STATE OF RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

BRIDGE DESIGN
STANDARD DETAILS

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14.30 ABUTMENTS, PIERS AND WALLS ON Fill

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

APPROVED
Chief, Bridge Design

APPROVED
Superintendent, Bridge Design

APPROVED
Chief Engineer

CHIEF ENGINEER

DATE

DATE

DATE
### LIST OF ABBREVIATIONS

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### SECTION & DETAIL DESIGNATIONS

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### Detail Mark

- **SECTION LETTER ON SHEET**: X
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- **SHEET ON WHICH SECTION IS DRAWN**: X
- **DETAIL NUMBER ON SHEET**: X
- **DETAIL MARK**: X
- **SHEET ON WHICH DETAIL IS DRAWN**: X
- **SECTION TITLE**: A
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### Section & Detail

- **REVISIONS**
- **EASTERN RHODE ISLAND DEPARTMENT OF TRANSPORTATION**
- **BRIDGE STANDARDS**
- **DRAWING NUMBER**: A1
CONCRETE STRENGTHS:

- **CLASS HP, 8'0" C/4-100 PSI**
  - "DESIGNER TO INDICATE ALL COMPONENTS WITH ABOVE CLASS OF CONCRETE."

- **CLASS XX, 7'2' C/4-60 PSI**
  - "DESIGNER TO INDICATE ALL COMPONENTS WITH ABOVE CLASS OF CONCRETE."

- **CLASS 6, 5'0" C/4-35 PSI**
  - "DESIGNER TO INDICATE ALL COMPONENTS WITH ABOVE CLASS OF CONCRETE."

- **CLASS C, 4'6" C/4-20 PSI**
  - "DESIGNER TO INDICATE ALL COMPONENTS WITH ABOVE CLASS OF CONCRETE."

- **DESIGNER - THE STRENGTHS SHOWN ABOVE ARE THE MINIMUMS FROM THE IR STANDARD SPECIFICATIONS. HARDEN CONCRETE STRENGTH MAY BE SPECIFIED AS PER THE DESIGNER'S REQUEST, AS PER THE DESIGNER'S REQUEST.""

CONCRETE NOTES:

1. **ALL FENSE AND FALLS OF THE DEEP FOUNDATIONS TIES SPECIFIED IN THIS CONTRACT WILL BE IN ACCORDANCE WITH THE DESIGNER'S SPECIFICATIONS.**

2. **DESIGNER TO INCLUDE A NOTE REGARDING THE DISCLOSURE AND AVAILABILITY OF PROJECT GECORTECHNOLOGY INFORMATION DATA AND REPORTS IN ACCORDANCE WITH THE IR CIVIL BRIDGE DESIGN MANUAL (SECTION 6-9).**


7. **UNLESS OTHERWISE INDICATED ON THE PLANS, ALL MAIN REINFORCING BARS SHALL HAVE THE FOLLOWING MINIMUM COVER:**

   - **CONCRETE CAST AGAINST OR PERMANENTLY EXPOSED TO EA-EARTH-EARTH, ABANDON THE FOLLOWING MINIMUM COVER:**
     - **DECK SLABS (WITH WEARING SURFACE)**
       - **TOP** 2" (1/4'" - 0"
       - **BOTTOM** 1" (1/8'" - 0"
     - **DECK SLABS (EXPOSED DECKS)**
       - **TOP** 3" (1/4'" - 0"
       - **BOTTOM** 2" (1/8'" - 0"

   - **DECK OVERLAYS FOR PRESTRESSED BUTTED BOX BEAMS & VIBRATED SLABS**
     - **TOP** 2.5" (1/4'" - 0"
     - **BOTTOM** 1.5" (1/8'" - 0"

   - **ALL OTHER BARS**
     - **2"**

   - **COVER TO TIES AND STIRRUPS MAY BE 0.25 INCH LESS THAN THE ABOVE VALUES SPECIFIED FOR MAIN REINFORCING, BUT IN NO CASE LESS THAN 0.1 INCHES.**

8. **ALL ANCHOR BOLTS SHALL BE ASTM DESIGNATION A377 AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM DESIGNATION M-250 ON METAL, ACCORDING TO SECTION 50-10 OF THE IR STANDARD SPECIFICATIONS.**

9. **ALL ANCHOR BOLTS SHALL BE SET PRIOR TO PLACEMENT OF CONCRETE UNLESS OTHERWISE AUTHORIZED BY THE ENGINEER.**

10. **HORIZONTAL CONSTRUCTION JOINTS OTHER THAN THOSE SHOWN ON THE PLANS WILL NOT BE PERMITTED WITHOUT A WRITTEN REQUEST BY THE CONTRACTOR AND PRIOR AUTHORIZATION BY THE ENGINEER.**

11. **UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CONCRETE SURFACES VISIBLE IN ELEVATION TO ONE FOOT BELOW FINAL GRADE LIMIT UNLESS THE UNDERSIDE OF ALL CONCRETE DECK SLABS OUTSIDE OF THE FACE BEAMS, SHALL RECEIVE A CONCRETE SURFACE-PROTECTIVE FINISH IN ACCORDANCE WITH THE IR STANDARD SPECIFICATIONS (SECTION 6-9).**

12. **THE ENTIRE TOPSIDE SURFACES OF ABUTMENT AND PIER CAP BEAM SEATS, AS WELL AS VERTICAL FACES OF BLOCKINGS, AND PARAMETER EMBLEMS SHALL BE COVERED WITH A FACETING SEALER (H-20-30) CONCRETE SURFACE TREATMENT PROTECTIVE COATING IN ACCORDANCE WITH SECTION 6-9 OF THE IR STANDARD SPECIFICATIONS.**

13. **ALL EXPOSED EDGES AND REINFORING CORNERS NOT OTHERWISE DETAILLED ON THE PLANS SHALL HAVE A MINIMUM 1/8" CHAMFER.**


15. **THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING CONCRETE STAINS OR DECORATIONS DURING CONSTRUCTION UNTIL SUCH TIME WHEN THE SURFACES ARE APPROVED AND ACCEPTED. ANY CONCRETE STAINS OR DECORATIONS OCCURRING PRIOR TO ACCEPTANCE OF THE SURFACES SHALL BE REMOVED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE STATE.**

16. **UNLESS OTHERWISE NOTED ON THE PLANS, JOINT FILLER IS TO BE A PRE-FORMED, NON-HARDENING, NON-EXPANDING TYPE IN ACCORDANCE WITH SECTION 6-10.1 OF THE IR STANDARD SPECIFICATIONS.**

17. **PLACEMENT, FINISHING AND CURING OF BRIDGE DECK CONCRETE SHALL BE IN ACCORDANCE WITH SECTION 6-10 OF THE IR STANDARD SPECIFICATIONS AND IN ACCORDANCE WITH THE SPECIFICATIONS AND DIRECTIONS OF THIS SPECIFICATION.**

18. **EMBOLISM LIMITS FOR SKILLED AND EQUIPMENT OPERATORS SHOULD BE IN ACCORDANCE WITH SECTION 6-19 OF THE IR STANDARD SPECIFICATIONS.**

20. **IN ACCORDANCE WITH THE IR STANDARD SPECIFICATIONS, ALL METAL TIES, NON METALLIC TIES OR NIPPLES WHICH ARE PROPERLY HOOKED FOR CONCRETE FORMWORK SHALT BE SO PLACED AS TO ENSURE A MINIMUM OF 1 INCH CLEAR SPACE FROM THE SURFACE OF THE CONCRETE WITHOUT CAUSING DAMAGE TO THE CONCRETE SURFACE.**

21. **WATER STOPS ARE REQUIRED FOR HORIZONTAL AND VERTICAL CONSTRUCTION JOINTS IN ABUTMENTS AND WALLS WHEN EXPOSED TO BACKFILL, EARTH-MATTERS, WATER STOPS SHALL BE INSTALLED AT THE LOCATIONS DETAIL ON THE PLANS, AT THE LOCATIONS AS SPECIFIED ABOVE AND AT ALL LOCATIONS AS DIRECTED BY THE ENGINEER. ALL IN ACCORDANCE WITH SECTION 412 OF THE IR STANDARD SPECIFICATIONS."
Sectional Steel Notes:
1. Panel dimensions are given in Allan columns, with bracing and a column of unbraced sections in parentheses. The fabricator is responsible for incorporating the column, column cross-section, slenderness ratio, and other effects that may impact the overall girder lengths, dimensions, and other design details.
2. Site details for structural steel columns are to be provided in a separate document for the floor frame and columns. All dimensions are to be taken from the finished floor level. Site details for bridges shall be provided in a separate document for the bridge frame and columns. All dimensions are to be taken from the finished bridge level. Site details for other structures shall be provided in a separate document for the structure frame and columns. All dimensions are to be taken from the finished structure level.
3. Site details for expansion joints shall be provided in a separate document for the expansion joint system. All dimensions are to be taken from the finished expansion joint level.
4. Site details for shear walls shall be provided in a separate document for the shear wall system. All dimensions are to be taken from the finished shear wall level.
5. Site details for the fire protection system shall be provided in a separate document for the fire protection system. All dimensions are to be taken from the finished fire protection system level.

Example:

14. Welding of all welds in accordance with AWS D1.1. All welds shall be inspected in accordance with AWS D1.1. All welds shall be inspected in accordance with AWS D1.1. All welds shall be inspected in accordance with AWS D1.1. All welds shall be inspected in accordance with AWS D1.1.

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14. THE EXTERIOR FACE OF FLEXIBLE BEAMS SHALL RECEIVE A SELECTED FORNIX OR RUBBED FINISH (OR FIELD OR IN THE PLANT) IN ACCORDANCE WITH THE STANDARDS SPECIFICATIONS. THE COST SHALL BE INCLUDED IN THE UNIT PRICE $9.00 FOR THE PRESTRESSED CONCRETE MEMBERS.

15. THE TOP SURFACES OF THE PRESTRESSED SLABS, BOX BEAMS, & GIRDERS SHALL HAVE EITHER A SMOOTH OR A RUBBED FINISH (1/4" AMPLITUDE) AS INDICATED ON THE PLANS.

16. ALL DEFORMATION BARS SHALL BE PLACED IN THE WORK IN SUCH A FASHION TO PERMIT EASY CHECKING.

17. ALL GALVANIZED PRESTRESSING STEEL AND GALVANIZED REINFORCING BARS SHALL BE SECURELY TIED TO PREVENT DELICATION. THIS USE FOR THE GALVANIZED REINFORCING STEEL SHALL BE SHOWN ON THE SHOP DRAWINGS. PRECAST UNITS SHALL NOT BE FIXED OR DRILLED INTO OR ATTACHED TO THE STRUCTURE. ALL HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASHRAE M-236.

18. THE DETAILS OF ALL ANCHOR, ANCHOR, and ANY OTHER ITEMS REQUIRED TO BE CAST INTO THE PRECAST PRESTRESSED UNITS (WHETHER DETAIL ON THE CONTRACT DOCUMENTS OR PROVIDED FOR THE CONTRACTOR'S CONVENIENCE OR) SHALL BE SHOWN ON THE SHOP DRAWINGS. PRECAST UNITS SHALL NOT BE FIXED OR DRILLED INTO OR ATTACHED TO THE STRUCTURE. ALL HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASHRAE M-236.

19. THE NON-DRAWN GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 15,000 PSI AFTER 28 DAYS AS DETERMINED BY TESTING UNDER ASTMD 596 X 100 AND SHALL NOT EXHIBIT ANY MEASURABLE DECREASE IN VOLUME AFTER CURING. THE CONTRACTOR SHALL FOLLOW THE MANUFACTURER'S RECOMMENDATIONS. DRILLING OR CORE DRILLING FOR THE DETAILS SHOWN IN THE SHOP DRAWINGS, THE GROUT SHALL BE ON THE HOOK-APPROVED MATERIAL LIST.

20. THE ENDS OF BEAMS SHALL BE VERTICAL. AFTER ALL DEAD LOADS HAVE BEEN PLACED.

21. HARDHEADED VIBRATORS SHALL BE EQUIPPED WITH RUBBER-TIPPED HEADS.

22. FOR SIZE AND LOCATION OF MINOR SLITS, SEE PIER ELEVATION, AND DEFORMATION BARS.

23. NO TRAFFIC OR HEAVY EQUIPMENT SHALL BE PLACED ON THE BRIDGE UNTIL THE POST TENSIONING OPERATION HAS BEEN COMPLETED AND THE GROUT HAS ATTAINED THE 28 DAY COMPRESSION STRENGTH.

GENERAL NOTES REGARDING TEMPORARY CONSTRUCTION CONDITIONS:

1. DESIGN WIND PRESSURES FOR CONSTRUCTION

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<td>OVER 10 AND UP TO 32</td>
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<td>OVER 127 AND UP TO 189</td>
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TABLE NOTES:

A. APPROPRIATION OF THE TABULAR PRESSURE

- WIND COMPONENTS (DURING CONSTRUCTION) PRIOR TO THE INSTALLATION OF THE PERMANENT BRIEFCASE SYSTEMS, NOT INCLUDING CRANE LIFTING.
- FALSE WORK, SHOULDERING, AND SCAFFOLDING AS DEFINED IN "GUIDE DESIGN SPECIFICATION FOR PRECAST BRIEFCASE WORK" EXCLUDING 3-DIMENSIONAL, LATTICED OR TRUSSED FRAMES (IN TOWERS).

WIND PRESSURES FOR ALL OTHER STRUCTURES SHALL BE CALCULATED BASED ON ASCE DESIGN LOADS ON STRUCTURES DURING CONSTRUCTION. (BASED ON ALL REFERENCE TO THE CODE IN THE SECOND 28 PSF PUBLICATION. SHALL BE THE LATEST REVISION TO THE ASCE 7. THE EXISTING CATEGORY SHALL BE __ AS DESIGNED AND SHOWN ON THE CONTRACT DOCUMENTS)

B. WHERE APPLICABLE, HIGHER ANNUAL WIND REQUIREMENTS SHALL SUPERSIDE THESE REQUIREMENTS.

2. ELECTION OF BRIEFCASE COMPONENTS

FOR THE ELECTION OF THE STRUCTURES, THE FOLLOWING SHALL APPLY:

- THE CONTRACTOR SHALL SUBMIT AN ELECTION PLAN THAT PROVIDES COMPLETE DETAILS OF THE PROJECT INCLUDING, BUT NOT LIMITED TO, TEMPORARY SUPPORTS, SCAFFOLDS, AND OPERATING PROCEDURES, CRANE PLACEMENT, AND ASSUMED LOADS AND CALCULATED WINDS DURING VARYING STAGES OF LIFTING. THIS APPLIES TO STRUCTURES OF ANY KIND OR SHAPE OR SIZE. WIND-LOAD FACTORS OF 1.50 SHAKE II ARE ADEQUATE FOR 125 PERCENT OVER EXCEEDING THE TOTAL PSF LOAD INCLUDING SPREADING, RIDGES, WINDS, AND ALL OTHER MATERIALS. THIS FACTOR OF SAFETY MUST BE IN ADDITION TO ALL MANUFACTURERS' PUBLISHED FACTORS OF SAFETY.

- A REGISTERED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF RHODE ISLAND WILL BE REQUIRED TO STAMP THE CONTRACTOR'S ELECTION PLAN.

- THE CONTRACTOR'S PROFESSIONAL ENGINEER WILL BE REQUIRED TO INSPECT AND PROVIDE WRITTEN APPROVAL OF INSTALLATION PRIOR TO ALLOWING VEHICLES ON PIKEWALLS OR BEYOND THE STRUCTURE. THE PROFESSIONAL ENGINEER MUST ALSO SUBMIT CHANGES TO THE CONTRACTOR'S ELECTION PLAN. ADDITIONALLY, ALL PROPOSED CHANGES MUST BE SUBMITTED TO REC FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTATION.


- THE CONTRACTOR WILL BE REQUIRED TO PERFORM DAILY INSPECTIONS OF THE ERECTED COMPONENTS, PRIOR TO THE BRIDGE GIRDERS. COMPLETELY UNEFFECTED.

1. Refer to the Rhode Island DOT Bridge Design Manual for the Foundation Pile Design Requirements.

2. The selection of the appropriate pile type(s), including any type not detailed herein, shall be based on the findings and recommendations of the geotechnical consultant's report (GCR).

3. The estimated pile take-up elevation shall be provided for each structure unit.

4. The applicable notes shown below shall be furnished on the contract drawings.

5. The pile reinforcing details shown are minimum requirements. The engineer shall specify the reinforcement to meet the site specific design requirements.

Notes:
1. For the requirements pertaining to the furnishing and driving of the pile, load test and the foundation piles, refer to the Rhode Island Standards Specifications.

2. Foundation piles shall be driven to a sufficient depth and resistance to adequately develop their specified allowable bearing capacity. The engineer shall be the sole judge based on soil data and the results of the field investigation as to the required driving resistance to develop the load capacity.

3. The contractor shall submit to the engineer, information on the type of equipment proposed to be used in the driving of the piles, the following sequence of operations, and details of all pile driving equipment and accessories for each pile type specified, all in accordance with Section 9.4a of the R.I. Standard Specifications.

4. All welding shall be in accordance with the latest American Welding Code American Standard AWS D1.5.
**DESIGNER NOTES:**

1. PROVIDE TRANSVERSE (CONFINEMENT) STEEL IN ACCORDANCE WITH ACI 318-11 AND OTHER LOADING CONDITIONS. TRANSVERSE (CONFINEMENT) STEEL SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE GREATER OF:
   - MAXIMUM CROSS-SECTIONAL COLUMN DIMENSION
   - 1.5 TIMES THE CLEAR HEIGHT OF COUMN
   - 16 INCHES
   MAXIMUM TIES OR SPIRALS SPACING SHALL BE 6 INCHES.

2. EXTEND TRANSVERSE (CONFINEMENT) STEEL FOR A LENGTH EQUAL TO ONE-HALF THE MAXIMUM CROSS-SECTIONAL COLUMN DIMENSION BUT NOT LESS THAN 1.5 INCHES. MINIMUM TIES OR SPIRALS SPACING SHALL BE 6 INCHES.

3. PROVIDE TRANSVERSE (CONFINEMENT) STEEL IN ACCORDANCE WITH ACI/ASHTO SEismic AND OTHER LOADING REQUIREMENTS.

4. SPACING OF TRANSVERSE (CONFINEMENT) STEEL OVER THE LENGTH OF THE SPHERE SHALL NOT EXCEED ONE-QUARTER OF THE MINIMUM CROSS-SECTIONAL COLUMN DIMENSION OR 4 INCHES.

5. DESIGNER SHALL REFER TO THE HIGHWAY BRIDGE DESIGN MANUAL (SECTION 2.3.2) FOR CRASH PROTECTION WALL REQUIREMENTS ADJACENT TO AND IN CLOSE PROXIMITY OF RAILROAD TRACKS.

6. LAP SPACES IN LONGITUDINAL REINFORCEMENT IN POTENTIAL PLASTIC HINGE REGIONS ARE NOT PERMITTED. FULL MECHANICAL CONNECTION SPACES IN ACCORDANCE WITH ACI/ASHTO HIGHWAY BRIDGE DESIGN SPECIFICATIONS MAY BE USED. MECHANICAL SPLICES IN ADJACENT SPANNERS ARE PERMITTED. TRANSVERSE SPACING SHALL BE IN ACCORDANCE WITH NOTE 4.

7. LAP SPACES IN TRANSVERSE REINFORCEMENT IN POTENTIAL PLASTIC HINGE REGIONS ARE NOT PERMITTED. FULL MECHANICAL CONNECTION SPACES IN ACCORDANCE WITH ACI/ASHTO HIGHWAY BRIDGE DESIGN SPECIFICATIONS MAY BE USED.

8. DESIGNER SHALL ADD A NOTE TO THE PLANS SPECIFYING THE REQUIREMENTS INDICATED IN THE ACI/ASHTO HIGHWAY BRIDGE DESIGN SPECIFICATIONS FOR "FULL MECHANICAL CONNECTIONS."
**DESIGNER NOTES:**

1. **D** = DIAMETER OF ELASTOMERIC BEARING PAD
   
   \[ D = \text{LENGTH OF SOLE PLATE} = \text{THE SUM OF}(D + \frac{2}{3})\] or [WIDTH OF BOTTOM PLATE]

   \[ W = \text{WIDTH OF SOLE PLATE} \geq D + \frac{2}{3} \]

2. THE END OF THE BEAM AND SOLE PLATE MAY BE FLUSH, HOWEVER THE SOLE PLATE CANNOT EXTEND BEYOND THE BEAM END. IF REQUIRED, INCREASE THE LENGTH OF BEAM SO THAT IT STAYS FLUSH WITH THE SOLE PLATE.

3. IF NECESSARY, Cope SOLE PLATE and BEAM BOTTOM FLANGE TO MAINTAIN A MINIMUM OF 3” CLEARANCE.

4. DEPENDS ON THE BEARING PAD SIZE, THE WIDTH OF THE BRIDGE SEAT MAY NEED TO BE INCREASED TO MAINTAIN A MINIMUM OF 3” CLEARANCE.

5. SOLE PLATE SHOULD BE TAPPED IF SLOPE OF BEAM BOTTOM FLANGE DUE TO ROADWAY GRADE AND CAMBER EXCEEDS 1%. PROVIDE DETAIL OF TAPERED SOLE PLATE.

6. MINIMUM THICKNESS OF SOLE PLATE AFTER BEVELING SHALL BE \( D \). IF WELD MADE IN FIELD IS DIRECTLY OVER ELASTOMER, REVELED PLATE MAY BE AS THIN AS \( D \) OR THERE IS A LATERAL SEPARATION BETWEEN THE WELD AND ELASTOMER OF \( D \) OR GREATER.

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**NOTES:**

1. ELASTOMER SHALL HAVE A SHEAR MODULUS OF 0.105 kIP.

2. STEEL LAMINATES SHALL CONFORM TO ASTM A1011 GRADE 36.

3. THE COMpressive DESIGN LOAD ON THE BEARING PAD IS 100 kPS. THE COMPRESSIVE DESIGN STRESS IS THE RESULT OF Dividing THE COMpressive DESIGN LOAD BY THE AREA OF THE PAD AND IS EQUAL TO 100 kPS.

4. ELASTOMERIC BEARING PAD SHALL NOT BE VULNERABLE TO THE SOLE PLATE.

---

**ELASTOMERIC BEARING PAD – STEEL BEAMS**

- NOT TO SCALE

---

**DESIGNER NOTES:**

1. THE MINIMUM THICKNESS OF THE INDIVIDUAL INTERNAL ELASTOMERIC LAYERS SHALL BE \( D \). TOP AND BOTTOM COVER LAYERS SHALL BE \( D \) FOR BEARINGS WITH THICKNESS LESS OR EQUAL TO \( D \) AND \( D \) FOR THICKER BEARINGS. FURTHERMORE, COVER LAYERS SHALL BE NO THICKER THAN \( D \) OF THE INDIVIDUAL INTERNAL LAYER.

2. STEEL LAMINATES SHALL HAVE A MINIMUM THICKNESS OF 11 GAGE (0.015”). ACTUAL THICKNESS OF STEEL LAMINATES IN SHEET SHALL BE USED TO CALCULATE TOTAL BEARING THICKNESS.

3. ALL ELASTOMERIC BEARING PAD FOR STEEL BEAMS FOR A GIVEN STRUCTURE SHALL HAVE A CONSTANT THICKNESS AND SHALL BE IDENTICAL.

4. ALL ELASTOMERIC BEARING PAD ON ANY SUBSTRUCTURE UNIT SHALL HAVE THE SAME NOMINAL COMPRESSIVE STIFFNESS.

5. ELASTOMERIC BEARING ACCESORIES SHALL BE USED FOR BOTH PRESTRESSED CONCRETE AND STEEL BEAM BRIDGES AND SHALL BE DESIGNED AND FABRICATED IN ACCORDANCE WITH SECTION 14 OF THE ACI STUDY GROUP DESIGN SPECIFICATIONS AND SECTION 15 OF THE ACI STUDY GROUP BRIDGE DESIGN SPECIFICATIONS AND PER RED LINES BRIDGE DESIGN MANUAL.

6. CREATORS WALLS SHALL BE PROVIDED AT SUBSTRUCTURE ELEMENTS TO ASSIST TRANSVERSE MOVEMENT. FOR ADDITIONAL INFORMATION REFER TO DRAWING NO. 3.10 AND 7.80.
**DESIGNER NOTES:**

1. When using the beam and sole plate may or may not be used. However, the sole plate cannot extend beyond the beam end, if required, increase the length of beam so that it stays flush with the sole plate.

2. Depending on the bearing pad size, the width of the bridge seat may need to be increased to maintain a minimum of 3" clearance.

3. Steel laminated shall be a minimum thickness of 0.160".

4. Steel laminated shall conform to ASTM A 1011 Grade 36 or higher.

5. The compressive design stress of the bearing pad is 50 ksi. For the compressive design stress in the area of the pad and is equal to 50 ksi.

6. Tapered internal load plate shall conform to AASHTO M 270 Grade 50.

7. All bearings shall be checked prior to shipping. The marks include the bearing location on the bridge, and a 1" deep direction arrow that points up station. All marks shall be permanent and be visible after bearing is installed.

---

**NOTES:**

1. Do not extend the beam and sole plate beyond the beam end, if required, increase the length of beam so that it stays flush with the sole plate.

2. The width of the bridge seat may need to be increased to maintain a minimum of 3" clearance.
NOTES:

1. FOR DESIGN MATERIAL, FABRICATION AND GENERAL CONSTRUCTION REQUIREMENTS, REFER TO THE R.I. STANDARD SPECIFICATIONS OR THE SPECIAL PROVISIONS. EACH BEARING ASSEMBLY EXCEPT FOR THE PIPE AND STAINLESS STEEL PLATE SHALL BE ZINC METALIZED OR GALLIONIZED.

2. THE OVERALL HEIGHT OF THE BEARINGS, WHICH VARIES WITH THE LENGTH AND MANUFACTURER, MUST BE KNOWN BEFORE THE EXACT BEAM SPACING CAN BE DETERMINED. SEE IN STANDARD SPECIFICATIONS OR SHIP INSTRUCTIONS.

3. MASONRY BASE PLATES SHALL BE PLACED ON 1" GRADED FABRIC PAD AS SPECIFIED IN SECTION M-13.4 OF THE RI STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

4. ANCHOR ROD SPACING SHALL BE COORDINATED WITH THE BEARING MANUFACTURER.

5. ANCHOR RODS SHALL BE GALLIONIZED AND DESIGNED AS M-270 RODS (1/2" RODS).

6. BEARING INSTALLATION SHALL BE IN CONFORMITY WITH SPECIAL PROVISIONS TO THE SPECIFICATION AND THE MANUFACTURER’S RECOMMENDATIONS.

7. AFTER SETTING MASONRY BASE PLATES, ANCHOR ROD HOLES SHALL BE FILLED WITH NON-SHRIMP (EPOXY) CEMENT.

8. PIPE INDICATES POLYETHYLENE трубку.

DESIGNER NOTES:

1. CONSTRUCTION DRAWINGS SHALL CONTAIN ALL THE REQUIRED INFORMATION PER THE R.I. DEPARTMENT OF TRANSPORTATION BRIDGE DESIGN MANUAL SECTION 6 (CONSTRUCTION REQUIREMENTS RELATED TO THE BEARING INSTALLATION SETTING TABLE).

2. PROVIDE CLEAR DRAWING SECTIONS TO CLEARLY SHOW THE DETAIL OF THE BEARING ASSEMBLY COORDINATED WITH THE BEARING MANUFACTURER. ANCHOR ROD DETAIL SHALL BE APPROPRIATELY DESIGNED.

3. ANCHOR ROD DIAMETER SHALL BE DETERMINED IN ACCORDANCE WITH THE GROUP LOAD REQUIREMENTS SPECIFIED IN THE AASHTO BRIDGE SPECIFICATION (INCLUDING SECONDARY REQUIREMENTS).

4. DIMENSIONS, SIZES OF PLATES, AND WELDS NOT SHOWN ARE DEPENDENT ON DESIGN LOAD, BEARING TYPE, AND FICTION. THE MANUFACTURER’S DESIGN, PREPARED BY THE MANUFACTURER, SHALL PROVIDE ALL PERIPHERAL BEARING INSTALLATION REQUIREMENTS. THE DETAILS OF THE DRAWING ARE DETERMINED AFTER APPROVAL OF THE SHOP DRAWINGS.

5. THE NOTES SHOWN ON THIS DRAWING SHALL BE PROVIDED ON CONTRACT DRAWING, WHERE APPLICABLE.

6. FOR DETAILS OF PIPE ATTACHMENTS TO STEEL BEAMS AND FOR ANCHOR ROD AND MASONRY PLATE, DETAILS REFER TO DRAWING NO. 5.30.
FRAMING PLAN FOR SKEW 20' OR LESS
(SIMPLE SPAN)
PLATE GIRDERS (G) OR ROLLED SECTIONS (S)

FRAMING PLAN FOR SKEW GREATER THAN 20'
(SIMPLE SPAN)
PLATE GIRDERS (G) OR ROLLED SECTIONS (S)

DESCRIPTOR NOTES:
1. FOR SKEWS 20 DEGREES OR LESS, PLACE INTERMEDIATE DIAPHRAGM PARALLEL TO CENTERLINE OF BEARING.
2. FOR SKEWS GREATER THAN 20 DEGREES, PLACE INTERMEDIATE DIAPHRAGM PERPENDICULAR TO CENTERLINE.
3. FOR HORIZONTALLY CURVED SPAN BRIDGES, DIAPHRAGMS SHALL BE PROVIDED AT EACH SUPPORT AND AT INTERMEDIATE INTERFACES. SPAN DIAPHRAGMS SHALL BE PROVIDED AT INTERMEDIATE INTERFACES WITH SPACING AS DETERMINED THROUGH FIELD CALIBRATION. DIAPHRAGMS SHALL BE PLACED BASED ON FIELD CALIBRATION.
4. WHEN USING ROLLED SECTIONS, USE LEADING PLAN WITH PREFIX S-3, S-2, ETC.
5. LAYOUT IS SIMILAR FOR CONTINUOUS SPANS.
6. FRAMING PLAN SHOULD CONTAIN BEARING TYPE AND APPROPRIATE LEGENDS.

DECK GRADE NOTES:
1. ELEVATIONS OF BEAMS ARE GIVEN AT THE CENTERLINE OF BEARINGS OF EACH BEAM AND AT THE CENTERLINE OF EACH SPAN.
2. (0.00) ELEVATIONS GIVEN ARE THEORETICAL FINISH GRADES.
3. (0.00) ELEVATIONS GIVEN IN PARENTHESES ARE THEORETICAL BASE GRADES.
4. (0.00) ELEVATIONS GIVEN IN PARENTHESES ARE THEORETICAL BASE GRADES.
5. DIAPHRAGMS ARE ELEVATION DIFFERENCES CAUSED BY SUPPLEMENTAL LOADS (WEIGHT OF RAILING, RAIL BASE, AND CURB).
NOTE:
1. BOLTED FIELD SPUCES SHALL BE CONSIDERED SUPERCRITICAL CONNECTIONS WITH
   CLASS B FIXING SURFACES.
2. + DENOTES 3" # ASTM A325 HIGH STRENGTH BOLT IN HOLE.
3. THICKNESS DIFFERENCES OF 3/8" OR LESS DO NOT REQUIRE FILLER PLATE.
   FILLER PLATES SHALL CONFORM TO ASTM A 270 GRADE 38 OR 55.
4. ONE ROW OF STUD SHEAR CONNECTORS SHALL BE PLACED ALONG THE CENTERLINE
   OF THE TOP FLANGE SPICE PLATE.

BOLTED FIELD SPICE DETAILS

SCALE: 1"=1'-0"
END DIAPHRAGMS (D-1)

1. CONNECTION PLATE OR END BEARING STIFFENER, BEARING STIFFENERS AS REQUIRED FOR FUTURE JACkING AND SHADING (TYP.)
2. TOP OF DECK SLAB
3. 1\% DECK SLAB

INTERMEDIATE DIAPHRAGMS (D-2)

1. CONNECTION PLATE OR END BEARING STIFFENER, BEARING STIFFENERS AS REQUIRED FOR FUTURE JACkING AND SHADING (TYP.)
2. TOP OF DECK SLAB
3. 1\% DECK SLAB

DESIGNER NOTES:
1. FOR SHEAR CONNECTOR DETAIL SEE DRAWING 6.20.
2. THE END DIAPHRAGM AND CONNECTION DETAILS SHOWN ARE MINIMUM REQUIRED EXCEPT FOR FLEX SHALLowing.
3. SECTION DETAILS FOR END DIAPHRAGM AND CONNECTION DETAILS SHALL BE DETERMINED BASED ON FUTURE JACKING LOAD REQUIREMENTS (REFER TO JOINT LAD BRIDGE DESIGN MANUAL AND/or THE REQUIREMENTS OF ADDITIONAL BRIDGE DESIGN SPECIFICATIONS.

NOTE:
1. THE END DIAPHRAGMS ARE TO FOLLOW THE CROSS PITCH OF THE ROADWAY.
2. LOCATIONS OF HOLES IN CONNECTION PLATES SHALL BE DETERMINED BY THE FABRICATOR.

THIS SHEET IS NOT TO SCALE

REVISED
No. DATE

BRIDGE STANDARDS

DIAPHRAGM DETAILS
FOR ROLLED SECTIONS

DRAWING NUMBER: 6.40
FRAMING PLAN

NOTE:
01 = TYPICAL INTERIOR END CROSS FRAME
02 = TYPICAL INTERIOR INTERMEDIATE CROSS FRAME
03 = TYPICAL EXTERIOR END CROSS FRAME
04 = TYPICAL EXTERIOR INTERMEDIATE CROSS FRAME

DESIGNER NOTES:
1. EXTERIOR CROSS FRAME SPACING SHALL BE GOVERNED BY DESIGN REQUIREMENTS.
2. FRAMING PLAN SHOWS PREFERRED TOP FLANGE INTERNAL BRACING CONFIGURATION.
3. DIMENSION CROSS FRAME SPACING ALONG CENTER LINE OF CONSTRUCTION.
4. RADIAL LAYOUT PREFERRED.
5. DIMENSION LOCATIONS OF INCLINATION ACROSS GAUGED IN BOTTOM FLANGES. PROVIDE 1 BOLT PER STEEL BOX GIRDER PER SUBSTRUCTURE.

CROWNED ROADWAY SECTION

NOT TO SCALE

SUPERELEVATED ROADWAY SECTION

NOT TO SCALE

DESIGNER NOTES:
1. MAINTAIN CONSTANT TRAPEZOIDAL SHAPE.
2. W.P. INDICATES WORKING POINT. WORKING POINTS SHALL BE DEFINED ON CONSTRUCTION PLAN.

THIS SHEET IS NOT TO SCALE.
NOTE:
ALL CROSS FRAME AND STIFFENER PLATE CONNECTIONS TO BOX GIRDER BOTTOM FLANGE ARE WELDED TO BEAR.

END CROSS FRAME
SCALE: 1/8"=1'-0"

NOTE:
WEB PLATE AS REQUIRED WHEN CONNECTION CROSS FRAME BETWEEN BOXED WITH VARYING CROSS SLOPE.

END CROSS FRAME CONNECTION DETAILS
SCALE: 1/8"=1'-0"

EXTERIOR INTERMEDIATE CROSS FRAME
SCALE: 1/8"=1'-0"

DESIGNER NOTES:
1. THE INTERIOR CROSS FRAME MEMBERS SHALL BE DESIGNED TO ACCOMMODATE THE FORCES FROM THE EXTERIOR CROSS FRAMES.
2. WELD ALL ANGLES TO GUSSET PLATES WITH FILLET WELDS ON NEAR SIDE ONLY.
3. MINIMUM NUMBER OF BOLTS SHOWN. ACTUAL NUMBER OF BOLTS SHALL BE DETERMINED BY DESIGNER.
4. LINE OF ACTION FOR INTERIOR AND EXTERIOR CROSS FRAME MEMBERS SHALL BE COINCIDENT TO THE CENTERLINE OF WEB.

SEE NOTE 1
SEE NOTE 2
SEE NOTE 3
SEE NOTE 4
ACCESS HATCH AT INTERIOR END CROSS FRAME

NOTE:
ADJACENT END CROSS FRAME SHOWN. PIER END CROSS FRAME SIMILAR.
(INCLUDE THIS NOTE FOR MULTIPLE SPAN BRIDGES)

SECTION
SCALE: 3/4"=1'-0"

REVISIONS

DEPARTMENT OF TRANSPORTATION
RIVER ISLAND
BRIDGE STANDARDS

STEEL BOX GIRDER DETAILS
SHEET 4

DRAWING NUMBER: 6.73
**DESIGNER NOTES:**

1. **THE DESIGNER SHALL COORDINATE THE LOCATION OF THE INSPECTION HATCH WITH THE OWNER BRIDGE SECTION.**

2. **LOCATIONS OF 5/8" x 5/8" BENT PLATES SHALL BE PROVIDED ON A BRIDGE HATCH IF THE INSPECTION ACCESS HATCH IS LOCATED LESS THAN 20' FROM THE GROUND.**

**INSPECTION ACCESS HATCH NOTES:**

1. **INTERIOR OF ALL BOX BEAMS SHALL BE LEFT IN A BROWN CLEAN CONDITION, FREE FROM ALL DEBRIS. THE ENGINEER SHALL PROVIDE ACCESS TO BOX INTERIORS FOR CLEAN-OUT ACCEPTANCE.**

2. **ALL STEEL COMPONENTS SHALL CONFORM TO ASTM A 270 GRADE 36 AND SHALL BE GALVANIZED AFTER ASSEMBLY IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A 1141. ALL FASTENERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A 307.**

3. **ACCESS HATCH SHALL BE PAINTED ON BOTH SIDES AND EDGES WITH THE SAME COATING AS USED ON THE OUTSIDE/INSIDE OF THE BOX GIRDER.**

4. **ALL LOCKS ON A BRIDGE SHALL BE KEPT THE SAME.**

(ELIMINATE THIS NOTE IF LOCKS ARE NOT NEEDED)
FRAMING PLAN
PRESTRESSED CONCRETE BEAMS
(SKEW ANGLE 30° AND UNDER)

DIAPHRAGM ELEVATIONS

NOTE:
The inserts for interior beams shall be conditioned. Otherwise, so as to avoid interference with each other.

DETAIL

SECTION

DESIGNER NOTES:
1. For bearing details and requirements, and expansion joint details, refer to Drawing 7.30.
2. To avoid cracking of the girder, the designer shall limit the total dead load force to 3/4 of the beam weight.
3. The designer shall refer to the Bridge Island LRPD Bridge Design Manual for future joint requirements.
4. Refer to NSF-W/USF Bridge Design Specifications for vertical stiffener requirements at ends of beams.

 THIS SHEET IS NOT TO SCALE

PRESTRESSED BEAM DETAILS AND FRAMING LAYOUT

DRAWING NUMBER: 7.10
DESIGNER NOTES:
1. THIS SHEET CONTAINS STANDARD AASHTO AND NEW ENGLAND BULB TEE BEAM SECTIONS. APPENDABLE DETAILS, INCLUDING BEAM DIMENSIONS, ELEVATIONS, SIZES AND NUMBER OF REINFORCING BARS SHALL BE SHOWN ON THE CONTRACT DRAWINGS.
2. THE AMOUNT OF REINFORCEMENT AND STRAND ARRANGEMENT IS ILLUSTRATIVE ONLY. THE ACTUAL NUMBER AND SIZE OF STRANDS AND REINFORCEMENT SHALL BE DETERMINED BASED UPON DESIGN REQUIREMENTS.
3. THE MAXIMUM SPAN LENGTHS SHOWN BELOW ARE APPROXIMATE AND ARE PROVIDED AS A GUIDE ONLY. SUCH FACTORS AS STRENGTH OF CONCRETE, NUMBER OF STRANDS, TYPE OF LIVE LOAD AND BEAM SPACING WILL AFFECT THESE LIMITS.
4. TO AVOID CRACKING OF THE GIRDERS, THE DESIGNER SHALL LIMIT THE TOTAL HOLD DOWN FORCE TO 3/4 OF THE BEAM WEIGHT.
5. STRANDS SIZE & SPACING SHALL BE AS REQUIRED BY DESIGN. MAXIMUM STRAND SPACING SHALL BE 4" INCHES FOR AASHTO SECTIONS, 6" INCHES FOR NEW SECTIONS.
6. STRANDS SHALL BE DETAILLED SO AS NOT TO BE IN CONFLICT WITH THE INSERTS PROVIDED FOR THE DIAPHRAGM OR WITH THE FIXED BEARING ANCHOR BOLT.
7. FOR BEARING DETAILS AND REQUIREMENTS, REFER TO DRAWING 7.80.
8. FOR PRESTRESSED DESIGN & DETAILING REQUIREMENTS ALSO REFER TO THE HIND LTD. BRIDGE DESIGN MANUAL.
9. EMBRITTLEMENT LENGTHS OF THE HORIZONTAL SHEAR REINFORCING INTO THE DECK MAY NEED TO BE INCREASED IN CASES OF LARGE WIND EFFECTS. THE DESIGNER SHALL ENSURE THAT AT LEAST 3' CLEAR COVER IS MAINTAINED TO THE TOP OF THE DECK AT ALL LOCATIONS. THE EMBRITTLEMENT LENGTH SHOWN DOES NOT PRODUCE FULL DEVELOPMENT.
10. THE MAXIMUM SPAN LENGTHS LISTED BELOW ARE APPROXIMATE AND ARE PROVIDED AS A GUIDE ONLY. THEY ARE BASED ON AN ENS ANALYSIS, BUT THEY WILL VARY DEPENDING ON FACTORS AS STRENGTHS OF CONCRETE, NUMBER OF STRANDS, SPACING OF BEAMS, AND DEAD AND SUPERIMPOSED DEAD LOADS.

AASHTO BEAM PROPERTIES

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<th>TYPE</th>
<th>W(LB/FT)</th>
<th>A (IN²)</th>
<th>Y₁ (IN)</th>
<th>Y₂ (IN)</th>
<th>S₁ (IN³)</th>
<th>S₂ (IN³)</th>
<th>I (IN⁴)</th>
<th>SPAN RANGE</th>
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<td>369</td>
<td>20.17</td>
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<td>560</td>
<td>24.73</td>
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<td>6.190</td>
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TYPICAL NEBT SECTION

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<th>A (IN²)</th>
<th>Y₁ (IN)</th>
<th>Y₂ (IN)</th>
<th>S₁ (IN³)</th>
<th>S₂ (IN³)</th>
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<td>801</td>
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<td>913</td>
<td>33.03</td>
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<td>14,911</td>
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NEW ENGLAND BULB TEE (NEBT) BEAM PROPERTIES

LEGEND:
- STRAIGHT STRANDS
- GRIPPED STRANDS
- FOUR REINFORCING STEEL
NOTE:
1. BEFORE ANGLE IS NOT TO EXCEED 30° EXCEPT AS AUTHORIZED BY THE ENGINEER.
2. PROVIDE LATERAL TIES AT MIDPOINT AND END POINTS.

SECTION PROPERTIES

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<thead>
<tr>
<th>BEAM TYPE</th>
<th>Depth (in)</th>
<th>Width (in)</th>
<th>Actual Width (in)</th>
<th>$A$ (in$^2$)</th>
<th>$I_x$ (in$^4$)</th>
<th>$I_y$ (in$^4$)</th>
<th>$C_{x,y}$ (in$^2$)</th>
<th>$C_{x,y}$ (in$^2$)</th>
<th>WT (lbs/ft)</th>
<th>% MAX SPAN/FT</th>
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<td>1234.0</td>
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</table>

* SEE DESIGNER NOTE 3

NOTE:
1. DESIGNER SHALL INVESTIGATE EXISTING BEAM GROUP FOR INTERFERENCE WITH CONSTRUCTION OR EXISTING APPARATUS. CONSIDERATION SHOULD BE GIVEN TO AVOIDING THE NUMBER OF LATERAL TIES, AMOUNT OF POST TENSIONING AND/OR PROVIDING ADDITIONAL BEAR SEATS.
2. STUBSPACING AND SPACING SHALL BE AS REQUIRED BY DESIGN.
3. THE MAXIMUM SPAN LENGTHS LISTED ABOVE ARE APPROXIMATE AND ARE PROVIDED AS A GUIDE ONLY. THEY ARE BASED ON AN IDEAL LIVE LOAD, BUT THEY WILL VARY DEPENDING ON SUCH FACTORS AS STRENGTH OF CONCRETE, SIZE AND NUMBER OF STRANDS, AND WHETHER OR NOT A 5 MIN. REINFORCED CONCRETE DECK OVERLAP IS USED.
4. THIS SHEET CONTAINS STANDARD PRESTRESSED CONCRETE SLAB SECTIONS. SPECIFIC APPLICATIONS, DETAILS, INCLUDING SLAB DIMENSIONS, ELEVATIONS, SIZES AND NUMBERS OF STRANDS OF BAR STRENGTHS SHALL BE DRAWN TO THE CONTRACT DRAWINGS.
5. FOR ANY AUTHORIZED SKEW ANGLE GREATER THAN 30 DEGREES, THE DESIGNER MUST CONSIDER THE RESISTING EFFECTS OF THE LARGER SKEW ANGLE AND CONSIDER DETAILING ADDITIONAL ADDITIONAL LATERAL TIE STRANDS TO COMPENSATE FOR THE REDUCED LATERAL FORCES.

DRAWING NUMBER: 7.40

PRESTRESSED CONCRETE SLABS

SHEET 1

REVISED
No. DATE

OAHU ISLAND
DEPARTMENT OF TRANSPORTATION
BRIDGE STANDARDS

SCALE 1" = 1'-0"
DESIGNER NOTES:

1. ALL PRESTRESSED BEAMS WILL BE DESIGNED IN ACCORDANCE WITH THE LATEST ANSI AASHTO BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES.

2. TOP AND BOTTOM TRANSVERSE STIRRUP SIZE AND SPACING SHALL BE AS REQUIRED BY DESIGN, WITH THE ADDITIONAL REQUIREMENT THAT SPACING DOES NOT EXCEED 10".

3. THE ACTUAL NUMBER AND LOCATION OF THE PRESTRESSED STRANDBUND SHALL BE DESIGNED AND SHALL CONFORM TO THE SPACING SHOWN ON DRAWING NO. 7-96.

4. END STIRRUPS LOCATED % OF THE BEAM DEPTH FROM THE END SHALL BE DESIGNED TO MEET THE STIRrup DeSIGN REQUIREMENTS FOR ANCHORAGE ZONE OF PRESTRESSED CONCRETE BEAMS. ALL OTHER STIRRUPS IN THE BLOCK-OUT SECTION SHALL BE DESIGNED AS TRANSVERSE STIRRUPS.

5. THE HORIZONTAL END OF THE VERTICAL END STIRRUPS ARE EQUAL TO THE DEPTH OF THE BEAM AND SHALL BE DESIGNED ON THE PLAN VIEW.

6. HORIZONTAL END STIRRUPS SHALL BE EMBEDDED A MINIMUM DISTANCE EQUAL TO THE DEPTH OF THE BEAM (OR 32") INTO THE WEB OF THE VOATER SECTION, WHICHEVER IS LONGER. LENGTH OF EMBEDMENT SHALL BE NOTED ON THE PLAN VIEW.

7. PROPERLY NOTE ON SHEET THE LOCATION AND SPACING OF ANY PENETRATION WHICH EXTEND INTO SIDEWALKS, CURBS OR BARRIERS ON THE CROSS-SECTION AND PLAN VIEW OF THE BEAM.

8. IF BLOCK-OUT SECTION IS FOR CONTINUITY, PROVIDE #4 BARS TO MEET DESIGN REQUIREMENTS. IF BLOCK-OUT SECTION IS FOR A JOINT SYSTEM, PROVIDE A MINIMUM OF #4-#6 BARS (TYP.)

9. THE LENGTH, SIZE AND QUANTITY OF CONTINUITY REINFORCEMENT SHALL BE DETERMINED BY THE DESIGNER. CONTINUITY REINFORCEMENT WILL NOT BE REQUIRED IF BLOCK OUT IS FOR PLACING A JOINT SYSTEM.

10. THE DESIGNER SHALL CONFORM TO DRAWING NO. 7-96. 7-96, 7-177, 7-377 HORIZONTAL, SHEAR REINFORCING AND BARS TOP SURFACES SHALL BE DESIGNED FOR BONDED BOX BEAMS UTILIZING A 5" BOX COMPOSITE REINFORCED CONCRETE BOX OVERLAY.

LONGITUDINAL SECTION

END REINFORCING PATTERN (WITH BLOCK-OUT)
NOTES:
1. BRIDGE DECK SHALL BE PLACED IN ACCORDANCE WITH THE PLACEMENT SEQUENCE SHOWN ON THE PLANS.
2. THE SURFACE OF THE PREVIOUSLY CAST CONCRETE SHALL BE BLAST CLEANED, POLISHED, WETTED WITH CLEAN WATER, AND THEN FLOOURED WITH A MORTAR COMPOSED OF EQUAL PARTS OF THE CEMENT AND SAND SPECIFIED FOR THE NEW CONCRETE. BEFORE NEW CONCRETE IS PLACED ADJACENT THERETO, THE REBAR SHALL BE CLEANED BEFORE MORTAR HAS TAKEN INITIAL SET.
4. DOWEL BAR SPACERS SHALL BE USED WHERE USE OF LAP SPACERS IS NOT FEASIBLE.
**2 SECTION SCUPPER**

**SCUPPER DETAILS**

**SECTION**

**PLAN**

**SECTION**

**PLAN**

**SECTION**

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**SECTION**

**SUBPAVEMENT DRAIN**

**NOTE:**

1. The section 8.20 scupper should be used when structural strengthening or prestressed beam interference with the outfall pipe.

2. Refer to the round lid bridge design manual for scupper design and detailing requirements.

3. When the scupper is placed at a location where expansion between it and the adjacent structure is likely to occur, provisions shall be made to accommodate the movement.

4. Details are similar for finished concrete deck.
TYPICAL SECTION AT RAIL POST
SCALE: 1/2"=1'-0"

TYPICAL EXPANSION JOINT DETAIL
SCALE: 1/2"=1'-0"

TYPICAL RAIL JOINT
SCALE: 1/2"=1'-0"

ANCHOR BOLT ASSEMBLY
SCALE: 1/2"=1'-0"

SECTION A
SCALE: 1/2"=1'-0"

SECTION
SCALE: 1/2"=1'-0"

BRIDGE RAILING ANCHOR DETAIL
SCALE: 1/2"=1'-0"

STEEL RAILING NOTES
1. THE ENTIRE RAILING SYSTEM SHALL BE METALIZED AND PAINTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE R.I. STANDARD SPECIFICATIONS.
3. STRUCTURAL STEEL SHAPES AND PLATES SHALL CONFORM TO THE REQUIREMENTS OF A360 DESIGNATION A 360, GR. 30.
5. THE ENTIRE ANCHOR BOLT ASSEMBLY SHALL BE GALVANIZED IN ACCORDANCE WITH THE REQUIREMENTS OF A992 DESIGNATION A 111.
6. RAIL POSTS SHALL BE SET VERTICAL IN THE FIELD. LEAD SHIMS SHALL BE PROVIDED UNDER THE BASE PLATES TO MAKE UP THE DIFFERENCE BETWEEN THE FABRICATED POST UNIT AND THE ACTUAL SLOPE OF THE SIDEWALK OR BRUSH CURB.
7. MAXIMUM POST SPACING SHALL BE 8'-0".
8. THE RAILS AND CHANNELS SHALL BE WELDED PARALLEL TO THE ACTUAL PROFILE OF THE SIDEWALK OR BRUSH CURB.
9. RAILINGS SHALL BE SPACED OVER EXPANSION JOINTS.
RAIL NOTES:
1. TWO BAR (CRASH-TESTED) STEEL BRIDGE RAIL SHALL INCLUDE POSTS, BASE PLATES, ANCHOR RSAW, PREFORMED PADS, RAIL ASSEMBLY BOLTS, NUTS, WASHERS, STUDS, STRUCTURAL TUBING, SPICE Small, PIPE SPACERS, RETRO REFLECTIVE DELIMINATORS, ALL APPURTEINANCES, METALIZING, AND PAINTING (IF SPECIFIED).
2. BRIDGE RAIL POSTS SHALL BE SET NORMAL (0°) DEGREES TO THE PROFILE GRADE, EXCEPT ON GRADES OVER 1.0% WHERE POSTS SHALL BE SET VERTICAL.
3. ENDS OF RAIL TUBE SECTIONS SHALL BE SAWED OR MULLED AND SHALL BE TRUE AND SMOOTH. ALL CUT EDGES OF ALL MATERIAL SHALL BE GROUND SMOOTH.
4. EACH PIECE OF RAIL TUBING SHALL BE ATTACHED TO A MINIMUM OF THREE (3) POSTS.
5. BOLT HOLES SHALL BE DRILLED OR PUNCHED. FLARE CUTTING MAY BE USED TO FINISH SLOTTED HOLES IF MECHANICALLY GUIDED.
6. AT INTERIOR SPACES, PIPE SPACING SHALL BE USED ON ONLY ONE SIDE OF THE SPICE TO ALLOW MOVEMENT ON THAT SIDE. BOTH SIDES AT A SPICE SHALL RECEIVE THE SAME TREATMENT.
7. MILL OR SHOP TRANSVERSE MISALIGNS SHALL NOT BE PERMITTED ON ANY RAIL ELEMENT. RAIL ELEMENTS USED ON CURVES SHALL USE 2/5 BASE TUBES AND SHALL BE SHAPED TO THE REQUIRED CONICITY.
8. NO PUSHING, DRILLING, CUTTING OR MOLDING SHALL BE PERMITTED AFTER METALIZING. EXCEPT FOR DETAILED "X". DAMAGED AREAS OF METALIZING SHALL BE REPAIRED IN STRIGHT CONFORMANCE WITH THE MATERIAL SUPPLIER'S REQUIREMENTS AND SHALL BE APPROVED BY THE EYECOR.
9. NUTS FOR 1/8" THREADED ANCHOR RODS CONNECTING THE BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A DRAG TIGHT AND GIVEN AN ADDITIONAL 1/8 TURN.
10. THREADS FOR ANCHOR NUTS MAY BE ROLLED OR CUT. IF CUT THREADS ARE USED, BOLT DIAETE MAY NOT BE LESS THAN NOMINAL DIAMETER OF ROLLED THREADS ARE USED. ROLL DIAMETER SHALL BE 0.05 DIAMETER.
11. THE RAIL POST, BASE PLATE AND ANCHOR CAGE MAY BE INSTALLED PROPERLY TO THE LOCATION DIMENSIONED ON THESE PLANS. THE RAIL POSTS OF THE (3) RAIL CURVING MEMBERS MAY BE ADJUSTED TO ACCOMMODATE THE ANCHOR CAGE, BUT MUST NOT BE OUT.

MATERIAL NOTES:
1. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500, GRADE A. METALIZING SHALL MEET THE COMMERCIAL "X"-NOTCH REQUIREMENTS OF "X". AT FOR ASTM A500, GRADE A. THE TEST SAMPLES SHALL BE TAKEN AFTER FORMING THE TUBES. CHAMPY "X"-NOTCH IS NOT REQUIRED FOR SPICE TUBES.
2. RAIL POSTS AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A272 OR 50, EXCEPT ANCHOR PLATES MAY BE ASTM A36.
3. THREADED STUDS AND WASHERS NUTS FOR RAIL-TO-FAT ATTACHMENT (DETAILED "A") SHALL CONFORM TO ASTM A194 TYPE 36, STAINLESS STEEL, AND SHALL BE TORQUE TESTED PER EYECOR REQUIREMENTS. WASHERS SHALL BE ROLL FORMED STAINLESS STEEL, 3/8" THICK.
4. SCREW HOLE, WASHERS AND NUTS SHALL CONFORM TO ASTM 500-03. "X" HOLE AND EXCEPT THAT "X" HOLE DIAMETER MAY BE SIZED ON THE BOTTOM OF ANCHOR ASSEMBLY. WASHERS SHALL BE ROLL FORMED STAINLESS STEEL, 1/4" THICK. WASHERS SHALL MEET THE MINIMUM REQUIREMENTS OF A.S.M.E. B18.22.
5. ALL STEEL COMPONENTS (EXCEPT COATINGS) SHALL BE METALIZED AFTER FABRICATION IN CONFORMANCE WITH SECTION 1107. "THERMAL SPRAYED ZINC COATING FOR NEW STRUCTURAL STS." IN THE PASE 324, STANDARD SPECIFICATION FOR RAIL AND PIPE END AND ENDS FOR CONSTRUCTION. THE METALIZING SHALL HAVE A UNIFORM APPEARANCE, AND METALIZED MATERIAL SHALL BE PROPERTY STORED.
6. DETAIL "A" STUDS SHALL BE MOLDED BEFORE TUBES ARE METALIZED.
7. PREFORMED BEARING PADS (1/8" THICK) SHALL CONFORM TO AASHTO A525.

DESIGNER NOTE:
PRIVATE PAINT COLOR FOR RAILING SYSTEM THIS BRIDGE RAIL SYSTEM WAS SUCCESSFULLY CRASH TESTED FOR AASHTO TL-4 IN 1994 BY THE NEW ENGLAND TRANSPORTATION CONSORTIUM.

REVISED No. DATE:

BRIEF DESCRIPTION:
TWO BAR STEEL BRIDGE RAIL (CRASH-TESTED TL-4)

SHEET 1

DRAWING NUMBER: 10.30
RAIL NOTES:
1. BRIDGE RAIL SHALL INCLUDE POSTS, BASE PLATES, ANCHOR RODS, PREFORMED FINS, RAIL ASSEMBLY BOLTS, NUTS, WASHERS, STUDS, STRUCTURAL TUBING, SPACER BARS, PIPE SPACERS, ALL ATTACHMENTS, METALLIC AND PAINTING (IF SPECIFIED).
2. BRIDGE RAIL POSTS SHALL BE SET VERTICAL.
3. ENDS OF RAIL TUBE SECTIONS SHALL BE SAWED OR MACHINED AND SHALL BE TRUE AND TRIM. ALL CUT EDGES OF ALL MATERIAL SHALL BE GROUND SMOOTH.
4. EACH PIECE OF RAIL TUBING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS BETWEEN SPACES.
5. BOLT HOLES SHALL BE DRILLED OR PUNCHED.
6. AT INTERIOR SPACES, PIPE SPACERS SHALL BE USED ON ONLY ONE SIDE OF THE SPACING TO ALLOW MOVEMENT OF SADDLE ON CURVES.
7. SPACER PIPE SPACERS SHALL BE USED ON BOTH SIDES OF THE SPACING TO ALLOW MOVEMENT ON CURVES.
8. WILL OR SHOWN TRANSVERSE MEASURES SHALL NOT BE PERMITTED ON ANY RAIL ELEMENT. RAIL ELEMENTS USED ON CURVES SHALL BE SHAPED TO FIT THE REQUIRED CURVATURE.
9. NO PUNCHING, DRILLING, CUTTING OR WELDING SHALL BE PERMITTED AFTER METALWORKING (EXCEPT FOR DETAILS), DAMAGED AREAS OF METALWORKING SHALL BE REPAIRED IN STRICT CONFORMANCE WITH THE MATERIAL SUPPLIER'S RECOMMENDATIONS AND SHALL BE APPROVED BY THE ENGINEER.
10. NUTS FOR 1-1/4" THREADED ANCHOR RODS CONNECTING THE BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A TORQUE FIT AND GIVEN AN ADDITIONAL 1/8 TURN.
11. THREADS FOR ANCHOR RODS MAY BE ROLLED OR CUT. IF CUT THREADS AND FLANGED BOLT CUPPLING SHALL BE AT LEAST 0.75 TIMES NOMINAL DIAMETER. IF ROLLED THREADS ARE USED, ROG DIAMETER SHALL NOT BE LESS THAN ROG DIAMETER OF THREADS.
12. FOR RAIL CONNECTION TO END POST, SEE "END POST DETAILS" SHEET.
13. DETAIL 2 IS REQUIRED AT THE POST ADJACENT TO THE END POST.

MATERIAL NOTES:
1. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500, GRADE B, STRUCTURAL STEEL TUBE. RAIL TUBING SHALL MEET THE LONGITUDINAL CHAMFER K-Notch REQUIREMENTS OF 15 FT. LBS. AT 1/2" FOR ASTM A500, GRADE B. THE REST SAMPLES SHALL BE TAKEN AFTER FORMING THE TUBES. CHAMFER K-NOTCH IS NOT REQUIRED FOR SPACER TUBES.
5. DETAIL 2 STUBS SHALL BE WELDED ON AFTER TUBES ARE METALIZED BY SPECIAL PROCESS OFF MACHINE. WELDING ON SADDLES THEN TOUCH UP METALIZING PER RAIL FOTE 88.
6. PREFORMED BEARING PLATES (1/8" THICK) SHALL CONFORM TO AASHTO M251.

DESIGNER NOTES:
1. THIS BRIDGE RAIL SYSTEM HAS BEEN ACCEPTED BY FMR AS A TL-5 RAILING.
2. PROVIDE PAINT COLOR FOR RAILING SYSTEM.

SIDE ELEVATION
**TYPE I PROTECTIVE SCREEN**
(Chain Link Fence)

**TYPE II PROTECTIVE SCREEN**
(Chain Link Fence)

**RAIL SPlice DETAIL**

**DETAIl OF POST CONNECTION**

**SECTION**

**NOTES:**
1. All bolts shall be set vertical unless otherwise specified.
2. Maximum post spacing shall be 8'-0".
3. Posts, rails, tension bars, rail splices, washers and nuts shall be aluminum alloy 6061-T6 ASTM Designation B 221.
4. The aluminum pipe shall be aluminum alloy 6061-T6 with 0.062 thickness.
5. The tension rods shall be aluminum alloy 6061-T6 with 0.062 thickness.
6. The bolts shall be stainless steel, not exceeding Grade 5.
7. The nuts shall be stainless steel, not exceeding Grade 5.
8. The portions of the aluminum base plates to be in contact with the concrete or asphalt shall be thoroughly coated with an approved aluminum paint or equivalent coating.
9. The aluminum base plates shall be aluminum alloy 6061-T6 with 0.062 thickness.

**DESIGNER NOTES:**
1. In general, protective screens should be considered on overpasses with heavy pedestrian traffic (such as near schools and playgrounds), overpasses in urban areas, or overpasses where private properties are located beneath, and overpasses spanning railroad tracks.
2. The type II protective screen (chain link fence) should only be considered for bridged span over railroad tracks or when the clearance is too narrow to allow for type I.
3. Alternate protective screen details may be considered, provided specific conditions warrant.
4. The notes shown below should be included on the contract drawings.

**REVISIONS**

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**DRAWING NUMBER:** 10.40

**PROTECTIVE SCREEN**
(Chain Link Fence)

**SHEET 1**

**THIS SHEET IS NOT TO SCALE**
NOTES:
1. ALL POSTS SHALL BE SET VERTICAL, UNLESS OTHERWISE SPECIFIED.
2. MAXIMUM POST SPACING SHALL BE 8'-0".
3. POSTS, RAILS, TENSION BARS, RAIL SPACERS, WASHERS AND POST CONNECTION CLAMPS SHALL BE ALUMINUM ALLOY 6061-T6 ASTM DESIGNATION B 221.
4. THE ALUMINUM FABRIC SHALL BE ALUMINUM ALLOY 6061-1809-94 ASTM DESIGNATION B 221, NO. 9 GAUGE (0.118" DIAMETER).
5. THE ARRE TIES SHALL BE ALUMINUM ALLOY 1100-0-18 NO. 6 GAUGE (0.194" DIAMETER).
6. THE TENSION BANDS SHALL BE ALUMINUM ALLOY 6063-1805 ASTM DESIGNATION B 221.
7. THE BOLTS SHALL BE STAINLESS STEEL ASTM DESIGNATION A 193 B7 TYPE 304.3 FV = 30 KSI.
8. THE NUTS SHALL BE STAINLESS STEEL ASTM DESIGNATION A 194.

BACK ELEVATION VIEW

RAIL SPACER

SCALE: 1" = 1'-0"

SECTION

SCALE: 6" = 1'-0"

ELEVATION - PROTECTIVE SCREEN CLAMPS

SCALE: 1" = 1'-0"

SECTION

SCALE: 6" = 1'-0"
EXPANSION JOINT IN WALLS AND ABUTMENTS

CONTRACTION JOINT IN WALLS AND ABUTMENTS

CONSTRUCTION JOINT IN WALLS AND ABUTMENTS

Y-GROOVE IN PARAPET

CONTRACTION JOINT IN PARAPET

JOINTS IN SIDEWALK OR BRUSH CURB

PARAPET AND SIDEWALK
CONTRACTION JOINT SEALANT LIMIT

TYPICAL SECTIONS THROUGH WALL JOINTS
(EXPANSION JOINT SHOWN)

WEEP DRAIN

WALL DRAIN

DESIGNER NOTES:
1. EXPANSION JOINTS SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 70'-0".
2. CONTRACTION JOINTS SHALL BE LOCATED AT INTERVALS NOT EXCEEDING 20'-0".
3. ALL JOINTS IN ABUTMENTS SHALL BE LOCATED APPROXIMATELY MIDWAY BETWEEN SPANS.

THIS SHEET IS NOT TO SCALE

REVISED
No. DATE
RI DEPARTMENT OF TRANSPORTATION
BRIDGE STANDARDS
WALL JOINTS AND MISCELLANEOUS DETAILS
DRAWING NUMBER: 12.10