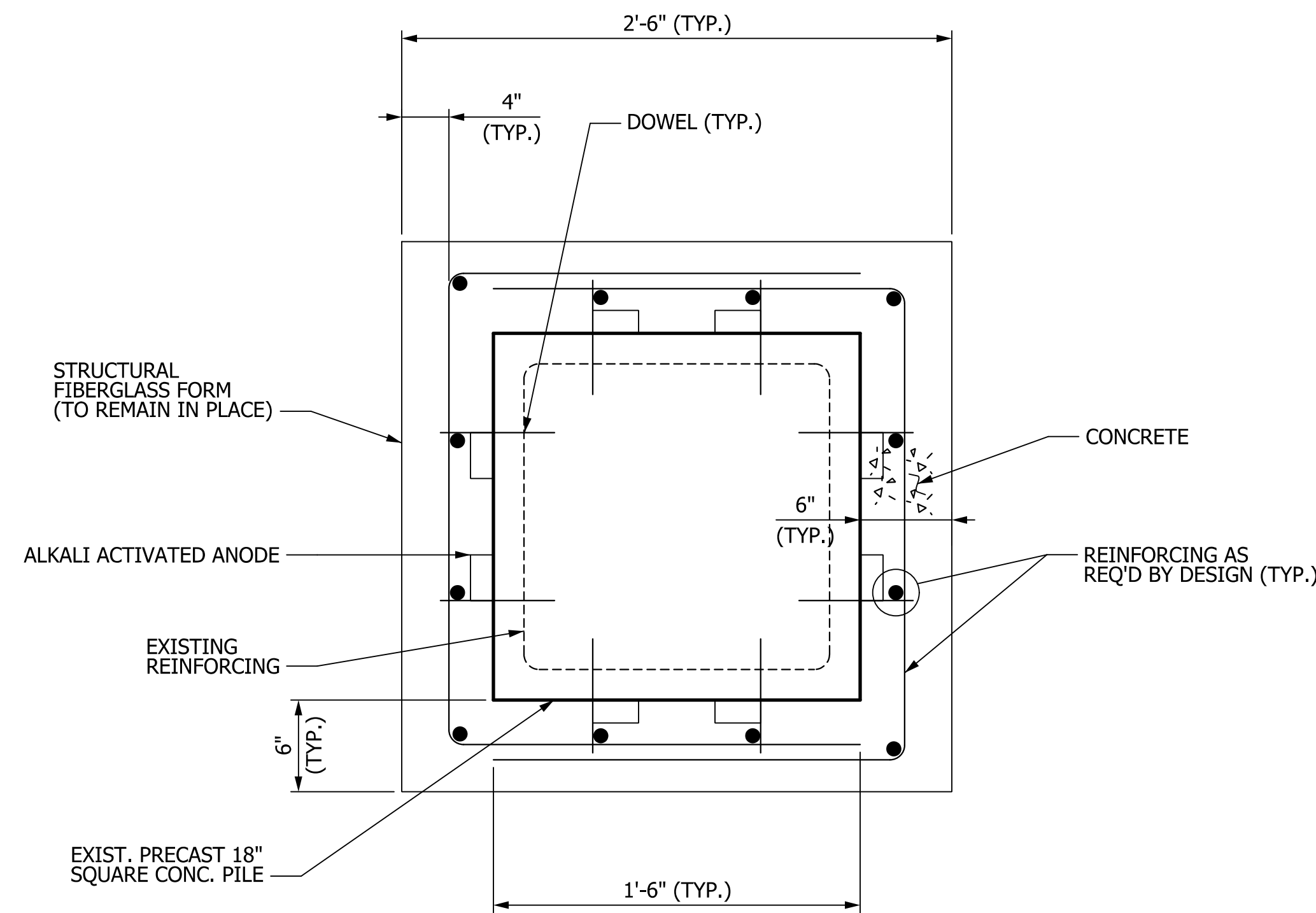
NOT FOR CONSTRUCTION	CONCEPTUAL PLANS		HNTB HNTB CORPORATION SC License No. 265 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
	REV.		SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
	REV.		GALVANIC CATHODIC PROTECTION SYSTEM DETAILS (SHEET 1 OF 2)	
	REV.		S-26-154 (CYPRESS AVE) BRIDGE SUPERSTRUCTURE REPLACEMENT OVER MURRELLS INLET CREEK	
	REVIEWED		COUNTY	ROUTE
	QUAN.		HORRY	S-26-154



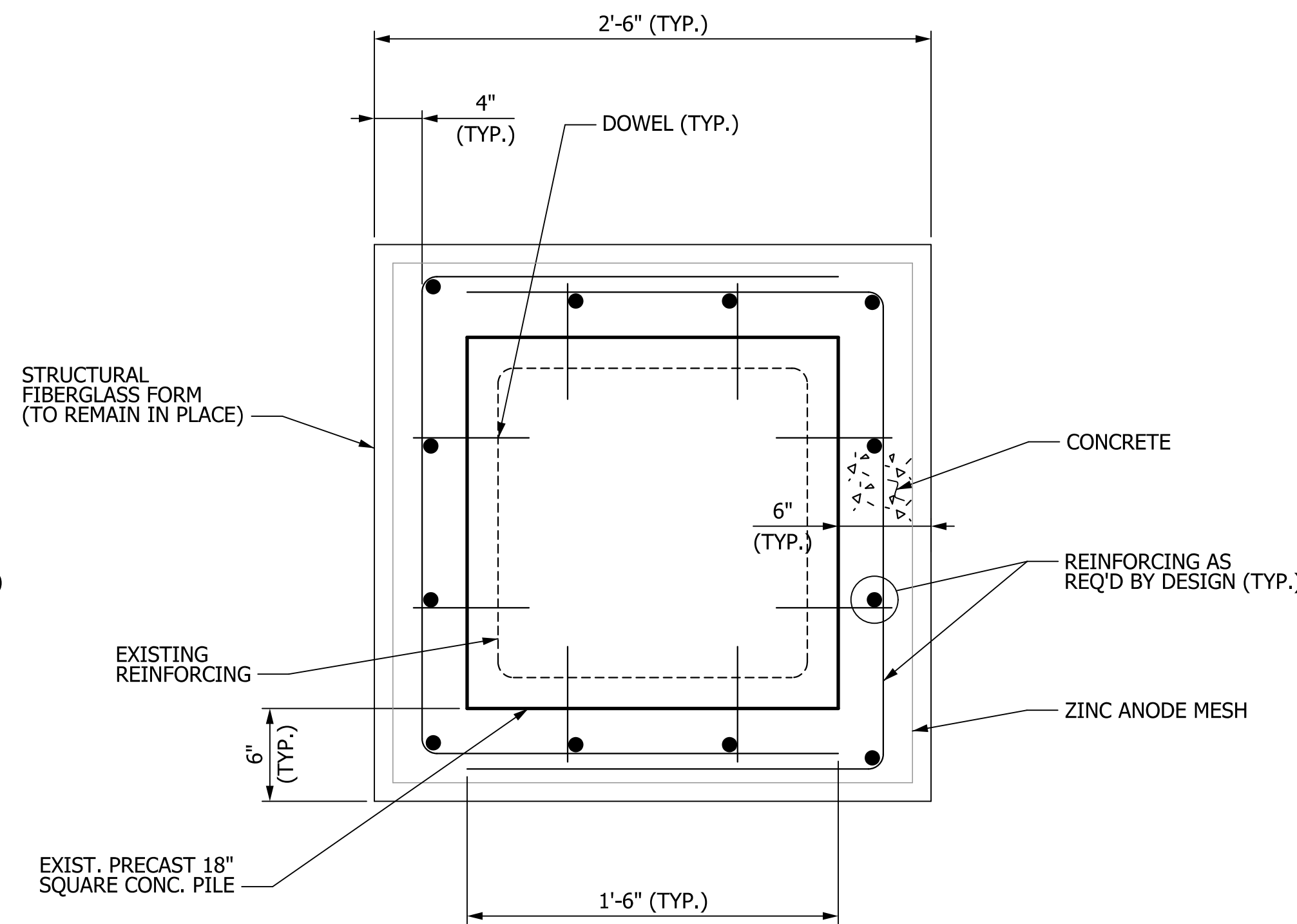
SECTION VIEW EMBEDDED ZINC ANODE OPTION



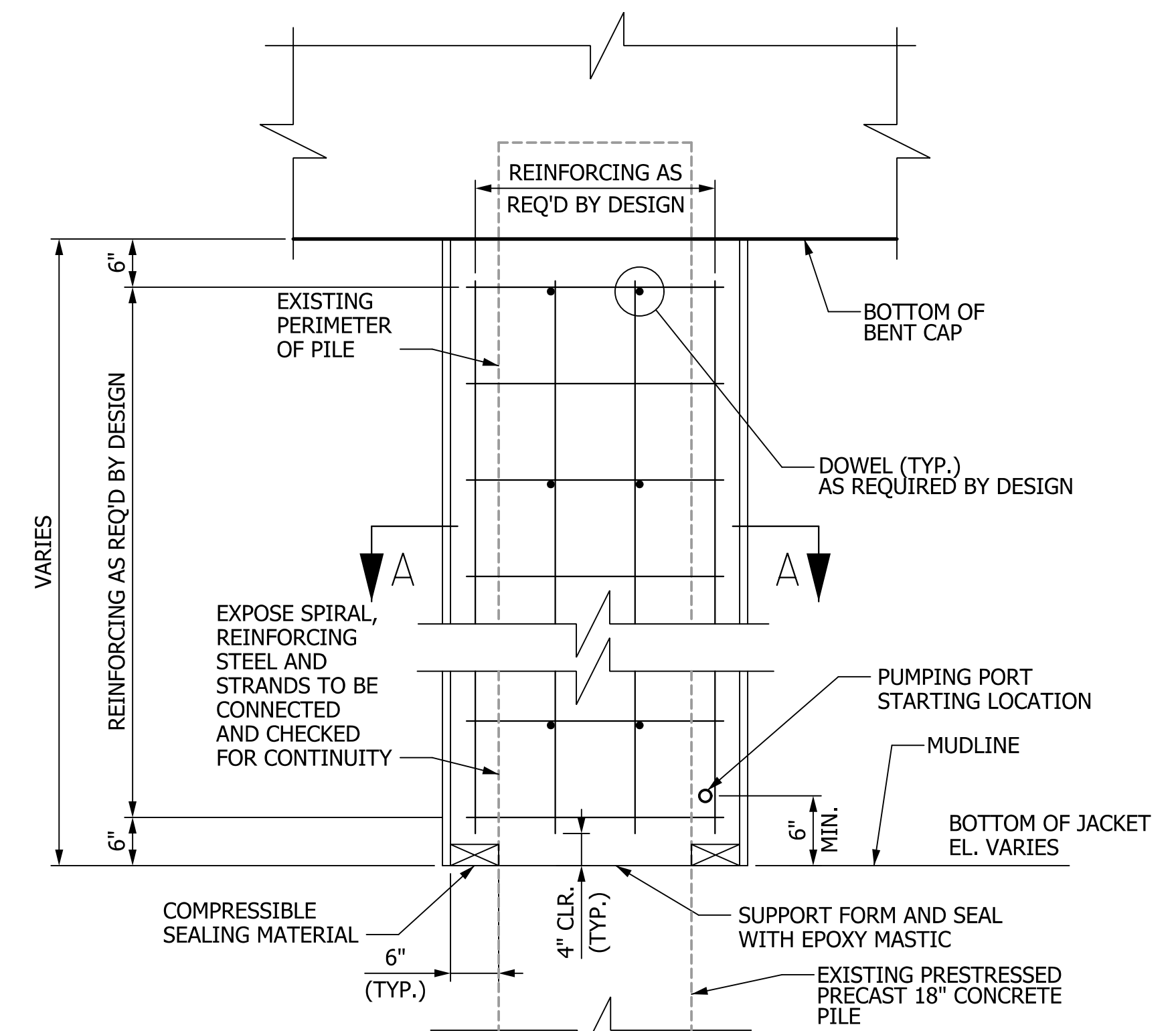
SECTION VIEW EMBEDDED CONTINUOUS ZINC ANODE OPTION



ALKALI ACTIVATED ANODE OPTION



SECTION A-A ZINC MESH ANODE OPTION



STRUCTURAL CATHODIC PROTECTION INTEGRAL PILE JACKET

NOT FOR CONSTRUCTION	CONCEPTUAL PLANS		HNTB HNTB CORPORATION SC License No. 265 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609		
	REV.		SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION		
	REV.				
	REV.		GALVANIC CATHODIC PROTECTION SYSTEM DETAILS (SHEET 2 OF 2)		
REV.					
QUAN.			S-26-154 (CYPRESS AVE) BRIDGE SUPERSTRUCTURE REPLACEMENT OVER MURRELLS INLET CREEK		
DR.	MEW	DWH			4/24
DES.					
BY	CHK.	DATE			
			COUNTY	ROUTE	
			HORRY	S-26-154	