

ELEVATION OF CAST IN PLACE BARRIER RAIL

EPOXY REINFORCING STEEL - TWO RAILS					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
6c1	Rail, Vertical		338	21.4	1185
6c2	Rail, Vertical		338	12.10	951
5d1	Rail, Longitudinal		48	36.5	1823
Total (lbs)					3959

CONCRETE PLACEMENT SUMMARY	
CONCRETE	TOTAL
422.5 @ 0.05 cu yds per lin ft	21.1

ESTIMATED QUANTITIES		
ITEM	UNITS	QUANTITY
Rail, Concrete Barrier (Cast in Place)	Lin. Ft.	4235

TOTAL ESTIMATED BRIDGE QUANTITIES			
ITEM NO.	ITEM	UNITS	QUANTITY
1	STRUCTURAL STEEL	Lbs.	562.5
2	RAIL, CONCRETE BARRIER (Cast in Place)	Lin. Ft.	4235

Estimate Reference Information

Item No. 2. Includes the cost of 1748 L.F. of #5 bars, 1408 L.F. of #6 bars of epoxy coated reinforcing steel and 21.1 cu yd. of Class D Structural Concrete

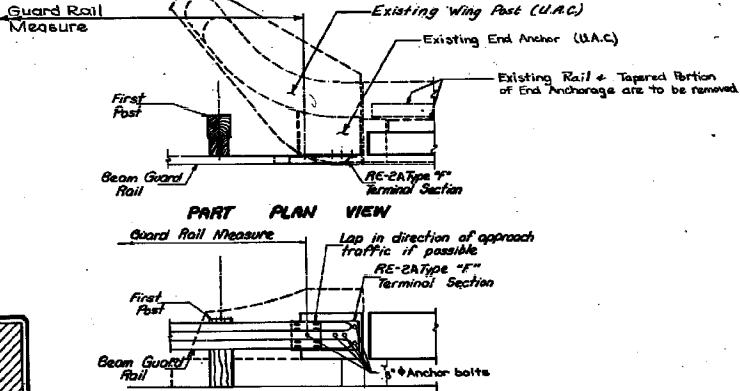
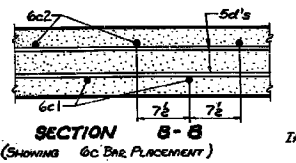
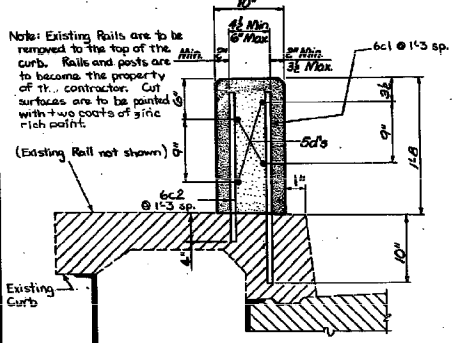
CAST IN PLACE BARRIER RAIL NOTES:
 Minimum clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted or shown.
 All exposed corners 90° or sharper are to be filleted with a 3/4" dressed and beveled strip.

The permissible construction joints are to be placed between vertical bars at a minimum spacing of 20 feet. Construction joint contact surfaces are to be coated with an approved bond breaker.
 Cast of joint sealer and bond breaker shall be considered incidental to other construction.
 The cast in place barrier rail is to be bid on a lineal foot basis measured from end to end of rail. The number of lineal feet of cast in place barrier rail installed will be paid for at the contract price per lineal foot based on plan quantities. Price bid for cast in place barrier rail shall be full compensation for furnishing all material, including reinforcing steel, and all of the equipment and labor required to erect the rail in accordance with these plans and current specifications.
 All cast in place barrier rail concrete is to be Class D.
 The joint sealer shall conform to Fed. Spec. TT-500230 or TT-500227 for type II, Class A or B.
 All reinforcing is to be epoxy coated. The epoxy coating shall be in accordance with Article 415.10B of the Standard Specifications.

The cost of removal of existing rail + tapered portion of existing guardrail and anchorage shall be included in price bid for "Cast in Place Barrier Rail".
DOWEL SETTING NOTE
 The 6c bars shall be set as dowels in drilled holes. Holes are to be drilled to the depth shown. The dowels shall be installed in accordance with the manufacturer's recommendations. One of the two following systems shall be used as a bonding agent for the dowels:
 A. EPOXY GROUT SYSTEM IN ACCORDANCE WITH STANDARD SPECIFICATIONS ARTICLE 2302.15.
 B. HYDRAULIC CEMENT GROUT SYSTEMS. DRILLED HOLES ARE TO BE 2 1/2 TIMES THE DOWEL DIAMETER AND ARE TO BE BLOWN CLEAN WITH COMPRESSED AIR IMMEDIATELY PRIOR TO PLACING GROUT. THE HYDRAULIC CEMENT GROUT SHALL BE ONE OF THOSE APPROVED IN MATERIALS I.M. 491.13 AND SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

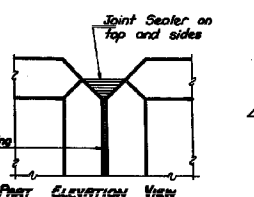
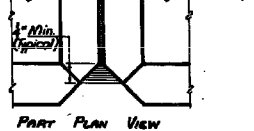
Bridge Maintenance No. E617.43068
 Design for Repairs to 0° Skew
 210'-0" x 26' CONTINUOUS I-BEAM BRIDGE
 640 End Spans 82'-0 Interior Span

CAST IN PLACE BARRIER RAIL DETAILS
 Station: 51+62.00 FEB. 1986
 DAVIS COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION
 Design Sheet No. 1 of 4 File No. 27274 Design No. 186



PART ELEVATION VIEW (Showing beam guard rail attachment to RE-2A Type 'F' Terminal Section U.A.C.)

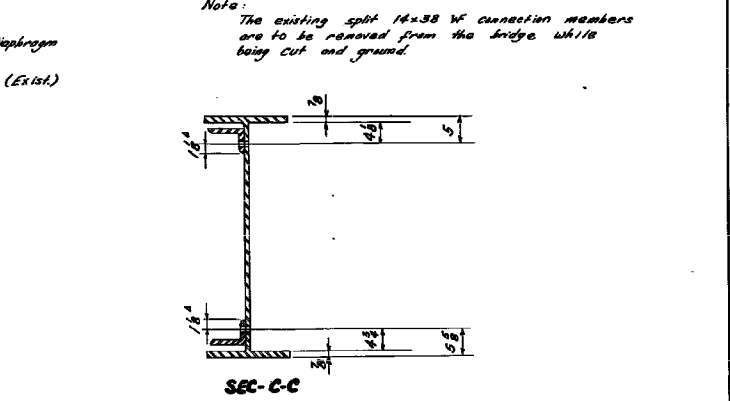
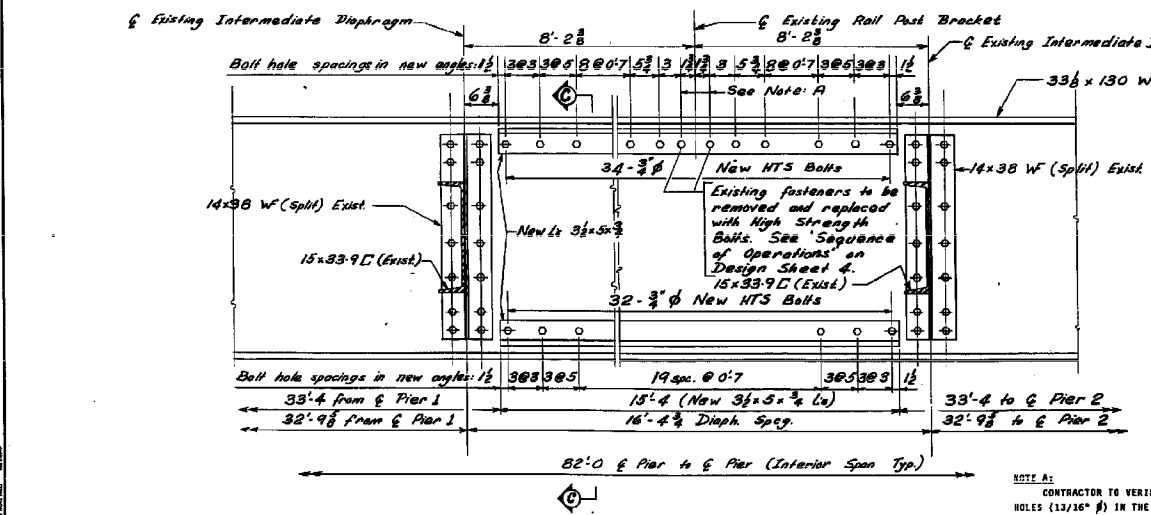
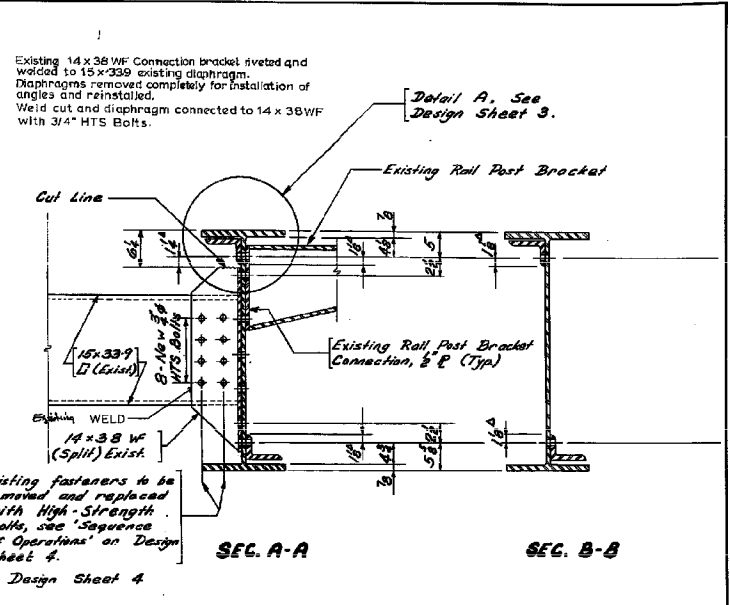
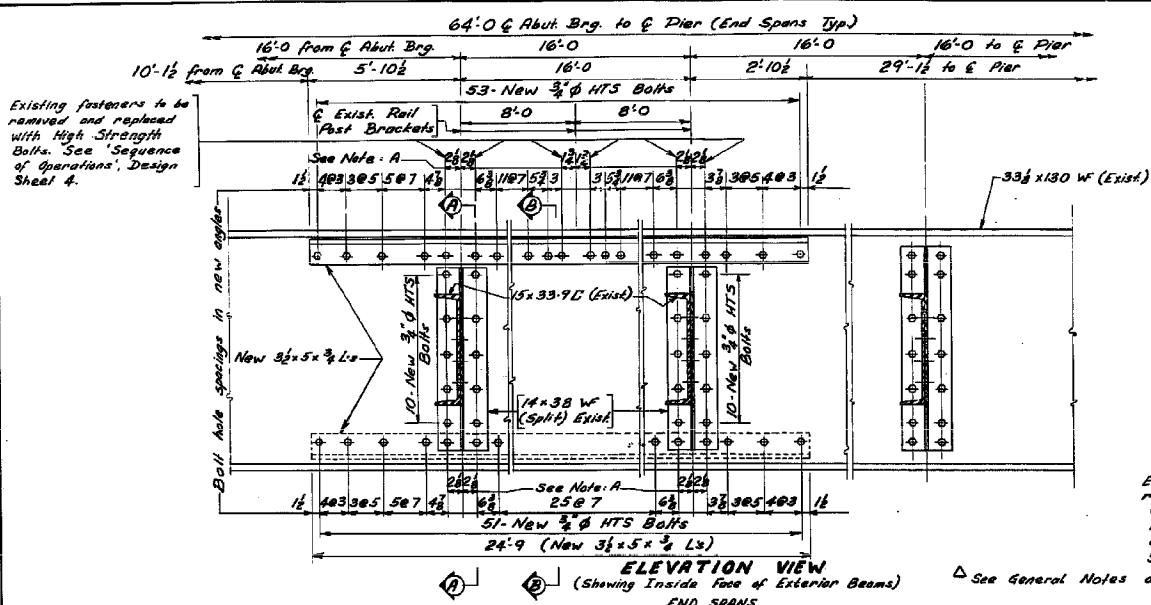
PART SECTION A-A



CAST IN PLACE BARRIER RAIL JOINT DETAILS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.
 DATE: 2-12-86
 Signature: Ray Phillips
 REG. NO. 438
 FILE NO. 74585

Revised 8-4-85: (Draw) Existing Notes checked. Deleted 8-2-85: Notes concerning steel inserts and anchor bolts changed. Revised 7-7-81: Group measurement changed. Revised 5-16-1980: This sheet corrected.

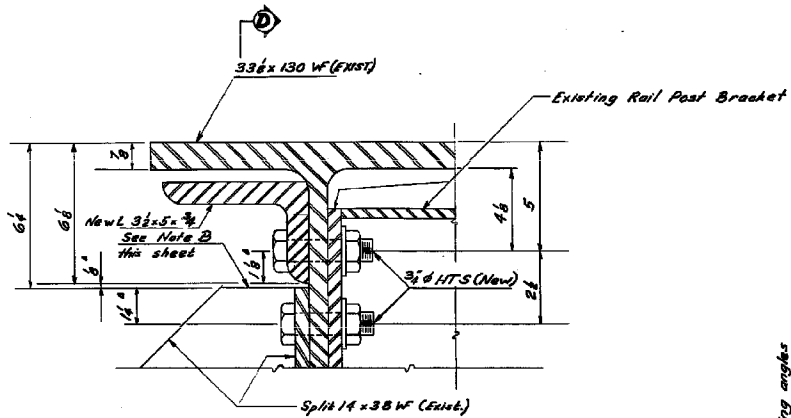


NOTE A:
CONTRACTOR TO VERIFY THESE DIMENSIONS AND THEN FIELD DRILL THESE BOLT HOLES (1 1/2" ϕ) IN THE 3 1/2" LEG OF THE 3 1/2" X 5 X 3/4" STRENGTHENING ANGLE AND MAINTAIN THE 1 1/8" EDGE DISTANCE SHOWN ON DESIGN SHEETS 2 & 3. THIS PROCEDURE WILL BE TYPICAL AT THE INTERMEDIATE DIAPHRAGM AND RAIL POSTS BRACKET LOCATIONS THAT REQUIRE NEW BOLTS. LOCATION OF ALL OTHER BOLT HOLES IN THE 3 1/2" X 5 X 3/4" STRENGTHENING ANGLES ARE AS SHOWN AND WILL BE SHOP DRILLED.

Details for Repair to O'Skew
210' x 26' CONT. I-BEAM BRIDGE
 64'-0" End Spans 82'-0" Interior Span
BEAM STRENGTHENING DETAILS
 STR: 51-62.0 FEBRUARY, 1986
MAINTENANCE NO: 2617-48 063
DAVIS COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION
 Design Sheet No.: 2 Of 4 File No.: 27224 Design No.: 186

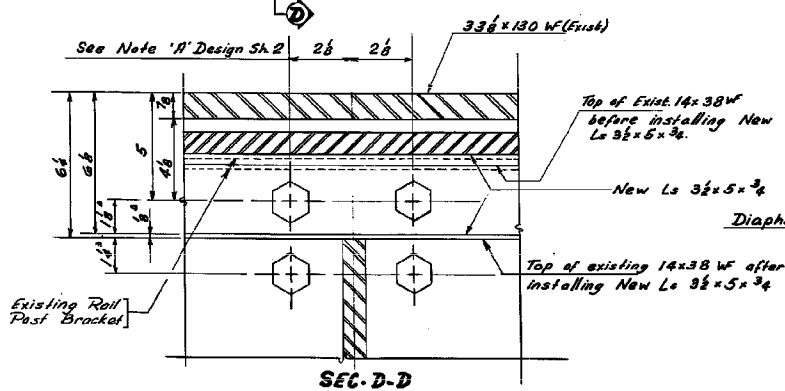
DESIGNED BY: **MADHUR BANMAN** CHECKED BY: **ALAN CRABBE**
 DRAWN BY: **MADHUR BANMAN** CHECKED BY: **ALAN CRABBE**

DAVIS COUNTY WAPELLA PROJECT NUMBER: **FN-63-1(32)-21-86** SHEET: **GB** TOTAL: **7**



See General Notes on Design Sheet 4.

DETAIL A

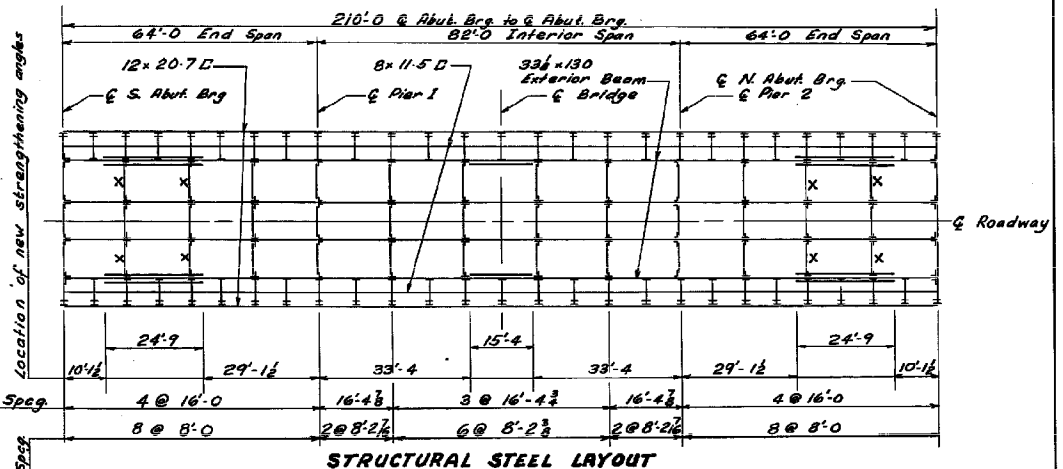


SEC. D-D

NOTE B:

FIELD CUT AND GRIND TO PROVIDE CLEARANCE FOR INSTALLATION OF NEW 3 1/2 X 5 X 3/4 STRENGTHENING ANGLES ALONG THE TOP FLANGE OF THE EXISTING 33 1/2 X 130 W EXTERIOR BEAMS. THE PROCEDURE FOR MODIFYING THE REQUIRED PORTION OF THE SPLIT 14 X 38 W WILL FOLLOW THE STEPS DETAILED IN THE "SEQUENCE OF OPERATIONS", STEPS 1 THROUGH 6. FINAL MODIFIED SURFACE WILL HAVE A SMOOTHNESS EQUIVALENT TO AHSI 125 OR SMOOTHER. CARE MUST BE TAKEN TO PREVENT ANY OVERCUTTING, BOWLING OR UNDERCUTTING. A TOTAL OF 8 SPLIT 14 X 38 W MEMBERS ARE TO BE REMOVED, CUT, GROUND AND REPLACED.

X: Locations of Intermediate Diaphragms to be modified, See 'Sequence of Operations' on Design sheet 4.



STRUCTURAL STEEL LAYOUT

Details for Repair to 0' Shew
210' x 26' CONT. I-BEAM BRIDGE
 64'-0" End Spans 82'-0" Interior Span
BEAM STRENGTHENING DETAILS
 STA. 51+62.0 FEBRUARY, 1986
MAINTENANCE NO.: 2617.43063
DAVIS COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION
 Design Sheet No.: 3 Of 4 File No.: 27274 Design No.: 186

DESIGNED BY: MOHAMED BAHMAN TRACED BY: _____
 CHECKED BY: LeAnn Draback

DAVIS COUNTY WAPELLO PROJECT NUMBER: _____
 STATE: IOWA COUNTY: WAPELLO SHEET NO.: 66 TOTAL SHEETS: 7
 FN-63-1(32)-21-2G

GENERAL NOTES

THE ORIGINAL DESIGN OF THIS 210'x26' CONTINUOUS I-BEAM BRIDGE IS DESIGN NO. 147, DAVIS COUNTY. SUBSEQUENT REPAIRS ARE DETAILED IN DESIGN NO. 182, DAVIS COUNTY. COPIES OF DESIGN NO. 147 AND 182 CAN BE OBTAINED FROM THE AMES OFFICE OF THE IOWA D.O.T. - HIGHWAY DIVISION. SHOP DRAWINGS ARE NOT AVAILABLE.

THE 3 1/2x5x3/4 STRENGTHENING ANGLES WILL BE BOLTED TO THE WEB OF THE EXISTING 33 1/8x130WF CONTINUOUS I-BEAM EXTERIOR BEAMS WITH 3/4" # A325 HIGH-STRENGTH BOLTS. ALL EXISTING FASTENERS (NUTS AND/OR BOLTS) REMOVED TO FACILITATE THE INSTALLATION OF THE STRENGTHENING ANGLES WILL BE REPLACED BY A325 HIGH-STRENGTH BOLTS.

THE AREAS OF THE 33 1/8x130WF EXTERIOR BEAM TO BE COVERED BY THE 3 1/2x5x3/4 STRENGTHENING ANGLES AND AT LEAST 3 INCHES (WHERE POSSIBLE) OUTSIDE THESE AREAS WILL BE BLAST-CLEANED IN ACCORDANCE WITH 2508.03 OF THE CURRENT STANDARD SPECIFICATIONS. THE PORTIONS OF THE BLAST CLEANED SURFACES WHICH WILL BE UNDER THE ANGLES AND AN ADDITIONAL 1 INCH OUTSIDE THESE AREAS WILL BE PAINTED WITH A PRIME COAT OF ZINC SILICATE PAINT IN ACCORDANCE WITH ARTICLES 2508.03 AND 2508.04. CARE MUST BE TAKEN TO INSURE THAT THE ZINC SILICATE PRIMER IS APPLIED ONLY TO BLAST-CLEANED SURFACES AND THAT NONE IS APPLIED OVER OLD PRIMER OR PAINT. THE 3 1/2x5x3/4 STRENGTHENING ANGLES WILL BE PRIME COATED IN ACCORDANCE TO 2508.05 AFTER THE SHOP DRILLED HOLES HAVE BEEN DRILLED. THE ZINC SILICATE PAINT WILL MEET WITH THE REQUIREMENTS OF ARTICLE 4182.02 FROM THE CURRENT SPECIFICATIONS.

AFTER THE INSTALLATION OF THE 3 1/2x5x3/4 STRENGTHENING ANGLE, THE ANGLE AND BLAST-CLEANED AREA AROUND IT WILL BE PAINTED ACCORDING TO SUPPLEMENTAL SPECIFICATION 994, WITH THE FOLLOWING EXCEPTIONS:

- A) HIGH PRESSURE WATER CLEANING IS NOT REQUIRED.
- B) ZINC SILICATE PRIMER APPLIED OVER OLD PRIMER OR PAINT WILL BE REMOVED.
- C) ALL COSTS ASSOCIATED WITH THIS PAINT WORK WILL BE INCLUDED IN THE BID ITEM "STRUCTURAL STEEL."

THE BID ITEM "STRUCTURAL STEEL" SHALL INCLUDE ALL COSTS, INCLUDING FIELD CUTTING AND FIELD DRILLING, ASSOCIATED WITH FURNISHING AND INSTALLING WEB STRENGTHENING ANGLES FOR EXTERIOR BEAMS AS SHOWN AND NOTED ON DESIGN SHEET 2 & 3.

CHARPY NOTCH TESTING IS NOT REQUIRED FOR THE NEW STRUCTURAL STEEL ITEMS REQUIRED ON THIS JOB.

ANY DAMAGE TO PORTIONS OF THE STRUCTURE AND ITS PAINT SYSTEM NOT SPECIFICALLY COVERED BY THE SCOPE OF THESE PLANS SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT HIS EXPENSE.

DIMENSIONS FOLLOWED BY THE SYMBOL "Q" AND THE BOLT HOLE LOCATIONS ON THE REV 3 1/2x5x3/4 ANGLES ARE SET AND FIXED DIMENSIONS. ALL OTHER DIMENSIONS SHOWN ON SHEETS 2 & 3 MUST BE FIELD VERIFIED BY CONTRACTOR BEFORE REPAIR WORK BEGINS.

TRAFFIC WILL BE RESTRICTED TO THE LANE FARTHEST AWAY FROM THE EXTERIOR BEAM BEING STRENGTHENED.

SPECIFICATIONS:

CONSTRUCTION: IOWA DEPARTMENT OF TRANSPORTATION SPECIFICATION, SERIES OF 1984, PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 1983.

STRUCTURAL STEEL IN ACCORDANCE WITH SECTION 10.1, ASTM A-36, FATIGUE STRESS CYCLES BASED ON CASE II.

SEQUENCE OF OPERATIONS

1. DETACH SPLIT 14x38WF CONNECTED TO THE 33 1/8x130WF EXTERIOR BEAM AND 15x33.9 C INTERMEDIATE DIAPHRAGM. MATCH MARK TOP AND BOTTOM OF SPLIT 14x38WF AND MARK CUT LINE BEFORE REMOVING FROM ASSEMBLY. CONTRACTOR MUST SUPPORT THE DISCONNECTED END OF THE INTERMEDIATE DIAPHRAGM BY MEANS THAT MEET WITH THE ENGINEER'S APPROVAL. COST OF SUPPORTING DISCONNECTED END IS TO BE CONSIDERED INCIDENTAL TO CONSTRUCTION.
2. FLAME CUT AND GRIND TOP OF SPLIT 14x38WF TO LIMITS SHOWN IN DETAIL "A" OF PLANS.
3. BLAST-CLEAN ALL CONTACT AREAS AND AN ADDITIONAL 3 INCHES (WHERE POSSIBLE) OUTSIDE THESE AREAS IN ACCORDANCE WITH 2508.03 OF THE CURRENT STANDARD SPECIFICATIONS. CONTACT AREA IS THAT PORTION OF THE 33 1/8x130WF WEB AND FLANGE OF THE SPLIT 14x38WF, WEB OF THE SPLIT 14x38WF AND WEB OF THE 15x33.9 C THAT WILL BE IN CONTACT WITH EACH OTHER AFTER THE STRUCTURAL PIECES ARE BOLTED TOGETHER.
4. APPLY ONE COAT OF ZINC SILICATE PAINT MEETING WITH THE REQUIREMENTS OF ARTICLES 2508.03, 2508.04 AND 4182.02 ON THE SURFACES BLAST-CLEANED IN STEP 3 AND EXPOSED IN STEP 2.
5. RE-CONNECT THE MODIFIED SPLIT 14x38WF, BY CORRECTLY ALIGNING TOP AND BOTTOM MATCH MARKS, TO THE 33 1/8x130WF AND 15x33.9 C INTERMEDIATE DIAPHRAGM USING NEW HIGH-STRENGTH BOLTS. DO NOT INSTALL THE BOTTOM ROW OF TWO BOLTS CONNECTING THE FLANGE OF THE MODIFIED SPLIT 14x38WF TO THE WEB OF THE 33 1/8x130WF EXTERIOR BEAM AT THIS TIME. THESE BOLTS WILL BE REINSTALLED AT THE TIME THE STRENGTHENING ANGLES ARE BEING ATTACHED TO THE WEB, STEP 9.
6. COMPLETE STEPS 1 THROUGH 5 FOR ALL INTERMEDIATE DIAPHRAGMS IDENTIFIED ON THE "STRUCTURAL STEEL LAYOUT" ON DESIGN SHEET 3 OF THESE PLANS. CONTRACTOR MUST NOT DISCONNECT ADJACENT INTERMEDIATE DIAPHRAGMS AT THE SAME TIME AND WILL LEAVE NO DIAPHRAGMS DISCONNECTED DURING NON-WORKING HOURS.
7. FIELD VERIFY DIMENSIONS AND FOLLOW DIRECTIONS AS DETAILED IN NOTE "A".
8. PREPARE AREA OF THE 33 1/8x130WF TO BE COVERED BY THE 3 1/2x5x3/4 STRENGTHENING ANGLES AS DETAILED IN THE GENERAL NOTES, PARAGRAPH 3.
9. BOLT THE 3 1/2x5x3/4 STRENGTHENING ANGLES TO THE END SPAN EXTERIOR BEAM WITH 3/4" # HTS BOLTS AT THE INTERMEDIATE DIAPHRAGMS AND RAIL POST BRACKETS. THE BOLTS WILL BE ONLY PARTIALLY TIGHTENED AT THIS TIME. ORIENTATION AND MOUNTING LOCATION OF THE STRENGTHENING ANGLES WILL BE AS SHOWN ON DESIGN SHEET 2.
10. ENSURING THAT THERE IS NO SAG IN THE 3 1/2x5x3/4 STRENGTHENING ANGLES FIELD DRILL 13/16" # HOLES IN THE WEB OF THE EXTERIOR BEAMS USING THE SHOP DRILLED HOLES IN THE ANGLES AS A TEMPLATE.
11. FILL NEW BOLT HOLES DRILLED IN STEP 10 WITH 3/4" # HTS BOLTS AND TORQUE ALL BOLTS CONNECTING 3 1/2x5x3/4 STRENGTHENING ANGLES TO THE WEB OF THE 33 1/8x130WF.
12. COMPLETE PAINTING AS DETAILED IN THE GENERAL NOTES FOR "AFTER INSTALLATION OF THE 3 1/2x5x3/4 STRENGTHENING ANGLES", PARAGRAPH 4. THE FINAL COAT SHALL MATCH THE COLOR OF THE EXISTING PAINT.
13. REPEAT STEPS 7 THROUGH 12 FOR BOTH TOP AND BOTTOM STRENGTHENING ANGLES FOR BOTH END SPANS OF THE SAME CONTINUOUS I-BEAM EXTERIOR BEAM.
14. SHIFT OPERATIONS TO INTERIOR SPAN. REPEAT STEP 8 FOR INTERIOR SPAN.
15. PLACE THE 3 1/2x5x3/4 STRENGTHENING ANGLE AGAINST THE WEB OF THE 33 1/8x130WF EXTERIOR BEAM MAINTAINING THE ANGLE ORIENTATION AND LOCATION AS SHOWN ON DESIGN SHEET 2.
16. REPEAT STEPS 10 THROUGH 12.
17. REPEAT STEPS 14 THROUGH 16 FOR BOTH TOP AND BOTTOM STRENGTHENING ANGLES.
18. REPEAT STEPS 7 THROUGH 17 FOR CONTINUOUS 33 1/8x130WF EXTERIOR BEAM ON OTHER SIDE OF BRIDGE.

CONTRACTOR CAN NOW PROCEED TO CONSTRUCT THE CAST IN PLACE CONCRETE BARRIER RAIL AS DETAILED ON DESIGN SHEET 3.

DESIGNED BY: MEMMUR RAUMAN CHECKED BY: LeRoy Oberger
 DRAWN BY: MEMMUR RAUMAN CHECKED BY: LeRoy Oberger

DAVIS COUNTY WAPELLO

PROJECT NUMBER

Details for Repair to O'Skew
 210x26' CONT. I-BEAM BRIDGE
 64'-0" End Spans 82'-0" Interior Span
BEAM STRENGTHENING DETAILS
 STR: 51+62.0 FEBRUARY, 1986
MAINTENANCE NO: 2617-4S 063
DAVIS COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION
 Design Sheet No. 4 Of 4 File No.: 2727E Design No.: 186

STAR	TURK	FEAR	SHEET	TOTAL
IOWA	2		67	7

FN-63-V121-21-26