CATHODIC PROTECTION NOTES

THE "SDC" OVERLAY WORK IN CONJUNCTION WITH THE CP SYSTEM SHALL BE PERFORMED IN ACCORDANCE WITH ODOT SS 850 WITH THE FOLLOWING MODIFICATIONS:

BRIDGE DECK REPAIR AND OVERLAY WITH "Superplasticized Dense Concrete" AS PER PLAN FOR CP:

1. ANY REINFORCING BAR THAT IS EXPOSED DURING THE REMOVAL OF UNSOUND CONCRETE SHALL HAVE ADJACENT CONCRETE REMOVED TO A DEPTH THAT WILL PROVIDE A MINIMUM OF 3/4" CLEARANCE AROUND THE BAR WITHIN THE AREA OF EXPOSURE.

2. FULL DEPTH REPAIRS SHALL BE 511, CLASS S CONCRETE AND SHALL BE PLACED UP TO THE PLAN LOWER BOUNDARY OF THE UNIFORM THICKNESS OVERLAY, GIVEN A BROOM FINISH AND WATER CURED UNTIL THE CONCRETE HAS ATTAINED A MODULUS RUPTURE AT 400 PSI.

3. ALL VARIABLE THICKNESS PATCHES SHALL BE PLACED PRIOR TO THE PLACEMENT OF THE UNIFORM THICKNESS OVERLAY. REMOVE UNSOUND CONCRETE AND CLEAN EXPOSED STEEL IN ACCORDANCE WITH ODOT SS 845. THE PERIMETER OF ALL REMOVED AREAS SHALL BE SAWED TO A DEPTH OF 1 INCH TO PRODUCE A VERTICAL OR SLIGHTLY UNDERCUT FACE. CONCRETE AND EXPOSED STEEL WITHIN THESE AREAS SHALL BE BLAST CLEANED BY ABRASIVE BLASTING NOT MORE THAN 24 HOURS PRIOR TO PLACING THE VARIABLE THICKNESS PATCHES. A BONDING GROUT OF CEMENT, SAND, AND WATER MIXED TO A PAINT-LIKE CONSISTENCY SHALL BE BRUSHED ON THE SURFACE DRY REMOVAL AREA PRIOR TO PLACING THE VARIABLE THICKNESS CONCRETE. ALL LOOSE MATERIAL SHALL BE REMOVED PRIOR TO PLACEMENT, THE BONDING GROUT SHALL BE APPLIED IMMEDIATELY PRIOR TO PLACEMENT, THE PATCH SHALL BE PLACED UP TO THE PLAN LOWER BOUNDARY OF THE UNIFORM THICKNESS AND GIVEN A BROOM FINISH. THE VARIABLE THICKNESS CONCRETE SHALL BE CLASS S CONCRETE AND SALT SHALL BE ADDED TO MATCH THE SALT CONTENT OF THE DECK CONCRETE (10 TO 20 LBS./CY). THE VARIABLE THICKNESS PATCHES SHALL BE WATER CURED UNTIL THE CONCRETE HAS ATTAINED A MODULUS OF RUPTURE OF 400 PSI.

4. THE VARIABLE THICKNESS AND FULL DEPTH PATCHES SHALL BE BLASTED FOR A SUFFICIENT DURATION AND WITH SUFFICIENT INTENSITY TO EXPOSE AGGREGATE.

5. "HEAVY EQUIPMENT SHALL NOT BE ALLOWED ON THE ANODE. CONCRETE TRUCKS USED TO DELIVER THE SDC MAY DRIVE ACROSS THE ANODE ONLY WHERE IT HAS BEEN COVERED WITH PLASTIC AND PLYWOOD TO PROTECT IT. THE THICKNESS OF THE UNIFORM SDC OVERLAY ABOVE THE SCARIFIED SURFACE SHALL BE 1-3/4 INCHES."

6. "THE BONDING GROUT SHALL BE AS DESCRIBED IN SS850 BUT SHALL BE PLACED BY SPRAYING. THE GROUT SHALL COAT THE CONCRETE BRIDGE DECK WITHOUT FORMING PUDDLES."

7. METHOD OF MEASUREMENT FOR THE CLASS "S" CONCRETE (VARIABLE THICKNESS) MODIFIED AS PER PLAN FOR CP USED TO PLACE PATCHES SHALL BE THE VOLUME IN CUBIC YARDS AS INDICATED BY THE CALIBRATED METERS ON THE DELIVERY TRUCKS OF CLASS "S" CONCRETE PLACED AND ACCEPTED, LESS ANY WASTED.

8. BASIS OF PAYMENT. PAYMENT FOR COMPLETE AND ACCEPTED QUANTITIES AS MEASURED WILL BE MADE AT CONTRACT PRICE BID FOR:

ITEM	UNIT	DESCRIPTION
850	SQ. YD.	"Superplasticized Dense Concrete Overlay (1¾" thick), on existing deck, as per plan
511	CU. YD.	CLASS "S" CONCRETE (VARIABLE THICKNESS) AS PER PLAN FOR CP
850	CU. YD.	FULL DEPTH REPAIR, AS PER PLAN FOR CP

THE ANODE LEADS AND SYSTEM NEGATIVES SHALL CONSIST OF NO. 10 AWG STRANDED COPPER WIRES INSULATED WITH CROSS-LINKED POLYETHYLENE LISTED BY UL AS RHH/RHW/USE. EACH SYSTEM NEGATIVE SHALL BE ATTACHED TO THE REINFORCING STEEL BY EXOTHERMIC WELD AND COVERED WITH A NON-SHRINKING EPOXY MORTAR WHICH MEETS ODOT SS 956. THE SYSTEM NEGATIVE AND ANODE LEAD WIRES SHALL BE ROUTED FROM THE DECK TO THE R/C UNIT WITHOUT SPLICES, EXCEPT FOR THE ANODE LEAD TO CURRENT CONDUCTOR SPLICES, THROUGH THE CONDUIT AND JUNCTION BOX SYSTEM ATTACHED TO THE BOTTOM OF THE DECK. THERE SHALL BE NO CONTACT BETWEEN SYSTEM NEGATIVE WIRES AND THE BARE ANODES. ANODE AND NEGATIVE WIRES SHALL BE TAGGED BY TYPE OF LEAD AND ZONE.

CONDUIT JUNCTION BOX SYSTEM:

1. CONDUIT SHALL MEET 713.04.

2. EXPANSION CONNECTIONS AS NECESSARY SHALL BE FURNISHED AND INSTALLED. LENGTHS OF FLEXIBLE CONDUIT MAY BE USED TO ALLOW FOR BRIDGE MOVEMENT.

3. JUNCTION BOXES SHALL BE HOT DIPPED GALVANIZED CAST IRON OF SUFFICIENT SIZE TO ACCOMMODATE THE WIRING AND SPLICES.

4. ATTACHMENT HARDWARE SHALL BE FASTENED TO THE BRIDGE BY RAM SET PINS OR APPROVED EQUAL.

THE CONTRACTOR SHALL EMPLOY A QUALIFIED CORROSION ENGINEER APPROVED BY THE DIRECTOR TO:

1. TEST THE REINFORCING STEEL FOR ELECTRICAL CONTINUITY PRIOR TO OVERLAY WORK. THE CONTINUITY OF THE TOP MAT AS A UNIT, THE BOTTOM MAT AS A UNIT, AND THE CONTINUITY BETWEEN THE TWO MATS, AS WELL AS THE CONTINUITY BETWEEN THE TOP MAT AND ALL EMBEDDED STEEL SUCH AS GUTTERS AND EXPANSION JOINTS, SHALL BE TESTED.

2. ENERGIZE THE COMPLETED SYSTEM.

3. PERFORM "E VS. LOG I" TESTS TOP AND BOTTOM ON THE CP CIRCUIT TO DETERMINE THE CONSTANT VOLTAGE SETTINGS FOR THE CP CIRCUIT AND MAKE THOSE SETTINGS ON THE R/C UNIT. THE "E VS. LOG I" TEST MUST BE CONDUCTED IN AN AMBIENT TEMPERATURE WITHIN A RANGE OF 65 DEGREES F. TO 80 DEGREES F.

4. FURNISH A WRITTEN REPORT TO THE DIRECTOR FOR APPROVAL OF THE TEST RESULTS, FINDINGS, AND RECOMMENDATIONS.

5. RETEST THE SYSTEM AFTER ONE YEAR OF CP OPERATION AND PERFORM THE TESTS AND REPORTS DESCRIBED IN 3 AND 4.

6. FURNISH ALL EQUIPMENT AND PERSONNEL NECESSARY TO PERFORM THE ABOVE TESTS AND REPORTING.

THE COST OF THE WORK FOR FURNISHING AND INSTALLING THE CATHODIC SYSTEM AS DESCRIBED ABOVE AND IN THE PLANS AND INCLUDING FURNISHING AND INSTALLING THE ANODE MESH, CONDUIT JUNCTION BOX SYSTEM, ANODE LEADS, SYSTEM NEGATIVES, EPOXY; EXOTHERMIC WELDS, ATTACHMENT HARDWARE, HEAT SHRINK TUBING, AND TO PERFORM ALL DECK DRILLINGS AND CLEANING, TROUBLE-SHOOTING, ELECTRICAL BONDING, CONTINUITY TESTING, AND TO PROVIDE THE SERVICES OF A CORROSION ENGINEER SHALL BE PAID AS PART OF THE CONTRACT BID ITEM:

ITEM SPECIAL - LUMP SUM - CATHODIC SYSTEM

REFERENCE CELLS

REFERENCE CELLS SHALL BE SILVER/SILVER CHLORIDE ENCASED IN CONCRETE-COMPATIBLE MATERIAL. THE CELLS SHALL BE INSTALLED TWO PER ZONE IN AREAS OF SOUND CONCRETE WHICH HAS HALF CELL READINGS IN THE HIGHEST 10% MOST ANODIC READINGS OF ALL THE SOUND CONCRETE AREAS IN THE ZONE. THE CONTRACTOR SHALL PERFORM THE HALF CELL SURVEY ON A TEN-FOOT GRID IN ACCORDANCE WITH ASTM CH 76 PRIOR TO LOCATING THE REFERENCE CELL SITE.

THE CONTRACTOR SHALL EXCAVATE A 3 INCH WIDE, 6 INCH LONG AND 2 INCH DEEP SITE AT THE SELECTED CELL LOCATION. THE EXCAVATION SHALL BE FREE OF EXPOSED REINFORCING STEEL. THE REFERENCE CELL SHALL BE PLACED IN THE BOTTOM OF THE EXCAVATION. THE CONTRACTOR SHALL DRILL AN ACCESS HOLE IN THE EXCAVATION THROUGH THE DECK AND INTO A JUNCTION BOX CONDUIT SYSTEM ATTACHED TO THE BOTTOM OF THE DECK. THE REFERENCE CELL LEAD WIRE SHALL BE ROUTED THROUGH THE ACCESS HOLE AND CONDUIT SYSTEM TO THE RECTIFIER. THE CONTRACTOR SHALL ATTACH THE GROUND WIRE SUPPLIED WITH THE REFERENCE CELL TO THE REINFORCING STEEL. THE GROUND LEADS SHALL BE ATTACHED BY EXOTHERMIC WELDS TO THE REINFORCING STEEL AND COVERED WITH EPOXY MEETING ODOT SS 956. THE GROUND WIRE SHALL BE ATTACHED 2 TO 5 FEET FROM THE REFERENCE CELL. THE CONTRACTOR SHALL PERFORM ALL NECESSARY EXCAVATION FOR THE GROUND CONNECTION AND PROVIDE AN ACCESS HOLE TO A JUNCTION BOX AND CONDUIT SYSTEM ATTACHED TO THE BOTTOM OF THE DECK. THE CONTRACTOR SHALL ROUTE THE GROUND WIRE THROUGH THE JUNCTION BOX CONDUIT SYSTEM TO THE RECTIFIER. THE CONDUIT AND JUNCTION BOXES FOR THE REFERENCE CELL SHALL BE SEPERATE FROM THE CONDUIT AND JUNCTION BOXES FOR THE ANODE AND NEGATIVE WIRING.

THE CONTRACTOR SHALL BACKFILL AND REFERENCE CELL AND GROUND WIRE SITES WITH SALT FREE CLASS CONCRETE TO THE LEVEL OF THE DECK SURFACE. AFTER THE BACKFILL CONCRETE IS CURED THE CONTRACTOR SHALL MEASURE THE AC RESISTANCE AND HALF CELL POTENTIAL OF THE CELL AND GROUND WIRE CIRCUIT. RESISTANCE READINGS SHALL NOT BE MORE THAN 10,000 OHMS AND POTENTIAL READINS SHALL NOT BE ERRATIC. IF UNACCEPTABLE READINGS ARE OBTAINED, THE CONTRACTOR SHALL REPLACE THE REFERENCE CELL WITH A NEW CELL.

THE COST TO FURNISH AND INSTALL THE ABOVE DESCRIBED REFERENCE CELLS, CONDUIT, JUNCTION BOXES, ATTACHMENT HARDWARE, EXOTHERMIC WELDS, EPOXY, BACKFILL MATERIAL, DRILLING, AND TAGS SHALL BE PAID AS PART OF THE CONTRACT BID ITEM.

ITEM SPECIAL - 2 EACH - REFERENCE CELL

POWER SERVICE FOR CATHODIC PROTECTION

THIS ITEM SHALL INCLUDE:

1. FURNISHING AND INSTALLING A 1-1/2" CONDUIT RISER AND WEATHERHEAD MEETING 713.04, HUB FOR CONNECTION TO THE DISCONNECT SWITCH, DISCONNECT SWITCH, POWER WIRE #6 AWG COPPER STRANDED WIRE INSULATED WITH CROSS LINKED POLYETHYLENE LISTED BY UL AS RHH/RHW/USE FROM THE TRANSFORMER CONNECTION TO THE DISCONNECT SWITCH, AND ALL ATTACHMENT HARDWARE.

2. FURNISHING AND INSTALLING A POWER TRANSFORMER TO PROVIDE 120 VOLT SERVICE TO THE RECTIFIER/CONTROLLER UNIT, INCLUDING CONNECTION TO THE EXISTING POWER WIRE, AND ALL ATTACHMENT HARDWARE. THE TRANSFORMER SHALL BE AS REQUIRED TO MEET THE ELECTRICAL INPUT FROM THE EXISTING POWER SERVICE AND THE ELECTRICAL OUTPUT TO THE RECTIFIER/CONTROLLER UNIT.

3. ALL CONNECTIONS TO AND MODIFICATIONS OF EXISTING UTILITY COMPANY EQUIPMENT REQUIRED FOR THIS ITEM, AND THE NEW POWER TRANSFORMER AND ITS INSTALLATION, SHALL BE AS APPROVED BY THE CITY OF PAINESVILLE IN ACCORDANCE WITH THEIR REQUIREMENTS. THE CONTRACTOR SHALL RECEIVE ALL WRITTEN APPROVALS FROM THE CITY OF PAINESVILLE BEFORE ANY WORK IS PERFORMED.

PAYMENT FOR THE ABOVE SHALL BE INCLUDED IN THE CONTRACT BID ITEM:

ITEM SPECIAL - LUMP SUM - POWER SERVICE FOR CATHODIC SYSTEM

SUBMITTAL REQUIREMENTS

THE CONTRACTOR SHALL SUBMIT FIVE (5) COPIES OF THE FOLLOWING DOCUMENTATION FOR APPROVAL BY THE BUREAU OF CONSTRUCTION (VERN DUNLAP). MATERIAL SHALL NOT BE ORDERED UNTIL APPROVAL IS RECEIVED ON THE RELATED SUBMITTAL. THE CORROSION ENGINEER SHALL NOT PERFORM ANY TEST BEFORE APPROVAL IS RECEIVED ON THE SUBMITTAL QUALIFICATIONS.

	CATALOG CUT	WIRING DIAGRAM	QUALIFICATIONS
ANODE	X		
RECTIFIER/ CONTROLLER	X	X	
REFERENCE CELL	X		
HEAT SHRINK-ABLE TUBING	X		
CORROSION ENGINEER			X

Burgess & Niple, Limited
Engineers and Architects

13 / 15

CATHODIC PROTECTION NOTES

BRIDGE NO. LAK-44-0510
JACKSON STREET OVER S.R. 44

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
SJS	JLP		WAC	WAC 12/89	

BRUNING 44-23 7/86