

DESIGNER NOTE
 (REMOVE PRIOR TO PRINTING FINAL PLAN)
 FOR BRIDGES WITH SUPERELEVATION EXCEEDING 2%, SHOW DIMENSIONS FOR BOTH THE FRONT AND BACK FACE OF THE PARAPET. ALSO VERIFY THAT BAR R501E HAS 10" MIN. PROJECTION WHEN CROSS SLOPE VARIES FROM NORMAL 0.02 FT/FT

PARAPET/RAILING COMBINATION MEETS TL-4 REQUIREMENTS OF NCHRP REPORT 350 ON BRIDGE DECK AND TL-3 ON APPROACH PANEL

DESIGNER NOTE
 (REMOVE PRIOR TO PRINTING FINAL PLAN)
 MINIMUM BARRIER LENGTH ON APPROACH PANEL IS 13'-4" WITH MINIMUM OF 21 R502E & R503E DOWELS WITH ACCOMPANYING APPROPRIATE PARAPET VERTICAL BARS. VERIFY APPROACH PARAPET LENGTH WITH ROADWAY DESIGNER. REFER TO MEMO TO DESIGNERS #2020-01 FOR ADDITIONAL REQUIREMENTS REGARDING BARRIER PLACEMENT.

- NOTES:**
- F.F. DENOTES FRONT FACE
B.F. DENOTES BACK FACE
 - (A) SEE SHEET 2 OF 2 FOR DETAILS.
 - (B) PLACE BAR ON TOP OF BOTTOM REINFORCEMENT MAT IN DECK.
 - (C) STRUCTURAL TUBE RAIL CANTILEVER DIMENSIONS ARE BASED ON SUCCESSFUL CRASH TESTS AND SHOULD NOT BE MODIFIED.
 - (D) DIMENSIONS TO BE DETERMINED BASED ON THE BRIDGE DECK SLOPE.

REVISED:
 APPROVED: APRIL 09, 2020
 Kevin Westrom
 STATE BRIDGE ENGINEER

CERTIFIED BY _____ DATE _____
 LICENSED PROFESSIONAL ENGINEER
 NAME: _____ LIC. NO. _____

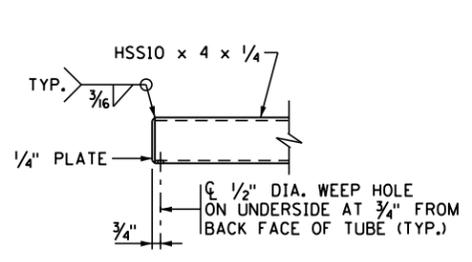
TITLE: STRUCTURAL TUBE RAILING (DESIGN T-1) AND CONCRETE PARAPET (TYPE P-2, TL-4)
 INTEGRAL OR SEMI-INTEGRAL ABUTMENT WITH BRIDGE SLAB SIDEWALK AND GUARDRAIL CONNECTION (WITH 2" CONCRETE WEARING COURSE)

DES: _____ DR: _____
 CHK: _____ CHK: _____
 SHEET NO. OF SHEETS

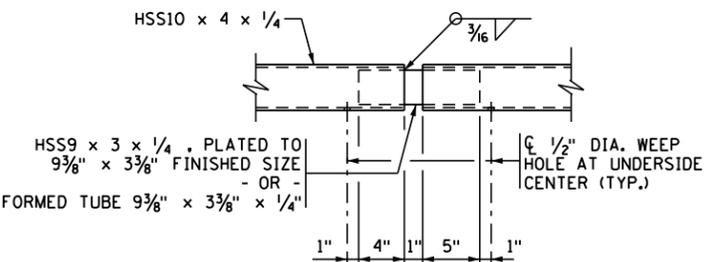
APPROVED: _____
 BRIDGE NO. _____

FIG. 5-397.157(D) (1 OF 2)

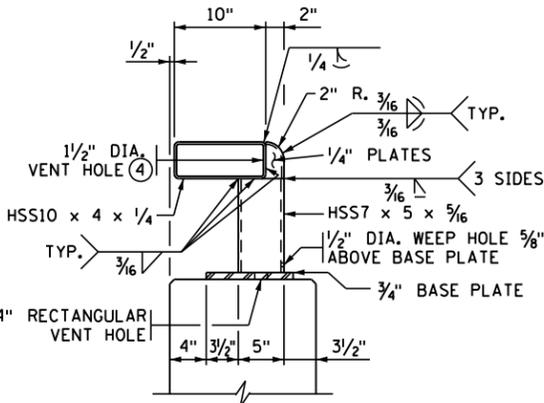
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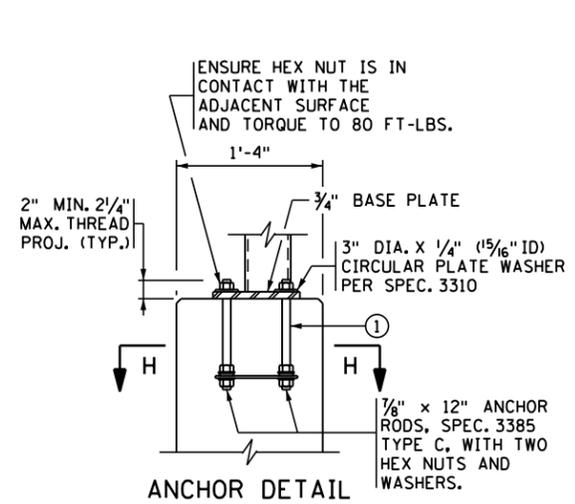
RAIL END DETAIL



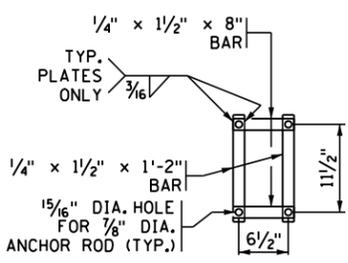
RAIL SLEEVE DETAIL



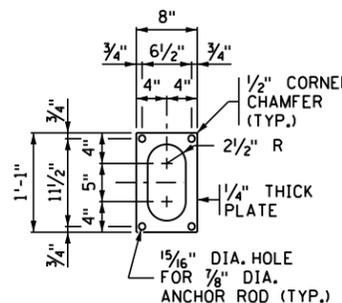
STRUCTURAL TUBE RAIL DETAIL



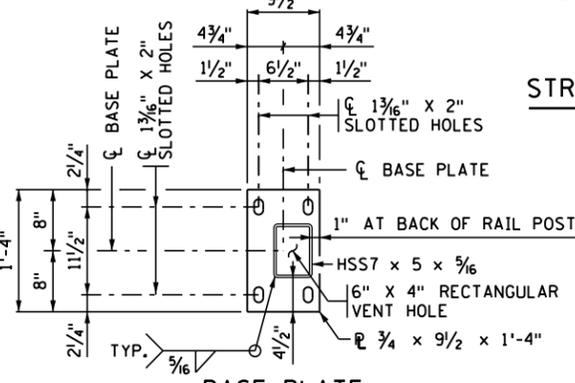
ANCHOR DETAIL



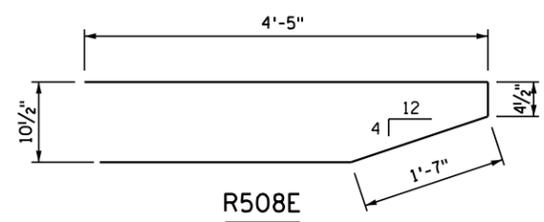
SECTION H-H
(ANCHOR BAR ALTERNATE)



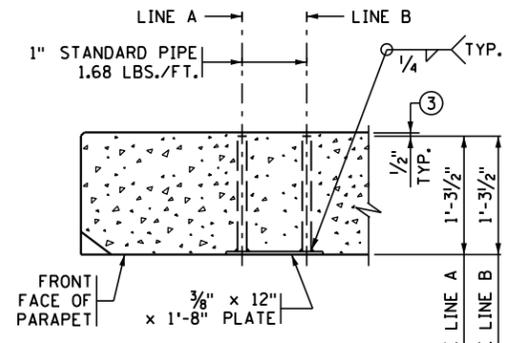
SECTION H-H
(ANCHOR PLATE ALTERNATE)



BASE PLATE

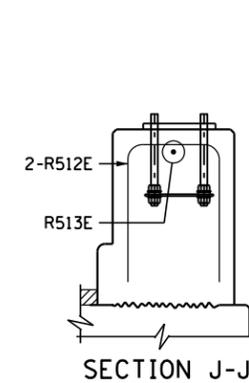


R508E

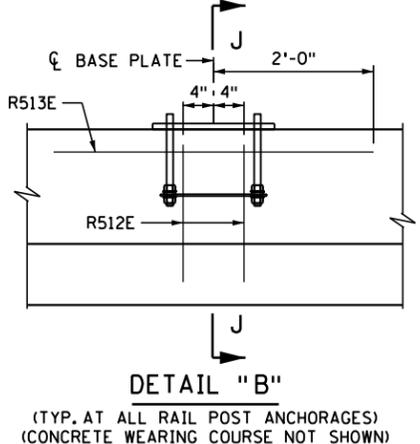


SECTION C-C

(REINFORCEMENT NOT SHOWN)
TRIM GUARDRAIL BOLTS SUCH THAT NO MORE THAN 1/2" PROTRUDES FROM BACK FACE OF PARAPET.
☆ DIMENSIONS INCLUDE 3/8" PLATE

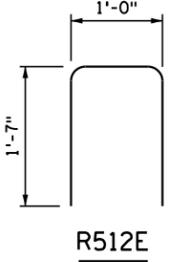


SECTION J-J

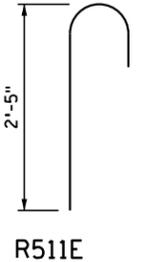


DETAIL "B"

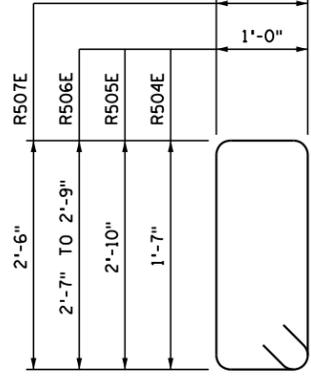
(TYP. AT ALL RAIL POST ANCHORAGES)
(CONCRETE WEARING COURSE NOT SHOWN)



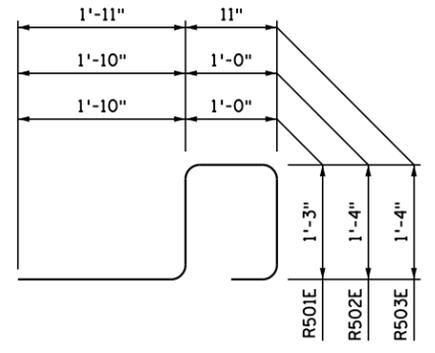
R512E



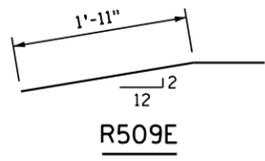
R511E



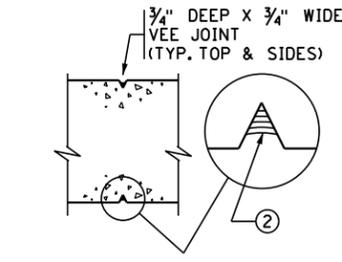
R504E, R505E,
R506E, R507E



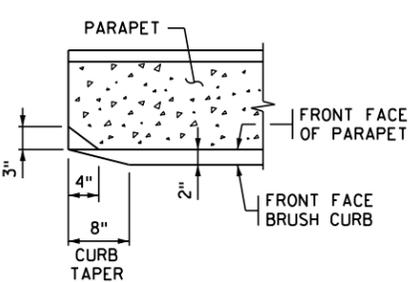
R501E, R502E, R503E



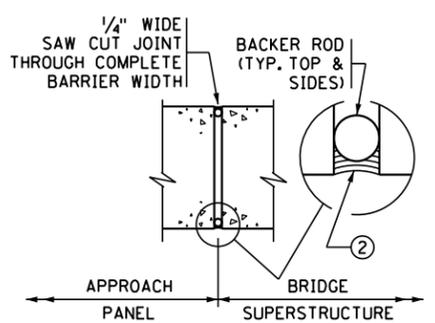
R509E



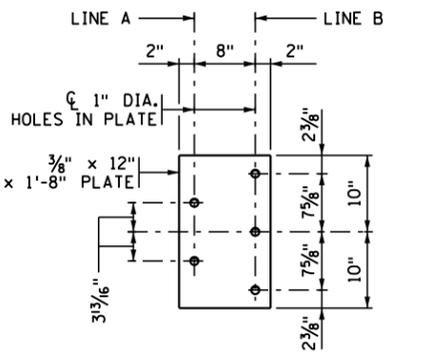
SECTION D-D
CONTROL JOINT DETAIL



SECTION F-F



SECTION G-G



GUARDRAIL CONNECTION DETAIL
GALVANIZE AFTER FABRICATION PER SPEC. 3394
ESTIMATED WEIGHT = 37 LBS.

BILL OF REINFORCEMENT FOR PARAPET

| BAR | NO. | LENGTH | SHAPE | LOCATION |
|-------|-----------|----------------|-------|------------------------|
| R501E | | 5'-10" | | PARAPET DOWEL |
| R502E | | 6'-0" | | PARAPET DOWEL |
| R503E | | 6'-0" | | PARAPET DOWEL |
| R504E | | 6'-1" | | PARAPET VERTICAL |
| R505E | | 8'-7" | | PARAPET VERTICAL |
| R506E | SER. OF 3 | 8'-1" TO 8'-5" | | PARAPET VERTICAL |
| R507E | | 7'-9" | | PARAPET VERTICAL |
| R508E | | 9'-1" | | PARAPET LONGITUDINAL |
| R509E | | 2'-8" | | PARAPET LONG. IN TAPER |
| R510E | | 2'-5" | | PARAPET VERTICAL B.F. |
| R511E | | 3'-0" | | PARAPET VERTICAL F.F. |
| R512E | | 4'-2" | | VERTICAL @ BASE PLATE |
| R513E | | 4'-0" | | LONGIT. @ BASE PLATE |
| R5_E | | | | PARAPET LONGITUDINAL |
| R5_E | | | | PARAPET LONGITUDINAL |
| R5_E | | | | PARAPET LONGITUDINAL |
| R5_E | | | | PARAPET LONGITUDINAL |

GENERAL NOTES

- MEASURE PAYMENT LENGTH OF "TYPE P-2 (TL-4) BARRIER CONCRETE (3S52)" BETWEEN THE OUTSIDE ENDS OF THE PARAPET. CONCRETE PARAPET = 395 LBS./FT. (0.098 CU. YDS./FT.)
- MEASURE PAYMENT LENGTH OF "STRUCTURAL TUBE RAILING DESIGN T-1" FROM END TO END OF TUBING. DO NOT DEDUCT FOR JOINTS.
- FINISH ALL EDGES OF PARAPET WITH 1/2" CHAMFER, EXCEPT WHERE OTHERWISE NOTED.
- SPACE CONTROL JOINTS AT 10 FT. MAXIMUM. REFER TO SUPERSTRUCTURE SHEET FOR SPECIFIC SPACING INFORMATION.
- PROVIDE CORRECT ALIGNMENT FOR ANCHORAGES BY PLACING THEM ACCURATELY AND NORMAL TO GRADE. SEE SPECIAL PROVISIONS.
- INSTALL RAIL POSTS NORMAL TO GRADE.
- PROVIDE STRUCTURAL STEEL AND PLATE WASHERS IN ACCORDANCE WITH SPEC. 3310. PROVIDE STRUCTURAL TUBES PER ASTM A500, GRADE B AS IN ACCORDANCE WITH SPEC. 3361.
- GALVANIZE BOLTS, NUTS, AND WASHERS IN ACCORDANCE WITH SPEC. 3392.
- GALVANIZE ALL OTHER STRUCTURAL STEEL IN ACCORDANCE WITH SPEC. 3394, AFTER FABRICATION.
- GUARDRAIL CONNECTION TO BE STRUCTURAL STEEL IN ACCORDANCE WITH SPEC. 3306.
- GUARDRAIL CONNECTION AND NAMEPLATE TO BE CONSIDERED INCIDENTAL.
- PRICE BID FOR "STRUCTURAL TUBE RAILING DESIGN T-1" INCLUDES ANCHORAGES AND ALL MATERIAL ABOVE TOP OF CONCRETE PARAPET.
- ALL MATERIAL IN THE CONCRETE PARAPET IS LISTED IN SUMMARY OF QUANTITIES FOR SUPERSTRUCTURE.
- SEE SPECIAL PROVISIONS FOR COATING TO BE APPLIED TO METAL RAILING.
- CONTINUOUSLY GROUND ALL METAL RAILINGS. SEE THE SPECIAL PROVISIONS. REFER TO THE ELECTRICAL PLANS AND ELECTRICAL SPECIAL PROVISIONS FOR DETAILS REGARDING BONDING MULTIPLE ELECTRICAL GROUNDING SYSTEMS.

- ① SUBSTITUTION OF ADHESIVE ANCHORAGE FOR CAST-IN-PLACE ANCHORAGE IS NOT PERMITTED.
- ② JOINT SEALANT PER MnDOT APPROVED/QUALIFIED PRODUCTS LIST - CRACK AND JOINT MATERIALS - SILICONE JOINT SEALERS.
- ③ REMOVE CONCRETE FROM PIPE ENDS AFTER FORM REMOVAL.
- ④ CENTER HOLE 1/4" FROM TOP OF TUBE.

REVISED:
APPROVED: APRIL 09, 2020
Kevin Westrom
STATE BRIDGE ENGINEER

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