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* SEE ROADWAY TYPICAL SECTIONS.

** PART PLAN **

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** NOTES **

- PREFORMED EXPANSION JOINT FILLER
- ** THIS DIMENSION MAY VARY IN ORDER TO USE SIMILAR WINDWALLS ELSEWHERE. **

Sections A-A and E-E are shown on Sheet [103].
Sections F-F and G-G are shown on Sheet [102].
See Sheet [102] for Seismic Pedestal Details.
FRONT VIEW OF SEISMIC PEDESTAL

The 8'-0" width of the pedestal shall be measured parallel to the centerline of bearing. The A302 & A309 bars shall be placed parallel to the centerline of bearing. The A25 & A209 bars shall be placed parallel to the beams or girder.

SECTION J-J

The location of the main reinforcement in the beam seat may be adjusted horizontally 1' to accommodate the A302 bars.

* The surface of the beam seat in this area shall be finished with a serrated theme. The serrations shall be 1/2" deep min./max.

BENDING DIAGRAMS

8'-0" skew angle

TABLE A

ADDITIONAL PEDESTALS REQUIRED

DESIGN SEISMIC FORCE (lbs)

PEDESTAL HEIGHT (H) (in)

ACCEPTABLE

200

150

100

50

0

285

280

275

270

265

260

255

250

245

240

235

230

225

220

215

210

205

200

150

100

50

0
CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB

ON PRESSED CONCRETE BOX BEAM BRIDGES

ON PRESSED CONCRETE BOX BEAM BRIDGES

ON BRIDGE LIMIT

APPROACH SLAB SUPPORTED ON ABUTMENT BACKFILL

APPROACH SLAB SUPPORTED ON ABUTMENT BACKFILL

APPROACH SLAB SUPPORTED ON ABUTMENT BACKFILL

CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB

CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB

- THE APPROACH SLAB MUST BE AS PRESSED CONCRETE BOX BEAM BRIDGE IS SHOWN AT THE SAME ELEVATION AS THE BEAM SLAB. HOWEVER, IT MAY ACTUALLY BE MOWER OR LOWER THAN THE BEAM SLAB DEPENDING ON THE RISE OF THE DECK.

NOTE 1: PRESSED ELASTOMERIC COMPRESSION JOINT SEAL, 105.11 USE 7/16" MOLD GROUT AND 1 1/8" HIGH GROUT IN GROOVE.

NOTE 2: 3" DEEP X 4" WIDE NOT APPLIED JOINT SEALER, 105.04.

NOTE 3: 1" PREFORMED EXPANSION JOINT SEALER, 105.05.

NOTE 4: TYPE "A" OR "E" WATERPROOFING.

NOTE 5: SEE E1550 FOR SANDING AND SEALING ASPHALT CONCRETE FLEXIBLE JOINTS.

NOTE 6: SEE SUPPLEMENTAL SPECIFICATION BAR "POLYMER MODIFIED ASPHALT EXPANSION JOINT SYSTEM".

TYPE "A" OR "E" WATERPROOFING SHALL NOT EXTEND ABOVE THE BOTTOM OF THE GROOVE INTO WHICH THE PREFORED ELASTOMERIC COMPRESSION JOINT SEAL IS TO BE PLACED. IT SHALL BE APPLIED TO THE ENTIRE AREA OF THE ABUTMENT OR SUPPORT STRUCTURE WHICH COMES INTO CONTACT WITH THE APPROACH SLAB.

FOR PRESSED CONCRETE BOX BEAM BRIDGES WITH ASPHALT CONCRETE ON BOTH BRIDGE DECK AND APPROACH SLAB, THE TOP OF APPROACH SLAB AT THE BRIDGE END SHALL BE CONSTRUCTED TO THE LEVEL OF THE TOP OF THE BEAMS TO FACILITATE WATERPROOFING ON THE JOINT. THE THICKNESS OF ASPHALT CONCRETE AT THE APPROACH END OF THE SLAB SHALL BE THE THICKNESS OF ASPHALT CONCRETE USED ON THE ROADWAY PAVEMENT. THE THICKNESS OF ASPHALT CONCRETE SHALL VARY UNIFORMITY, IF NECESSARY, IN THE LENGTH OF THE APPROACH SLAB. THE SURFACE SLABES SHALL BE GRADED TO PERMIT THE BOTTOM OF THE APPROACH SLAB TO BE PARALLEL TO THE TOP.

FOR STRUCTURES WITHOUT STIP SEAL, COMPRESSION SEAL OR POLYMER MODIFIED ASPHALT EXPANSION JOINTS, THAT HAVE AN ASPHALT CONCRETE WEARING SURFACE ON BOTH THE BRIDGE DECK AND APPROACH SLAB, EXTEND THE WATERPROOFING 2'-0" BEYOND THE BRIDGE LIMITS. FOR STRUCTURES WITH STIP SEAL AND COMPRESSION SEAL EXPANSION JOINTS, AND THE DECK WATERPROOFING AT THE PRESSED CONCRETE BOX BEAM NOTCH. FOR STRUCTURES WITH POLYMER MODIFIED ASPHALT EXPANSION JOINTS, EXTEND THE DECK WATERPROOFING TO THE CENTERLINE OF THE JOINT.
AGGREGATE DRAIN, CMS 605.07, 2'-0" WIDE x 1'-0" DEEP, CENTERED ON THE CENTERLINE OF SLEEPER SLAB.

NOTES:
1. 6" DIA. PERFORATED PIPE (CMS 707.31) UNDERDRAIN, CMS 605.03, PLACED ALONG THE ENTIRE LENGTH OF SLEEPER SLAB. SEE NOTES 1 THROUGH 3.

2. AGGREGATE BASE, 6" DIA. PERFORATED PIPE (CMS 707.31) UNDERDRAIN, CMS 605.03, PLACED ALONG THE ENTIRE LENGTH OF SLEEPER SLAB. SEE DETAILS 14-14.

3. REDUCTION IN THE SPACING OF THE 2'-0" FLEXIBLE ASPHALT PAVEMENT IS NECESSARY AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STANDARD BRIDGE DWG. AS-1-15, SHEET 22.

4. FOR APPROACH SLAB REBAR LAYOUT SHOWN TO CENTERLINE OF ROADWAY. THE REBAR LAYOUT FOR SLEEPER SLAB IS SIMILAR TO SLEEPER SLAB REBAR LAYOUT SHOWN IN DETAIL A, SHEET 714.

5. THE SPACING SHALL BE MEASURED PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY. THE SPACING FOR THE TOP TRANSVERSE REBARS SS502 SHALL BE PLACED PARALLEL TO CENTERLINE OF ROADWAY. (SEE ROADWAY PLANS)

6. PLACE DRAINS AND OUTLETS ON THE LOW SIDE OF SUPERELEVATED APPROACH SLABS AND BOTH SIDES IF THE APPROACH SLABS IS SHORTENED AND THE SPACINGS FOR THE TOP TRANSVERSE REBARS SS502 SHALL BE ADJUSTED IN ORDER TO AVOID INTERFERENCE WITH THE POLYMER MODIFIED ASPHALT JOINT SYSTEM.

7. IF PLANS DO NOT INCLUDE PAY ITEM FOR SUPPLEMENTAL SPECIFICATIONبارك OR POLYMER MODIFIED ASPHALT JOINT SYSTEM AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STD. BRIDGE DWG. AS-2-15, SHEET 43, DETAIL C. INCLUDE PAYMENT FOR JOINT SEALER.

8. AGGREGATE DRAIN, CMS 605.07, 2'-0" WIDE x 1'-0" DEEP, CENTERED ON THE CENTERLINE OF SLEEPER SLAB.

9. REDUCTION IN THE SPACING OF THE 2'-0" FLEXIBLE ASPHALT PAVEMENT IS NECESSARY AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STD. BRIDGE DWG. AS-2-15, SHEET 43, DETAIL C. INCLUDE PAYMENT FOR JOINT SEALER.

10. PLACE DRAINS AND OUTLETS ON THE LOW SIDE OF SUPERELEVATED APPROACH SLABS AND BOTH SIDES IF THE APPROACH SLABS IS SHORTENED AND THE SPACINGS FOR THE TOP TRANSVERSE REBARS SS502 SHALL BE ADJUSTED IN ORDER TO AVOID INTERFERENCE WITH THE POLYMER MODIFIED ASPHALT JOINT SYSTEM. HOWEVER, IF PLANS DO NOT INCLUDE PAY ITEM FOR SUPPLEMENTAL SPECIFICATIONبارك OR POLYMER MODIFIED ASPHALT JOINT SYSTEM AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STD. BRIDGE DWG. AS-2-15, SHEET 43, DETAIL C. INCLUDE PAYMENT FOR JOINT SEALER.

11. REDUCTION IN THE SPACING OF THE 2'-0" FLEXIBLE ASPHALT PAVEMENT IS NECESSARY AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STD. BRIDGE DWG. AS-2-15, SHEET 43, DETAIL C. INCLUDE PAYMENT FOR JOINT SEALER.

12. PLACE DRAINS AND OUTLETS ON THE LOW SIDE OF SUPERELEVATED APPROACH SLABS AND BOTH SIDES IF THE APPROACH SLABS IS SHORTENED AND THE SPACINGS FOR THE TOP TRANSVERSE REBARS SS502 SHALL BE ADJUSTED IN ORDER TO AVOID INTERFERENCE WITH THE POLYMER MODIFIED ASPHALT JOINT SYSTEM. HOWEVER, IF PLANS DO NOT INCLUDE PAY ITEM FOR SUPPLEMENTAL SPECIFICATIONبارك OR POLYMER MODIFIED ASPHALT JOINT SYSTEM AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STD. BRIDGE DWG. AS-2-15, SHEET 43, DETAIL C. INCLUDE PAYMENT FOR JOINT SEALER.

13. PLACE DRAINS AND OUTLETS ON THE LOW SIDE OF SUPERELEVATED APPROACH SLABS AND BOTH SIDES IF THE APPROACH SLABS IS SHORTENED AND THE SPACINGS FOR THE TOP TRANSVERSE REBARS SS502 SHALL BE ADJUSTED IN ORDER TO AVOID INTERFERENCE WITH THE POLYMER MODIFIED ASPHALT JOINT SYSTEM. HOWEVER, IF PLANS DO NOT INCLUDE PAY ITEM FOR SUPPLEMENTAL SPECIFICATIONبارك OR POLYMER MODIFIED ASPHALT JOINT SYSTEM AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STD. BRIDGE DWG. AS-2-15, SHEET 43, DETAIL C. INCLUDE PAYMENT FOR JOINT SEALER.

14. PLACE DRAINS AND OUTLETS ON THE LOW SIDE OF SUPERELEVATED APPROACH SLABS AND BOTH SIDES IF THE APPROACH SLABS IS SHORTENED AND THE SPACINGS FOR THE TOP TRANSVERSE REBARS SS502 SHALL BE ADJUSTED IN ORDER TO AVOID INTERFERENCE WITH THE POLYMER MODIFIED ASPHALT JOINT SYSTEM. HOWEVER, IF PLANS DO NOT INCLUDE PAY ITEM FOR SUPPLEMENTAL SPECIFICATIONبارك OR POLYMER MODIFIED ASPHALT JOINT SYSTEM AT THIS LOCATION, APPLY JOINT SEALER AS SHOWN IN STD. BRIDGE DWG. AS-2-15, SHEET 43, DETAIL C. INCLUDE PAYMENT FOR JOINT SEALER.

REINFORCING STEEL FOR SLEEPER SLAB

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**NOTES:**

1. 1" PREFORMED EXPANSION JOINT FILLER SHALL EXTEND UP BETWEEN CAST-IN-PLACE CONCRETE TURNBACK MINNEWALLS AND THE SIDE FACES OF APPROACH SLAB AND PROPOSED FLEXIBLE (ASPHALT) PAVEMENT TO THE ELEVATION OF 1" BELOW THE FINAL SURFACE ELEVATION OF THE FLEXIBLE (ASPHALT) PAVEMENT. THEN, APPLY 1" DEEP x 1" WIDE HOT APPLIED JOINT SEALER AS PER CMS 705.04.

2. SEE STD. BRIDGE DWG. AS-1-15, SHEET 514, DETAIL C.

3. FOR DETAIL A AND ADDITIONAL NOTES, SEE SHEET 514.

---

**SECTION A-A**

**JOINTED STRUCTURE WITH PROPOSED FLEXIBLE (ASPHALT) PAVEMENT**

**REINFORCING STEEL NOT SHOWN**

---

**LEGEND:**

- P.E.J.F. = PREFORMED EXPANSION JOINT FILLER
- T.F. = TACK FILLER
- W  = APPROACH SLAB WIDTH (VARIES, SEE DETAIL A)
- L  = Approach Slab Length
- 1" = 1 INCH

---

**ELEVATION**

TAKEN PERPENDICULAR TO E ROADWAY, LOOKING UP-STATION

---

**PLAN**

JOINTED STRUCTURE WITH CAST-IN-PLACE CONCRETE TURNBACK MINNEWALLS AND PROPOSED FLEXIBLE (ASPHALT) PAVEMENT
**PLAN**

Jointed structure with cast-in-place concrete turnback wingwalls and proposed rigid (concrete) pavement.

**SECTION A-A**

Jointed structure with proposed rigid (concrete) pavement. Reinforcing steel not shown.

NOTES:
1. 1" preformed expansion joint filler shall extend up between cast-in-place concrete turnback wingwalls and the side faces of approach slab and proposed flexible (asphalt) pavement to the elevation of 1" below the final surface elevation of the flexible (asphalt) pavement. Then, apply 3" deep x 1" wide hot-applied joint sealer as per CMS 105-04.
2. See Std. Bridge Cmg. AS-4-15, Sheet 122, Detail C.
3. For detail A and additional notes, see Sheet DM-4.1.

**ELEVATION**

Taken perpendicular to E roadway, looking up-station.

**LEGEND:**
- P.E.J.F. = Preformed Expansion Joint Filler
- TOP OF BURIED APPROACH SLAB
- FLEXIBLE (ASPHALT) PAVEMENT
- PROPOSED RIGID (CONCRETE) PAVEMENT
- REINFORCING STEEL NOT SHOWN
- JOINTED STRUCTURE WITH PROPOSED RIGID (CONCRETE) PAVEMENT
NOTES:

1. 1" PREFORMED EXPANSION JOINT FILLER SHALL EXTEND UP BETWEEN CAST-IN-PLACE CONCRETE TURNBACK WINGWALLS AND THE SIDE FACES OF APPROACH SLAB AND PROPOSED FLEXIBLE (ASPHALT) PAVEMENT TO THE ELEVATION OF P BELOW THE FINAL SURFACE ELEVATION OF THE FLEXIBLE (ASPHALT) PAVEMENT. THEN, APPLY 1" DEEP x 1" WIDE HOT APPLIED JOINT SEALER AS PER CMS 705.04.

2. FOR MIDWEST GUARDRAIL SYSTEM, BRIDGE TERMINAL ASSEMBLY, TYPE 1, SEE STD. CONST. DWG. MGS-3.1. FOR MGS BRIDGE TERMINAL ASSEMBLY, TYPE 2, SEE STD. CONST. DWG. MGS-3.2.

3. FOR TYPE 4-B CONCRETE CURB, SEE STD. CONST. DWG. BP-5.1.


5. PROVIDE 1" PREFORMED EXPANSION JOINT FILLER AT THE INTERFACE BETWEEN END OF CONCRETE BRIDGE RAILING AND TYPE 4-B CONCRETE CURB.

6. FOR GENERAL NOTES, SEE SHEET 14-14.
**SECTION B-B**

- TOP OF APPROACH SLAB
- CONSTRUCTION JOINT (TYP.)
- SINGLE SLOPE CONCRETE BRIDGE RAILING
  - MOTE 4B-8
  - SHALL BE DESIGNED AND SUPPLIED BY THE SAME MANUFACTURER.

**SECTION C-C**

- REINFORCING STEEL AND MSE WALL NOT SHOWN
- REINFORCEMENT STEEL AND MSE WALL NOT SHOWN
- SEE PROJECT PLANS FOR MOMENT SLAB DETAILS

**SECTION D-D**

- CONSTRUCTION JOINT (TYP.)
- SINGLE SLOPE CONCRETE BRIDGE RAILING

---

**NOTES:**

1. FOR LOCATION OF SECTIONS B-B, C-C, AND D-D SEE SHEET NO.
2. FOR ARMORLESS PREFORMED JOINT SEAL OPENING TABLE SEE SHEET NO.
3. APPLY BOND BREAKER TO THE ENTIRE TOP SURFACE OF THE CONCRETE SLEEPER SLAB.
   SEE REINFORCED CONCRETE SLEEPER SLAB SURFACE FINISH AND BOND BREAKER NOTE ON SHEET NO.
4. DIM. THE SKEW ANGLE IS 0°, AND IS EQUAL TO ZERO.

---

**LEGEND:**

- P.E.J.F. = PREFORMED EXPANSION JOINT FILLER
- T1 = THICKNESS OF PROPOSED REINFORCED BRIDGE RAILING (TYP.)
- SS = JOINT SEAL (TYP.)
- SEE NOTE 4 ON SHEET NO.

**ITEM 516 - ARMORLESS PREFORMED JOINT SEAL:**

SELECT THE ARMORLESS PREFORMED JOINT SEAL FROM ONE OF THE MANUFACTURERS LISTED BELOW:

- R.J. WATSON, INC.
  1035 WILSON AVENUE
  ALLEN, NY 14004-2909
  PHONE: (716) 901-7020
  FAX: (716) 901-7016
  - SILICOFLEX SS400 MAX. MOVEMENT RATING 49

- D.S. BROWN COMPANY
  350 E. WILDER ST.
  NORTH BOSTON, NY 14011
  PHONE: (716) 901-7020
  FAX: (716) 901-7016
  - SS450 MAX. MOVEMENT RATING 49

- WATSON BOWMAN ACME CORP.
  95 PINERロー DRIVE
  AMHERST, NY 14228-2121
  PHONE: (716) 901-7020
  FAX: (716) 901-7016
  - WATSON BOWMAN WAM-450 MAX. MOVEMENT RATING 49

- U.S. BROWN COMPANY
  750 E. WILDER ST.
  NORTH BOSTON, NY 14011
  PHONE: (716) 901-7020
  FAX: (716) 901-7016
  - SS150 MAX. MOVEMENT RATING 49


THE DEPARTMENT WILL MEASURE THE ARMORLESS PREFORMED JOINT SEAL BY THE NUMBER OF FEET HORIZONTALLY ALONG THE JOINT CENTERLINE.

THE DEPARTMENT WILL INCLUDE ALL MATERIALS, LABOR, EQUIPMENT, SURFACE PREPARATIONS, TOOLS, TRAFFIC CONTROL, AND INCIDENTALS NEEDED TO COMPLETE THE WORK DESCRIBED ABOVE IN THE CONTRACT PRICE FOR ITEM 516 - ARMORLESS PREFORMED JOINT SEAL.

---

**APPENDIX B - INSTALLATION**

- SEE PROJECT PLANS FOR MOMENT SLAB DETAILS

---

**STATE OF OHIO DEPARTMENT OF TRANSPORTATION**

**ADMINISTRATOR**

**REVISIONS OFFICE OF STRUCTURAL ENGINEERING**

**DATE**

---

**STATE OF OHIO DEPARTMENT OF TRANSPORTATION**

**ADMINISTRATOR**

**REVISIONS OFFICE OF STRUCTURAL ENGINEERING**

**DATE**

---

**STATE OF OHIO DEPARTMENT OF TRANSPORTATION**

**ADMINISTRATOR**

**REVISIONS OFFICE OF STRUCTURAL ENGINEERING**

**DATE**
DETAIL A

JOINTLESS SUPERSTRUCTURE WITH CAST-IN-PLACE CONCRETE TURNBACK Wingwalls and Proposed Flexible (asphalt) Pavement

NOTES:
1. FOR LOCATION OF DETAIL A AND REINFORCING STEEL LIST, SEE SHEET 14-11.
2. FOR SECTIONS C-C, D-D, E-E, AND ADDITIONAL NOTES, SEE SHEET 14-11.
3. IF THE SKEW ANGLE IS 0°, AND  EQUAL TO ZERO.
4. REBARS SS502 AND SS503 SHALL BE PLACED PARALLEL TO CENTERLINE OF ROADWAY.
5. FOR ARMORLESS PREFORMED JOINT SEALING OPENING TABLE, SEE SHEET 14-11 FORM JOINT OPENING USING REMOVABLE FORM.
6. FOR ARMORLESS PREFORMED JOINT SEAL NOTE, SEE SHEET 14-11.
7. APPLY BOND BREAKER TO THE ENTIRE TOP SURFACE OF THE CONCRETE SLEEPER SLAB. SEE "REINFORCED CONCRETE SLEEPER SLAB SURFACE FINISH AND BOND BREAKER" NOTE ON SHEET 14-11.
8. FOR TYPE 4-A CONCRETE CURB AND TYPE 4-C CONCRETE CURB, SEE STD. CONST. (B5-04).

SECTION A-A

SECTION B-B
NOTES:
1. For location of sections C-C, D-D, and E-E, see sheet AS-1-15.
2. For Midwest Guardrail, System Bridge Terminal Assembly, Type 1, see STD. CONST. DWG. MS-6.1.1, MS Bridge Terminal Assembly, Type 2 (STD. CONST. DWG. MS-3.2) similar.
3. For type 4-A concrete curb and Type 4-C concrete curb, see STD. CONST. DWG. MS-5.1.
4. For approach slab reinforcing steel and additional details, see STD. DWG. MS-5.1.
5. For Armoredless preformed joint seal opening table see sheet AS-1-15.
6. For Armorless preformed joint seal note, see sheet AS-1-15.
7. For general notes, see sheet AS-1-15.
8. Place drains and outlets on the low side of superelevated approach slabs and both sides if the approach slab is crowned.
9. The skew angle is greater than 0°.
10. Additional length due to geometry if the skew angle is greater than 0°. See detail A-A on sheet AS-1-15.
# SKEW ANGLE

# APPROACH SLAB WIDTH (TOE-TO-TOE CONCRETE BRIDGE RAILING/CONCRETE CURB)

## PLAN

### Jointless Superstructure with Cast-in-Place Concrete Turnback Wingwalls and Proposed Rigid (Concrete) Pavement

### ELEVATION

Taken perpendicular to road, looking up-station

## SECTION A-A

Reinforcing Steel Not Shown

---

**NOTES:**

1. For additional details, notes, reinforcing steel list, armorless preformed joint filler, see sheets 12A through 12B.
2. For type B pressure relief joint, see std. const. dwg. 0-2-4.
3. For approach slab reinforcing steel and additional details, see std. bridge dwg. AS-15-1B.
4. For general notes, see shear plane.
GENERAL NOTES

GENERAL

This standard drawing provides design and general construction details. The project plans shall show skew angles, special notes and details where necessary, and a pay item for type A, type B, or type C installation in the estimated quantities table. For conditions other than those indicated herein, the approach slab installation shall be adapted to fit the ends of the reinforced concrete approach slab.

For bridges and approach slabs with sidewalks, the details will be similar to the details shown here. The width of the approach slab shall be the full width of the bridge and the sidewalk will be on top of the approach slab.

DESCRIPTION

Perform work in accordance with CMS 526 except as noted herein.

DESIGN CRITERIA


DESIGN DATA

DESIGN LOAD:

F.W.S. = 0.080 KSF

DESIGN STRESSES:

CONCRETE = COMPRESSION STRENGTH = 4.5 KSI

REINFORCING STEEL = MIN. YIELD STRENGTH = 60 KSI

REINFORCED CONCRETE SLEEPER SLAB LENGTH

For type A installation and type C installation, the length of the approach slab shall be for the entire width of the approach slab as shown on sheets 5-14 through 12-14, respectively, for a skewed structure, the sleeper slab shall be placed parallel to the skew at the end of approach slab.

LONGITUDINAL CONSTRUCTION JOINT

For stage construction, longitudinal joint shall be in accordance with CMS 519, provide 2"6" lap splice of SS901 rebar or mechanical connectors per CMS 509.07. If required, make reinforcing steel lap splice of SS501.

REINFORCED CONCRETE SLEEPER SLAB SURFACE FINISH AND BOND BREAKER:

For type A installation and type C installation, the top surface of the reinforced concrete sleeper slab shall be troweled for a smooth finish.

WATER CURE the sleeper slab as per CMS 519.0.H.A. After water curing has been completed, membrane cure the sleeper slab as per CMS 519.0.H.B. Apply a second coat of the membrane cure to the sleeper slab prior to approach slab concrete pour at the same dosage rate specified in CMS 519.0.H.B. To the surfaces labeled "bond breaker" on sheets 5-14 and 11-14, for type A installation and sheets 6-14 through 8-14, for type C installation.

REPAIR COATING DAMAGE IDENTIFIED BY THE ENGINEER.

METHOD OF MEASUREMENT:

For type A installation and type C installation, the department will measure reinforced concrete sleeper slab by the number of linear feet complete in place and measured along the skew at the end of the approach slab.

For type B installation sheets 11-14 through 13-14, the department will measure reinforced joint mesh by the number of square yards of applied surface area, measured along the skew. See note for "reinforced joint mesh" on sheet 5-14. There is no reinforced concrete sleeper slab in type B installation.

BASIS OF PAYMENT

The department will pay for accepted quantities at the contract price for items 526 - type A installation (*: designer should fill in the appropriate type A, type B, or type C (which includes):

- 6" S.4. PERFORATED PIPE CMS 707.3B UNDERDRAIN (TYPE A INSTALLATION)
- GRANULAR MATERIAL FOR THE UNDERDRAIN (TYPE A INSTALLATION)
- PIPE COUPLINGS (TYPE A INSTALLATION)
- PIPE OUTLET AS PER STD. CONST. DM. DH-1.1 AND PIPE INSTALLATIONS AS PER STD. CONST. DM. SW-1.2, IF REQUIRED (TYPE A INSTALLATION)
- AGGREGATE DRAINS (TYPE A INSTALLATION AND TYPE C INSTALLATION)
- REINFORCED JOINT MESH (TYPE B INSTALLATION)
- EXCAVATION FOR REINFORCED CONCRETE SLEEPER SLAB (TYPE A INSTALLATION AND TYPE C INSTALLATION)
- REINFORCED CONCRETE SLEEPER SLAB (TYPE A INSTALLATION AND TYPE C INSTALLATION)
- REINFORCED STEEL INCLUDING SUPPORTS, TIE WIRES, AND IF REQUIRED, MECHANICAL CONNECTORS (TYPE A INSTALLATION AND TYPE C INSTALLATION)
- BOND BREAKER (TYPE A INSTALLATION AND TYPE C INSTALLATION)
- LONGITUDINAL CONSTRUCTION JOURNT FOR STAGE CONSTRUCTION, IF REQUIRED FOR TYPE A INSTALLATION AND TYPE C INSTALLATION

The department will pay for the following items separately:

- REINFORCED CONCRETE APPROACH SLAB WITH CURBS IF REQ'D.
- FLEXIBLE ASPHALT PAVEMENT
- POLYMER MODIFIED ASPHALT JOINT SYSTEMS (TYPE A INSTALLATION)
- ARMORED PREFORMED JOINT SEAL (TYPE C INSTALLATION)
- PREFORMED EXPANSION JOINTER FILLER
### Reinforcing Steel for 36° BR-1 Transition Mounted on Wingwall

**Legend**

- **N.S.**: Near Side
- **F.S.**: Far Side
- **E.S.**: Each Side
- **P.E.J.F.**: Preformed Expansion Joint Filler

**Mark**

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<th>Type</th>
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**NOTES**

1. For all New Jersey shape concrete bridge railings including the 36°-1 transitions, project plans should include plan view, elevation view, sections, reinforcing bars, reinforcing bending diagrams, and reinforcing weights.
2. See appropriate standard bridge drawing for abutment details.
3. For bridge terminals, assemble see site: G/C, D1/M3S: M05+1 and M05+2.
4. For deflection joint details and additional notes, see Sheet M06.

**Detailed Notes**

- See project plans. Field bend bars where necessary.
Railing Detail at Deck Expansion Joint
Reinforcing Steel Not Shown

LEGEND

DIA. = DIAMETER
HSS = HOLLOW STRUCTURAL SECTION
R = RADIUS

NOTES:
1. For bridge sidewalk railing with vandal protection fence as shown in Std. Bridge DMG. VFP-1-86, modified Std-1 or BP-3 shall be utilized instead of BP-1 or BP-3 in order to accommodate placement of vandal protection fence posts and post sleeves. For additional details and notes on vandal protection fence, see std. Bridge DMG. VFP-1-86.
2. For deflection joint details and general notes, see sheet #121.
3. Fabricate post sleeve and attach to base plate as shown on Std. Bridge DMG. VFP-1-86, SHEET #121.
GENERAL NOTES

The contractor has an option to perform full depth sawcut, however, the sawcut shall not be less than 1-1/2” below the top of the concrete slab.

USE AN EXIT GUIDE, FENCE, OR JOG TO ENSURE THAT THE CUT JOURNEY IS STRAIGHT, TRUE, AND ALIGNED ON ALL AXES OF THE PARAPET. THE PARAPET WILL BE THE WIDTH OF THE SAW BLADE, A MINIMUM OF 18 INCH.

SEAL THE PERIMETER OF THE DEFLECTION JOINTS TO A MINIMUM DEPTH OF ONE INCH WITH A POLYURETHANE OR POLYURETHANE MORTAR COMMENSURATE WITH ASTM C930, TYPE S. LEAVE THE BOTTOM 1/2 INCH OF BOTH THE INNER AND OUTER SIDES OF THE PARAPET UNSEALED TO ALLOW ANY WATER WHICH MAY ENTER THE JOINT TO ESCAPE.

MINIMUM EMBLEND OF VERTICAL REINFORCING BARS: IF THE MINIMUM EMBLEND SHOWN FOR THE VERTICAL REINFORCING BARS INTO THE BRIDGE DECK, APPROACH SLAB, MEDIAN, OR SIDEWALK IS NOT MET, THEN THE DESIGNER SHALL CALCULATE THE REQUIRED REINFORCING BARS AS SHOWN IN SECTION 8-2 ON THE "ASBETO LITE BRIDGE DESIGN SPECIFICATIONS" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAYS AND TRANSPORTATION OFFICIALS.

METHOD OF MEASUREMENT: THE DEPARTMENT WILL MEASURE THE LENGTH OF HAILING BETWEEN THE ENDS OF THE CONCRETE BARRIER.

BASE PAYMENT: FOR THE CONCRETE AND REINFORCING STEEL ABOVE OR EXTENDING ABOVE THE UPPERSURFACE OF THE SIDEWALK, CEMENTING COMPOUND, ANCHOR BOLTS, STEEL PLATES, AND POLYESTER BARRELS, PLUS THE STEEL HARDSHIPS AND STEEL HARDSHIPS AND HARDWARE, AND INCLUDED FOR PAYMENT IN THE UNIT PRICE SPECIFIED FOR THE MEASURED LENGTH.

FOR BRIDGE SIDEWALK RAILING WITHOUT VANDAL PROTECTION FENCE, THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE FOR ITEM 517, FASTENING CONCRETE PARAPET WITH TYPICAL STEEL TUBE RAILING.

FOR BRIDGE SIDEWALK RAILING WITH VANDAL PROTECTION FENCE, IN ADDITION TO THE ITEMS LISTED ABOVE, THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE FOR ITEM 518, FASTENING CONCRETE PARAPET WITH TYPICAL STEEL TUBE RAILING AND VANDAL PROTECTION FENCE WHICH INCLUDES FABRICATION OF BASE PLATES WITH STUDS AND HEXAGON SOCKET SET SCREWS.

THE DEPARTMENT WILL PAY FOR ALL REMAINING VANDAL PROTECTION FENCE COMPONENTS SEPARATELY.

NOTES TO DESIGNER: THIS STANDARD BRIDGE DRAWING IS INTENDED FOR USE WHEN THE APPROACH ROADWAY SECTION CONTAINS A CONCRETE SIDEWALK AND THE APPROACH RAILING IS ON THE OUTSIDE OF THE CONCRETE SIDEWALK.


**GENERAL NOTES**

**DESIGN SPECIFICATIONS:**

This standard drawing conforms to the "ABASHADO LIPS BRIDGE DESIGN SPECIFICATIONS" adopted by the American Association of State Highway and Transportation Officials, 2001, including the 2003 interim revisions, and the 2007 good bridge design manual.

**DESIGN BASIS:**

Design Method - Load and Resistance Factor Design
Live Load - H-93
Future Wearing Surface - 0.06 ksi

**DESIGN STRESSES:**

Substructure Concrete - Compressive Strength = 4.0 ksi
Reinforcing Steel - Minimum Yield Strength = 60 ksi

**DESIGN INSTRUCTIONS:**

This drawing provides general design and construction details. The project plans for each structure shall show stations, span lengths, roadway width, skew, curve and super-elevation data (if any), elevations, substructure details, estimated quantities, reinforcing steel list, areas of sealing, type of seal, and other necessary details and special notes.

**PILES:**

The design shall show the pile type, size, spacing and ultimate bearing value on the project plans. The maximum pile spacing is 8'-0".

**REINFORCING STEEL:**

The minimum lap lengths for the reinforcing steel are 1'-3" for #6 bars and 3'-3" for #8 bars, unless noted otherwise. The lap lengths assume epoxy coated reinforcing steel. If the longitudinal bars are spliced, place lap splices in a staggered arrangement.

---

**REINFORCING STEEL**

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**REINFORCING DIAGRAMS**

- Type 1
- Type 2
- Type 3
- Type 4
- Type 5
- Type 6

*DIMENSION MAY VARY WITH EACH INDIVIDUAL STRUCTURE.*
**GENERAL NOTES**

**DESIGN SPECIFICATIONS:**

This standard drawing conforms to the "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS" adopted by the American Association of State Highway and Transportation Officials (AASHTO), 2007, including the 2008 interim revisions, and the 2007 CDDO bridge design manual.

**DESIGN DATA:**

**DESIGN METHOD - LOAD AND RESISTANCE FACTOR DESIGN**

**DESIGN INSTRUCTIONS (CONTINUED):**

- The department will pay for accepted quantities at the contract price for item - special, pile encasement.
- The department will pay for accepted quantities at the contract price for item - special, pile encasement.
- The department will pay for accepted quantities at the contract price for item - special, pile encasement.

**LIMITS OF DESIGN:**

- This standard drawing should not be used for any bridge in which the following limits are exceeded:
  - (A) sky angle of 30°.
  - (B) unsupported length of piles equals 20 feet.
  - (C) to support a standard continuous concrete slab with an individual span of 57.50 feet.
  - (D) sloped embankment, debris, or ice floe loads which would cause appreciable horizontal force against the pile bent.
  - (E) rock or other firm material that would prevent driving piles at least 10 feet below the finished ground line.

**507, CIP, REINFORCED CONCRETE PILES:**

- The reinforcing steel shall be hot-dipped coated and shown in the structure's reinforcing bar list and be included in item 507, 16 inch cast-in-place piles furnished for payment.
GENERAL: This drawing provides design and general construction details for three-span slab bridges. The project plans for each structure will show span lengths, roadway width, skew, curve, and super-elevation of any elevations, slab reinforcement details in plan and transverse sections, substructure details, estimated quantities, reinforcing steel list and other necessary details and special notes.

Additional interior spans, the same length as the middle span, may be incorporated into the structure without change in slab thickness or area of reinforcing steel. When spans are added, the project plans will show the revised details.

ROADWAY WIDTH: The slab design is applicable for the following roadway widths, measured out to out of bridge deck: Width ≥ 3.87 ft.


DESIGN DATA: DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN (LRFD) - FUTURE WEARING SURFACE - ONE INCH MONOLITHIC CONCRETE - COMPREHENSIVE STRENGTH - 4000 PSI REINFORCING STEEL - MIN. YIELD STRENGTH - 60,000 PSI.

REINFORCING STEEL: Furnish the reinforcing steel, lengths shown below, at no additional cost to the state, as indicated in the table or standard drawings. If the contractor elects to utilize shorter bar lengths, provide the minimum lap length shown below at no additional cost to the state.

THE LOCATIONS OF THE SPLICES SHALL BE APPROVED BY THE ENGINEER.

NOTE: A BAR LENGTHS INCLUDE the 90° BEND STANDARD HOOK LENGTH.
## Edge Beam Slab Data - Over the Side Drainage

**Longitudinal**

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### Edge Beam Elevation - Over the Side Drainage

- \( y \) inches = \( \frac{1}{3} \) [Bridge Limit (Feet)] - [INC. M-Bars + 0.06 M-Bar Spacing (Feet)]

### Edge Beam Detail

- For slabs with \( t < 18" \)
- X-4" = 4" slab thickness
- X-5" = 5" slab thickness
- X-6" = 6" slab thickness

### Additional Information

- Edge Beam Detail for slabs with \( t \geq 18" \)
- Edge Beam Detail for slabs with \( t \geq 18" \)
- Edge Beam Detail for slabs with \( t \geq 18" \)

### Table for Additional N-Bars

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### Table for Edge Beam Details

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### Table for Edge Beam Elevation

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Drip Strip Notes

Install lower stainless steel drip strip, as detailed, along the full length of each side of the bridge. If splices are required in the lower drip strip, tightly butt the individual pieces together. Do not lap. Install a 1" x 5" long upper drip strip at each railing post. Bend up strips at 90° against the inside face of the forms before concrete is placed. After the forms are removed, bend the drip strips into the final position of 45° as shown herein.

Stainless steel shall be a minimum of 22 gauge ASTM A276, Type 304, mirror finish.

Use care when stripping forms so as not to damage or mar the stainless steel drip strip. To further ensure that wrinkling of the strips does not occur, use an adequate length backup bar during the forming or operation.

The Department will measure the drip strip of the post and will include the total length of both the upper and lower drip strips.

The Department will pay for accepted quantities at the contract price for view special stainless steel drip strip.

Prior to placing the asphalt overlay, install the zinc drip strips along the edge of the prestressed box beam as shown. Fasten the drip strips with 1/8" length, 3/16" shank diameter) button head spacers with detopped shanks on expansion anchors at 1'-6" o/c max. All installation devices shall be galvanized or stainless steel. Other similar devices shall not be used unless approved by the Engineer.

Place chamfer strip on (side of drip strip)

Upper Strip

For View C-C

Strip shown prior to concrete placement

Concrete deck surface
cambering (as necessary)

Continuous drip strip
to be field matched to clear post anchors (as necessary)

VIEW A-A

Strip shown prior to concrete placement

Composed Box Beam with TST-1-99 Railing

Strip shown prior to concrete placement

Concrete Deck Surface Cambering (as necessary)

Continuous drip strip to be field matched to clear post anchors (as necessary)
GENERAL NOTES:

COMPRESSION SEAL: Furnish material conforming to T05-14. The seal configuration should be similar to the details shown herein. Acceptable manufacturers' and O.D. Brown (Model 62500, Watson-Watson-Acme Model W4000) or an approved equivalent. Install the seal according to the manufacturer's specifications and under the supervision of the manufacturer's designated representative.

JOINTS IN COMPRESSION SEALS: Furnish seals in one continuous piece unless otherwise approved by the Engineer.

ARMOR STEEL: Each channel shape, angle shape, and all cross frame connection gusset plates shall be ASTM A50, grade 50 or 80. All other steel parts (including retainers), shall be ASTM A50, grade 50 or 80.

JOINTS IN ARMOR STEEL: Shop or field joints in the armor shall be complete penetration welds ground flush with all contact with the seal and the retainer.

ARMOR COATING: Coat all steel parts of the joint assembly according to T16.

DO NOT FIELD PAINT METALIZED SURFACES EXCEPT AS NOTED. Clean and paint the areas on the gusset plates damaged during construction installation in conformance with the structure's paint system. Protect the metalized coating area blasting or coating adjacent steel members. Overspray need not be removed.

TEMPORARY SUPPORTS: The fabricator shall design and install temporary supports to resist shipping, erection, and construction forces. The supports shall be adjustable in the field to account for variable temperature settings. Install the supports after the fabrication and coating is complete.

CONSTRUCTION PROCEDURE:

1. Place superstructure concrete in the span adjacent to the abutment prior to placing abutment backwall concrete.

2. Not more than four hours prior to the day's peak ambient temperature, set abutment expansion joint width to dimension "A" which shall be determined as follows:

   \[ A = \frac{D_2 - D_1}{\cos \theta} \]

   Where:
   \[ A = \text{joint width (inches)} \]
   \[ D_1 = \text{joint adjustment (inches)} \]
   \[ D_2 = \text{actual distance, in feet, to the thermal neutral expansion point of the superstructure along the centerline of the roadway.} \]
   \[ D_s = \text{modified distance for determining joint adjustment (feet).} \]

3. Place backwall concrete during stable or rising ambient temperatures and conclude placement at or immediately before the day's peak ambient temperature.

4. Loose any temporary end cap bolts after initial set of concrete, preferably not later than two hours after conclusion of concrete placement.

NOTES TO DESIGNER:

DESIGN LIMITS: This design is intended for structures with skew angles not greater than 15°, roadway grades of 2% or less and \( D_s \) see chart on this sheet not larger than 150 feet.

BEAM ENDS: For structures shall be made vertical. Designers shall supply details for structures with roadway grades greater than 2%.

COMPRESSION SEALS: At fixture readings shall be as shown where dimension "A" = \( D_2 \) at any ambient temperature.

LOCATION OF SEAL RETAINER BARS

DIMENSION "A" ADJUSTMENT \( D_s \)

COMPRESSION SEAL DETAIL

See the manufacturer's catalogue for the seal actually chosen for use.
SECTION J-J

NOTES:
★ SEE SHEET 4/4 FOR DEFINITION OF DIMENSION "L".
★ SEALANT SHALL BE TYVEK, TYPE S
★ SEE STEEL DROP STRIP STANDARD ARRAYS DRAWING (NOT INCLUDED WITH EXPANSION JOINT FOR PAYMENT).

PART PLAN AT ABUTMENT FOR FULL WIDTH STRUCTURES
**GENERAL NOTES:**

COMPRESSION SEAL: Furnish material conforming to Fig. 11. The seal configuration should be similar to the details shown herein. Acceptable manufacturers are: D.S. White, Waterton-Dwyer Mfg. Co., or any other approved equivalent. Install the seal according to the manufacturer's specifications and under the supervision of the manufacturer's designated representative.

JOINTS IN COMPRESSION SEALS: Furnish seals in one continuous piece unless otherwise approved by the designer.

ARMOR STEEL: All angle shapes shall be ASTM A590, Grade 80 or S60. All other steel parts including fasteners, shall be ASTM A36, Grade 36, 50 or S50.

JOINTS IN ARMOR STEEL: Shop or field joints in the armor shall be complete penetration welds ground flush with in contact with the seal and the repairer.

ARMOR COATING: Coat all steel parts of the joint assembly according to S6.

TEMPORARY SUPPORTS: The fabricator shall design and install temporary supports to resist shearing, elevation and construction forces caused by damage to the steel armor. These supports shall be located in the field to allow variable temperature settings. Install the supports after the fabrication and coating is complete.

STEEL DEFLECTORS: Furnish 22 gauge stainless steel conforming to ASTM A240, Type 304 or equivalent, with a #1 finish.

NON-SHRINKING GROUT: Furnish material conforming to Fig. 11. Mix the batch size such that placement can be completed within 30 minutes. Do not add water to increase flowability which has been decreased by delayed use in winter. Include with superstructure concrete for payment.

THREADED RODS: Furnish 5/8" diameter threaded rod and nuts conforming to ASTM A490, Grade 80, Galvanize according to S15. Include with the box beams for payment.

**BASIS OF PAYMENT:** The Department will pay for concrete placed in the box beam width separately under item 51.

**CONSTRUCTION PROCEDURE:**

1. Place joint assembly so the two (2) 1744/5' angles remain parallel to each other and perpendicular to the roadway gradeline.
2. For structures with a composite concrete wearing surface, place the superstructure concrete in the span adjacent to the adjustment prior to the placement of any anchorage beam concrete.
3. Not more than 4 hours prior to the day's peak ambient temperature, set ambient expansion joint width to dimension "A" which shall be determined as follows:
   
   A = \( \frac{\Delta_t}{\Delta_a} \times D \) where:
   
   - \( \Delta_t \): joint movement (inches) measured normal to joint
   - \( \Delta_a \): adjustment (inches) for peak ambient temperature

4. Place the backwalls concrete during stable or rising ambient temperatures. Conclusion placement at or immediately before the day's peak ambient temperature.
5. Hard place and vibrate concrete under joint armor to achieve complete consolidation.
6. Loosen any temporary joint armor supports after initial set of the concrete, preferably not later than 2 hours after conclusion of the concrete placement.
7. For structures with a monolithic asphalt wearing surface, place the concrete in the box beam notch according to step 6. After the backwall and panel concrete has been placed, texture the surface panels to the joint. Concrete min. compressive strength - 4.5 ksi.

**NOTES TO DESIGNER:**

**DESIGN LIMITS:** This design is intended for structures with beam angles greater than 8°, roadway grades of 1% or less and \( \Delta_t \) see chart on this sheet. Not larger than 1.5°.

The designer shall supply details for structures with roadway grades greater than 1%.

ANCHOR BAR HOLES (in anchor slabs shall be 2" x 9" unless otherwise shown or project plans).

**COMPRESSION SEALS AT FIXED BEARINGS shall be in accordance with dimension "A" = \( \frac{\Delta_t}{\Delta_a} \) at any ambient temperatures.**

**PRESTRESSED CONCRETE BOX BEAMS shall be modified as follows for compression seal installation:**

1. Stamp reinforcing steel. In notched areas at ends of composite beams shall not project above the top of concrete.
2. Ends of casting beams shall be notched full width on beams.
3. I-beam deck beams require a special design.
4. Holes for anchor bars shall be 1" x 1" diameter.
5. Beam ends for structures on grades over 1% shall be made vertical.

**DIMENSION "A" ADJUSTMENT \( \Delta_a \)**

\[ \Delta_a = \Delta_t \times D' \]

\( D' \) = Actual distance, in feet, to the thermal neutral expansion point of the superstructure along the centerline of the bridge.

\( \Delta_t \) = Modified distance for determining joint adjustment (\( \Delta_t \)).

\( \theta \) = Bend angle of expansion joint.

**LOCATION OF SEAL RETAINER BARS**

**ARMOR ANCHOR PLATE "A"**

**PLATE "B" PLAN**
PLAN AT ABUTMENT

FOR SKewed BRIDGES OVER 15°
WITH DEFLECTOR PARAPET RAILING

(B-1 Railing is shown, SBR-1-13 shall be similar)

FINISH CONCRETE SURFACE
EITHER FLUSH WITH OR A MAX.
OF 1/4" ABOVE JOINT ARMOR.

2" # HOLES, 1/2" PITCH

2" # HOLES, 1/2" PITCH

LOCATE ANCHORS IMMEDIATELY BELOW
THE UPPER DECK SLAB REINFORCING
STEEL.

ANCHOR PLATE 3/4"X6"X6" F. CLIP PLATES
ON SKewed STRUCTURES

1/4" MAX., TO 3/4" MAX.
VENT HOLE 9" C/C

3/4" X 4" X 2" ANCHOR PLATES
@ 1'-6" SPACING WITH ONE
PLATE WITHIN 3" OF EACH
END OF ANGLE.

SECTION X-X

VARIES 1/4" TO 3/4" BY MANUFACTURER

3" @ 60° F. (CLIP FLANGES
FORMING AT THE EDGE OF THE PARAPET.

2" # HOLES, 1/2" PITCH
PART PLAN AT ABUTMENT
FOR BRIDGES WITH SIDEWALK
PARAPET RAILING

SECTION F-F

DETAIL C

SECTION G-G

DETAIL D

FOR ADDITIONAL DETAILS, SEE DETAIL A ON SHEET 12/3.
FOR SECTION X-X SEE SHEET 12/4.
FOR SECTION Y-Y SEE SHEET 12/3.
**LEGEND**

1. This is the actual distance from the centerline of joint to the thermal neutral point of the superstructure measured along the centerline of roadway. This dimension includes 5 1/4" flexible wood skews, 1" for 30° skews and 4 1/4" for 60° thru 90° skews. The thermal neutral point of the superstructure is that point which has zero horizontal movement during temperature changes.

2. This distance for expansion joints having skew angles of 9° or less is the actual distance to the thermal neutral point of the superstructure along the centerline of roadway. This distance for expansion joints having skew angles over 9° but not greater than 60° is arrived at by multiplying the above defined distance along the centerline of roadway by the cosine of the expansion joint skew angle.

3. This is the joint opening dimension "A" required at the time of joint armor installation and shall be positioned until the temperature drops a sufficient amount to allow the minimum 9/16" opening.

4. Minimum joint opening dimension "A" at time of seal gland installation shall not be less than 9/16". If the joint opening is less, installation shall be postponed until the temperature drops a sufficient amount to allow the minimum 9/16" opening.

**EXAMPLE**

**Given:** The distance from the centerline of the joint to the thermal neutral point of the superstructure along the centerline of the roadway is 287.5'. The skew angle of the expansion joint is 30° and the anticipated ambient temperature at time of joint installation is 90° F.

**Find:** Required strip seal gland size and the joint opening dimension "A" at the time of joint armor installation.

**Solution:**

1. Enter Table A at 287.5' with 90° F and find that the required strip seal gland size is 4 inches.
2. Enter Table C at 287.5' X COSINE (30°) = 249.98' and find required joint opening at 65° F is 1.583".

**Notes:**

- Step 1 is required only at time of construction.

---

**SECTION Y-Y**

- Provide a 3/4" horizontal x 3/4" vertical hole at the exposed edge of the 3/4" cover plate and 1/2" x 1" bar.
GENERAL NOTES:

STRIP SEAL: Furnish extruded polyurethane material composition of the joint as shown on the plans and as specified by the manufacturer. See "Construction Procedure" for application.

JOWTS IN ARMOR STEEL: Furnish in any continuous piece unless otherwise approved by the engineer.

SEAL RETAINERS: Furnish solid shape steel retainers, as specified on Sheet 2 of 5 "Retainer Details," that are extruded, not welded or machined. Retainers manufactured from plate mill stock or built-up pieces are not acceptable. The manufacturer shall ensure that the seal remains clean and free of debris during joint assembly.

AT JOINT OPTIONS, especially on skewed bridge decks, the use of split retainers may be necessary to ensure proper seal installation. Before the seal is installed, correct any defects in the metal washer or the actual expansion joint that could cause damage to the seal.

JOINTS IN RETAINERS: Welds shall be made tight. Partial penetration welds around the outer periphery of the adjoining surfaces, grind flush all welds in contact with the seal and joint armor. Do not use short pieces of retainers less than 6'-0" long, unless required at curbs or on sidewalks. Do not provide additional splices in retainers at curbs or sidewalk sections other than those shown in the standard bridge drawings.

| TABLE E | PHYSICAL PROPERTIES OF SEAL ELEMENTS |
|-----------------|-----------------|-----------------|
| PROPERTY | REQUIREMENT | ASTM METHOD |
| TENSILE STRENGTH, MIN. PSI | 2000 | D450 |
| ELONGATION @ BREAK, MIN. PERCENT | 250 | D412 |
| HARDNESS, TYPE A DUROMETER, POINTS | 60 ± 5 | MODIFIED D2240 |
| EVEN AGING, TO 95°F @ 90% RH | 20 PERCENT | D573 |
| ELONGATION, LOSS, MAX. PERCENT, TYPE A DUROMETER, POINTS CHANGE MAX | 0 TO +5 | MODIFIED D2240 |
| OIL SWELL, ASTM GD. 3 TO HT @ 95°F, WT% CHANGE MAX | 45 PERCENT | D471 |
| COMPRESSIVE SET, 7 DAYS @ 40°F | NO CRACKS | G109 |
| LOW TEMPERATURE STABILITY | 200°F | G109 |
| WEARINESS, TYPE A DUROMETER, POINTS CHANGE MAX | 40 PERCENT | G395 METHOD B |

LUBRICANT-ADHESIVE: Furnish a one part moisture curing polyurethane compound meeting the requirements of ASTM D412 and as specified by the seal manufacturer. See "Construction Procedure" for application.

CONSTRUCTION PROCEDURE:

ARMOR INSTALLATION:
1. Place joint assembly so the channel and angle remain parallel to each other and perpendicular to the roadway.
2. Place abutment backwall concrete after the superstructure concrete is placed in the span adjacent to the abutment.
3. Set abutment joint width to dimension "A" no more than four hours prior to the day's first ambient temperature. See Project Plans for dimension "A".
4. Place the backwall concrete during stable or rising ambient temperatures. Consider placement at or immediately before the day's last ambient temperature.
5. Hand place and vibrate concrete under joint armor to achieve complete consolidation.
6. Loose any temporary joint armor supports after initial set of the concrete, preferably not later than two hours after conclusion of the concrete placement.

SEAL INSTALLATION:
1. Examine the retainer for soilage or defects that can damage the seal prior to seal installation, repair defects.
2. Not more than 24 hours prior to seal installation, bracket the retainer interior per edge of commercial blast cleaning, without damaging adjacent coatings. Remove all blasting media from the retainer.
3. Clean all surfaces of the seal with methyl ethyl ketone (MEK), toluene (T) or other manufacturer specified solvent using clean disposable cloths. Maintain the bonding surface cleanliness until installation.
4. Immediately before applying the lubricant-adhesive, bonding surfaces must be clean, dry and warmest than 40°F. Bonding surfaces must be maintained in this condition until the seal is installed. Librally apply the lubricant-adhesive to both the retainer and the seal areas. Use the manufacturer's specified methods for complete and uniform coverage.
5. Install the seal with equipment and procedure specified by the manufacturer. Elongation of the seal or structural damage to the seal caused by installation methods will cause for rejection.
6. Remove excess lubricant-adhesive after installation.
**PART PLAN AT ABUTMENT**

For square or low skewed (15° or less) bridges with inflection panel railing (BH-I railing is shown, SBH-I shall be similar).

For section A-A see Sheet 2 and 3.

**END OF SUPERSTRUCTURE**

Without curbs or parapets

- Steel drop strip, see standard bridge drawing, not included with expansion joint for payment.

**NOTE:** Where the total width out to out of box beams is equal to the bridge roadway width, joint armor shall be of sufficient length to allow for fit-up of beams. See formula for length "L".

\[
L = \frac{(N-1)(A) + N(W)}{12 \cos 0}
\]

- \(L\) = Length of joint, edge to edge of deck (feet)
- \(N\) = Number of beams
- \(W\) = Nominal width of beams (inches)
- \(A\) = Sine angle of joint

**END ABUTMENT AND SUPERSTRUCTURE**

Joint armor at deck face on beams without curbs or parapets.

**SECTION C-C**

- 2 - 1½" threaded rods with two hex nuts set in prestressed box beams during casting operations.

**STAINLESS STEEL DEFLECTOR**

Refer to standard bridge drawing EX-3-82 for all pertinent information.

**SEE DETAIL J**

**SECTION B-B**

**PLAN OF PLATE "B"**

**DETAIL J**

**SECTION A-A**

**SECTION B-B**

**PLAN OF PLATE "A"**

**BEAM**

<table>
<thead>
<tr>
<th>DIM. A</th>
<th>DIM. B</th>
<th>DIM. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>36&quot;</td>
<td>6&quot;</td>
<td>2-1/2&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>6&quot;</td>
<td>2-1/2&quot;</td>
</tr>
</tbody>
</table>
| # Allows for beam fit-up.
PLAN AT ABUTMENT

For skewed bridges over 45°
With reflector parapet railing

(If girding is shown, sbr-2-18 shall be similar)

SECTION X-X

© - Dimension "a" shall be determined
From Table "B", Table "C" or Table "D" on Sheet 2/5 for Section A-A and B-B

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

STANDARD REVIEWS DESIGNED DRAWN CHECKED REVIEWED

DESIGN AGENCY

STRUCTURAL ENGINEERING OFFICE OF BRIDGES

AJM

WTL/LMW

CONCRETE BOX BEAM STRUCTURES

COMPRESSIVE STRENGTH - 4.5 KSI.

CONCRETE WEARING SURFACE. THE CONCRETE MINIMUM THICKNESS WITH THE JOINT FOR SKEWED BRIDGES WITH ASPHALT SURFACE TEXTURE ON DECK JOINTS SHALL BE PARALLEL.
LEGEND

1. This is the actual distance from the centerline of joint to the thermal neutral point of the superstructure measured along the centerline of roadway. This distance shall be a maximum of 200' for 60°F, 300' for 70°F, and 400' for 80°F. The thermal neutral point of the superstructure is that point which has zero horizontal movement during temperature changes.

2. This distance for expansion joints having skew angles over 15° but not greater than 60° is arrived at by multiplying the above defined distance along the centerline of roadway by the cosine of the expansion joint skew angle.

3. This is the joint opening dimension "A" required at the time of joint armor installation.

4. Minimum joint opening dimension "A" at time of seal gland installation shall not be less than 1". If the joint opening is less, installation shall be postponed until the temperature drops a sufficient amount to allow the minimum 90°F opening.

EXAMPLE

Given - The distance from the centerline of the joint to the thermal neutral point of the superstructure along the centerline of roadway is 287.5'. The skew angle of the expansion joint is 30° and the anticipated ambient temperature is 65° F.

Find - Required strip seal gland size and the joint opening dimension "A" at the time of joint armor installation.

Solution -

(a) Enter Table "A" at 287.5' and find that the required strip seal gland size is 4 inches.

(b) Enter Table "C" at 287.5' x cosine of 30° = 248.98' and find required joint opening at 65°F is 1.86".

NOTE: Step (b) required only at time of construction.
GENERAL NOTES:

STRIP SEAL: FURNishes EXTRUDED POLYURETHANE MATERIAL CONFORMING TO THE REQUIREMENTS OF THE SEAL, THE RECOVERY TEST IS NOT APPLICABLE. THE PHYSICAL PROPERTIES OF THE STRIP SEAL SHALL CONFORM TO TABLE E.

THE MANUFACTURER OR AN ACCREDITED LABORATORY SHALL TEST EACH LOT AS SHIPPED AND SUM MANDATORY TESTS TO CONFIRM THE MATERIALS MANUFACTURING. THE SEAL AND RETAINER ARE AN INTEGRAL SYSTEM DESIGNED AND SUPPLIED BY THE SAME MANUFACTURER. SEE “CONSTRUCTION PROCEDURE” FOR INSTALLATION.

TABLE E

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>REQUIREMENT</th>
<th>ASTM METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>TENSILE STRENGTH, MIN. PSI</td>
<td>2500</td>
<td>D412</td>
</tr>
<tr>
<td>ELONGATION # BREAK, MIN. PERCENT</td>
<td>25%</td>
<td>D412</td>
</tr>
<tr>
<td>HARDNESS, TYPE A, SORRENTO POINTS</td>
<td>60 ± 5</td>
<td>MODIFIED D2240</td>
</tr>
<tr>
<td>EVEN AGRING, TO HP @ 20°F</td>
<td>20%</td>
<td>D513</td>
</tr>
<tr>
<td>TEMP. AGRING, LOSS, MAX., AT 50°F</td>
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<td></td>
</tr>
<tr>
<td>HARDNESS, TYPE A, SORRENTO POINT</td>
<td>0 TO +10</td>
<td>MODIFIED D2240</td>
</tr>
<tr>
<td>OIL SWELL, ASTM D395</td>
<td>0 TO +15</td>
<td>D471</td>
</tr>
<tr>
<td>ASTI AT NP @ 212°F MAX.</td>
<td>45%</td>
<td>D573</td>
</tr>
</tbody>
</table>


LOW TEMPERATURE STIFFENING POINTS | 0 TO +15 | OVEN AGING, 70 HR @ 212°F | 70% | D2240 |
| COMPRESSION SET, TO HP @ 20°F MAX. | 40% | G395 METHOD B |

ARMOR STEEL: ALL ANGLE SHAPES SHALL BE ASTM A36, GRADE 30 OR 50. ALL OTHER STEEL PARTS INCLUDING RETAINERS, SHALL BE ASTM A36 OR GRADE 30 OR 50.

JOWTS IN ARMOR STEEL: SHOULDER OR FIELD JOINTS IN THE ARMOR SHALL BE COMPLETE PENETRATION MIG FILL GROUND FLOOR IN THE CONSTRUCTION , IN CONTACT WITH THE RETAINER.

ARMOR COATING: COAT ALL STEEL PARTS OF THE JOINT ASSEMBLY ACCORDING TO ASTM.

TEMPORARY SUPPORTS: THE FABRICATOR SHALL DESIGN AND INSTALL TEMPORARY SUPPORTS TO RESIST SHORTH-ENING, DIRECTION AND CONSTRUCTION FORCES WITHOUT DAMAGE TO THE SEAL OR ARMOR COATING. THESE SUPPORTS SHALL BE ADJUSTABLE IN THE INDICATED ZONE TO ACHIEVE A POSITIVE SEAL AND ANCHORAGE.

NOW-SHUTTING, SHUTTLE: FURNishes MATERIAL CONFORMING TO ASTM D4070. LIMIT THE BATCH SIZE SUCH THAT PLACEMENT CAN BE COMPLETED WITHIN 30 MINUTES. DO NOT ADD WATER TO INCREASE FLOWABILITY WHICH HAS BEEN DECREASED BY DELAYED USE OR MORTAR. INCLUDE ALL WATER IN THE FRESH PLANT MIX FOR PARTICIPATION.

THICKLY THICKED ROODS: FURNishes 3.5 DIAMETER THICKENED ROODS. FABRICATE BOTH END PLATES OR BUILT-UP PIECES ARE NOT ACCEPTABLE. THE MANUFACTURER SPECIFIED SOLVENT USING CLEAN DISPOSABLE TRASH BAGS.

BASIS OF PAYMENT: THE DEPARTMENT WILL PAY FOR CONCRETE PLACED IN THE BOX BEAM MOTOR SEPARATELY UNDER ITEM 301.

CONSTRUCTION PROCEDURE:

ARMOR INSTALLATION:

1. PLACE REINFORCING STEEL SO THE TWO (2) 4-WAY WEB ANGLES ARE PARALLEL TO EACH OTHER AND PERPENDICULAR TO THE ROADWAY GRADIENT.

2. FOR STRUCTURES WITH A COMPOSITE CONCRETE WEARING SURFACE, PLACE THE SUPERSTRUCTURE AND ARMOR SECTIONS IN THE OPEN ADJACENT TO THE ADJUSTMENT PRIOR TO THE PLACEMENT OF ARMOR CONCRETE.

3. SET ADJUSTMENT EXPANSION JOINT WIDTH TO DIMENSION "A". PLACE MORE THAN FOUR HOURS PRIOR TO THE DAY'S PEAK AMBIENT TEMPERATURE. SEE PROJECT PLANS FOR DIMENSION "A".

4. PLACE THE ARMOR CONCRETE DURING STABLE OR RISING AMBIENT TEMPERATURES. CONCLUDE PLACEMENT AT NO LATER THAN TWO HOURS AFTER CONCLUSION OF THE BATCH PLACEMENT FOR PAYMENT.

5. FOR STRIP SEALS OR WET COMPACTING CONCRETE SEALS, INSTALL THE ARMOR PRIOR TO THE SEAL MORTAR"S ADJACENT TO THE ARMOR CONCRETE. INSTEAD OF THE ARMOR CONSTRUCTION, THE ARMOR CONCRETE IS PLACED PRIOR TO THE PRECAST OR Precast CONCRETE.
**TABLE A**

1. This is the actual distance from the centerline of joint to the thermal neutral point of the superstructure measured along the centerline of roadway. This dimension shall be a minimum of 300 for 60° skew, 345 for 45° skew, 365 for 30° skew and 425 for 0° skew. The thermal neutral point of the superstructure is that point which has zero horizontal movement during temperature changes.

2. This distance for expansion joints having skew angles of 15° or less is the actual distance to the thermal neutral point of the superstructure along the centerline of roadway. This distance for expansion joints having skew angles over 15° but not greater than 60° is arrived at by multiplying the above given distance along the centerline of roadway by the cosine of the expansion joint skew angle.

3. This is the joint opening (dimension "A") required at the time of joint installation. Safe but not less than 1/8. If the joint opening is less, installation shall be postponed until the temperature drops a sufficient amount to allow the minimum 1/8 opening.

**EXAMPLE**

Given - The distance from the centerline of the joint to the thermal neutral point of the superstructure along the centerline of the roadway is 300 ft. The skew angle of the expansion joint is 30° and the anticipated ambient temperature at time of joint installation is 65°F.

Find - Required strip seal gland size and the joint opening (dimension "A") at the time of joint installation.

**SOLUTION**

1A. Enter Table "A" at 1 with 20° skew and find that the required strip seal gland size is 4 inches.

1B. Enter Table "C" at 1 with 20° skew X cosine of 30° = 0.49099 and find required joint opening at 65°F is 1/8".

**NOTE:** Step 1B required only at time of construction.
**SECTION A-A**

ABUTMENT BREAST WALL REINFORCING STEEL NOT SHOWN

SEE NOTE 3

**SECTION B-B**

REINFORCING STEEL NOT SHOWN

SEE NOTE 8

**EPOXY COATED REINFORCING STEEL**

<table>
<thead>
<tr>
<th>MARK</th>
<th>LENGTH</th>
<th>TYPE</th>
<th>BENDING DIAGRAMS</th>
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<tbody>
<tr>
<td>A5_</td>
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<td>STR</td>
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</tr>
<tr>
<td>A601</td>
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<tr>
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<td>BENT</td>
</tr>
<tr>
<td>A610</td>
<td></td>
<td>W + 1'-5&quot;</td>
<td>BENT</td>
</tr>
<tr>
<td>A611</td>
<td></td>
<td>1'-0&quot;</td>
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**NOTES:**

1. PROVIDE 6'-0" CLOSURE POUR AT THE CONCRETE BRIDGE RAILING ALONGSIDE THE STRIP SEAL EXPANSION JOINT TO ACCOMMODATE THE INSTALLATION OF STRIP SEAL GLAND UNDERNEATH THE CONCRETE BRIDGE RAILING. (SEE GENERAL NOTES)


3. FOR TYPICAL ABUTMENT DETAILS, SEE SHEET 55.

4. SEE DETAIL C ON SHEET A5_ FOR ELASTOMERIC CONCRETE HEADER AND JOINT SEAL STEEL RETAINER DIMENSIONS.

5. FOR STRIP SEAL EXPANSION JOINT NOTE, SEE SHEET 55.

6. SEE DETAIL C ON SHEET A5_ FOR ELASTOMERIC CONCRETE HEADER AND JOINT SEAL STEEL RETAINER DIMENSIONS.

7. FOR AN EXAMPLE ON HOW TO DETERMINE STRIP SEAL GLAND OPENING DIMENSION, SEE SHEET 55.

8. FOR IRON RAILING SHAPE AND SINGLE SLOPE CONCRETE BRIDGE RAILINGS, SEE STD. BRIDGE DWG. BR-1-13 AND STD BRIDGE DWG. SBM-4-13, RESPECTIVELY.

9. PAYMENT FOR EPOXY COATED REINFORCING STEEL SHALL BE INCLUDED WITH ITEM 509 - EPOXY COATED REINFORCING STEEL.

10. FOR GENERAL NOTES, SEE SHEET 55.
See Project Plans for Dimensions of W, H, and H.

For Strip Seal Expansion Joint Note and Section D-D, See Sheet 3-5.

Steel Retainer Dimensions. See Detail C on Sheet 3-5 for Elastomeric Concrete Header and Joint Seal.

For Typical Abutment Details, See STD. Bridge Dwg. A-1-69.

For Reinforced Concrete Approach Slab, See STD. Bridge Dwg. AS-1-15 and Joint at the Sidewalk. (See General Notes)

View at Abutment, to Accommodate the Installation of Strip Seal Expansion Concrete Header and Perpendicular to the Skew as Shown in the Partial Plan.

Provide 1'-0" Closure Pour, Measured from the Edge of the Elastomeric Concrete Header and Perpendicular to the Skew as Shown in the Partial Plan view at Abutment, to Accommodate the Installation of Strip Seal Expansion Joint at the Sidewalk. (See General Notes)


For Typical Abutment Details, See STD. Bridge Dwg. A-1-69.

See Detail C on Sheet 3-5 for Elastomeric Concrete Header and Joint Seal Steel Retainer Dimensions.

For Strip Seal Expansion Joint Note and Section D-D, See Sheet 3-5.

See Project Plans for Dimensions of W, H, and H.

For General Notes, See Sheet 3-5.
SHEET NOTES:

1. FOR LOCATION OF SECTION D-D, SEE SHEET 5.
2. FOR LOCATIONS OF DETAIL C, SEE SHEETS 1 AND 2.
3. FOR AN EXAMPLE ON HOW TO DETERMINE JOINT SEAL OPENING DIMENSION, SEE SHEET 3.
4. FOR GENERAL NOTES, SEE SHEET 4.

**ITEM 516 - STRIP SEAL EXPANSION JOINTS**: FURNISH 3" x 3/8" ALUMINUM EXPANSION JOINTS IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND INSTALLATION PROCEDURES. THE MANUFACTURER SHALL PROVIDE ALL PLATES AS SHOWN IN DETAIL B ON THIS SHEET. TRANSVERSE EDGES MUST BE IN CONTACT WITH SIDEWALK SURFACES AFTER INSTALLATION.

**ITEM 517 - SIDEWALK COVER PLATE**: SIDEWALK COVER PLATES CAN ACCOMMODATE UP TO 6" MAXIMUM EXPANSION JOINT MOVEMENT, MEASURED IN PERPENDICULAR DIRECTION FROM THE CELL CENTER OF BEAMING. THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE BY THE NUMBER OF FEET FOR ITEM 516 - SIDEWALK COVER PLATE.

**ITEM 518 - STRIP SEAL EXPANSION JOINT ANCHORED WITH ELASTOMERIC CONCRETE**: INSTALL THE STRIP SEAL EXPANSION JOINT SYSTEM IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND INSTALLATION PROCEDURES. AN EXPERIENCED TECHNICAL REPRESENTATIVE OF THE MANUFACTURER SHALL BE PRESENT TO SUPERVISE ALL PHASES OF MATERIAL INSTALLATION TO ENSURE THAT THE JOINT SEAL IS BEING INSTALLED PROPERLY.

**ITEM 519 - STRIP SEAL EXPANSION JOINT ANCHORED WITH ELASTOMERIC CONCRETE**: THE JOINT SEAL SHALL SEAL AVOIDING THE JOINT SEAL AND ELASTOMERIC CONCRETE HEADER. THE JOINT SEAL RETAINER STEEL RAIL PROFILE, LUBRICANT-ADHESIVE, AND STEEL RETAINER'S ANCHORAGE METHOD ARE THE INTEGRAL JOINT SYSTEM THAT SHALL BE DESIGNED AND SUPPLIED BY THE SAME MANUFACTURER.

**ITEM 520 - SIDEWALK COVER PLATE**: SIDEWALK COVER PLATE MATERIALS SHALL BE USED FOR STRUCTURES WITH REINFORCED CONCRETE SIDEWALKS TO AN ELEVATION OF 6" BELOW THE TOP SURFACE OF THE SIDEWALK AND AN ANGLE BETWEEN 30° AND 60° MEASURED FROM THE HORIZONTAL LINE AT THE BEND POINT AS SHOWN IN SECTION D-D, SHEET 2.

**ITEM 521 - STEEL RETAINER DETAIL**: THE JOINT SEAL SHALL SEAL TO THE JOINT SEAL TOP AND JOINT SEAL STEEL RETAINER Edge.
EXAMPLE

- The distance from the centerline of the joint to the thermal neutral point of the superstructure along the centerline of the roadway is 287.5 feet.
- The skew angle of the expansion joint is 30° and the anticipated ambient temperature at the time of joint installation is 65° F.

**Given:**
- The distance from the centerline of the joint to the thermal neutral point of the superstructure along the centerline of the roadway is 287.5 feet.
- The skew angle of the expansion joint is 30° and the anticipated ambient temperature at the time of joint installation is 65° F.

**Required Joint Opening (Dimension "A")**
- The required strip seal gland size and the joint opening dimension "A" at the time of joint armor installation.

**Solution:**
1. Enter Table "A" at 1 with 287.5 feet and find that the required strip seal gland size is 4 inches.
2. Enter Table "B" at 1 with (287.5 feet x cosine of 30°) = 248.98 feet and find the required joint opening at 65° is 1.86 inches.

**Notes:**
- Step (b) is only required at time of construction.
- Minimum joint opening dimension "A" at the time of seal gland installation shall not be less than the dimension shown on Sheet 45. If the joint opening is less, installation shall be postponed until the temperature drops a sufficient amount to allow the minimum joint installation width dimension "A".

- This distance for expansion joints having skew angles over 15° but not greater than 60° is arrived at by multiplying the above defined distance along the centerline of roadway by the cosine of the expansion joint skew angle.

- This is the joint opening dimension "A" required at the time of abutment backwall concrete placement, based on the day's anticipated peak ambient temperature.

- Minimum joint opening dimension "A" at the time of seal gland installation shall not be less than the dimension shown on Sheet 45. If the joint opening is less, installation shall be postponed until the temperature drops a sufficient amount to allow the minimum joint installation width dimension "A".

**Legend**
- This is the actual distance from the centerline of joint to the thermal neutral point of the superstructure measured along the centerline of roadway. This dimension shall be a maximum of 298 feet for 60° skew, 342 feet for 45° skews, 385 feet for 30° skews, and 427 feet for 0° through 15° skews. The thermal neutral point of the superstructure is that point which has zero horizontal movement during temperature changes.

- This distance for expansion joints having skew angles of 0° or less is the actual distance to the thermal neutral point of the superstructure along the centerline of roadway. This distance for expansion joints having skew angles over 15°, but not greater than 60° is arrived at by multiplying the above defined distance along the centerline of roadway by the cosine of the expansion joint skew angle.

- This is the actual distance from the centerline of joint to the thermal neutral point of the superstructure measured along the centerline of roadway. This is the joint opening dimension "A" required at the time of abutment backwall concrete placement, based on the day's anticipated peak ambient temperature.
GENERAL NOTES

GENERAL:
This standard drawing provides design and general construction details. The project plans shall list dimension "A" for temperatures between 30°F and 90°F, other pertinent details, and special notes that are specific to the structure.

DESCRIPTION:
Perform work in accordance with CMS 516 except as noted herein.

DESIGN DATA (STRIP SEAL SYSTEM):

- DESIGN STRESSES (ABUTMENT):
  - H-L-93
  - STRENGTH = 60 KSI
  - EPOXY COATED REINFORCING STEEL - MIN. YIELD STRENGTH = 60 KSI

- STEEL RETAINERS (CONT.):
  - Furnish strip seal gland meeting the requirements of ASTM D5973. Provide to the engineer seven (7) days before starting work. Certified test data conforming to CMS 101.03. Acceptance is not required.
  - Lubricant-adhesive: Use a lubricant-adhesive to install the gland, provided by the manufacturer of the neoprene strip seal gland.
  - INSTALLATION: Install strip seal expansion joint system after all corrective deck work has been completed, including grouting.

- JOINTS IN NEOPRENE STRIP SEAL GLAND:
  - Furnish neoprene strip seal gland in one continuous piece unless otherwise approved by the engineer.

- STEEL RETAINERS:
  - Furnish solid shape steel retainers, as shown in detail D, sheet 35, that are extruded, hot rolled or machined. Retainers manufactured from bent plate or built-up pieces are not acceptable. The manufacturer shall specify the internal dimensions of the steel retainer to achieve a positive seal and anchorage.
  - AT JOINT UPTURNS, ESPECIALLY ON SKewed BRIDGE DECKS, THE USE OF SPLIT RETAINERS MAY BE NECESSARY TO ENSURE PROPER NEOPRENE STRIP SEAL GLAND INSTALLATION. WHERE THE SPLIT RETAINERS ARE REQUIRED, THE MANUFACTURER SHALL OBTAIN THE ENGINEER'S ACCEPTANCE FOR THE DESIGN.
  - BEFORE NEOPRENE STRIP SEAL GLAND IS INSTALLED, CORRECT ANY DEFECT IN THE STEEL RETAINER OR THE ACTUAL STRIP SEAL EXPANSION JOINT THAT COULD CAUSE DAMAGE TO THE NEOPRENE STRIP SEAL GLAND.

- STEEL RETAINERS (CONT.):
  - Structural steel material for steel retainers shall be ASTM A572, GRADE 36, 50, OR 50W.

- CLOSURE POURS:
  - The closure pours allow for installation of the expansion joint system after the concrete railings and sidewalk are installed.
  - For projects with inertial profiling surface smoothness requirements, the expansion joint system shall be installed after all surface smoothness corrective work has been performed.
  - For projects without inertial profiling surface smoothness requirements, the concrete railings and sidewalk may be completed without closure pours.

- JOINTS IN STEEL RETAINERS:
  - Welds shall be water tight, partial penetration welds around the outer periphery of the abutting surfaces. Grind flush all welds in contact with the neoprene strip seal gland.
  - Do not use short pieces of steel retainers less than 6'-0" long, unless required at curbs or sidewalks. Do not provide additional splices in retainers at the curb or sidewalk sections other than those detailed in the standard bridge drawings.

- STRIP SEAL EXPANSION JOINT COATING:
  - Coat steel parts of the strip seal expansion joint assembly according to CMS 516.

- STEEL RETAINER TEMPORARY SUPPORTS:
  - The fabricator shall design, provide, and install temporary supports to resist shipping, erection, and construction forces without damage to the steel retainers or coating. These supports shall be adjustable in the field to account for variable temperature settings and height adjustments. Install the temporary supports after the fabrication and strip seal expansion joint coating is complete.

- NOTES TO DESIGNER:
  - Project plans shall list dimension "A" as shown in section A-A, sheet 15 and 25 for temperatures between 30°F and 90°F in 10°F increments.

- NEOPRENE STRIP SEAL GLAND AT FIXED BEARINGS SHOULD BE THE SAME SIZE AS AT THE EXPANSION BEARINGS WITH A DIMENSION "A" OF 2 INCHES AT ANY AMBIENT TEMPERATURE.

LIMITATION: SKEW ANGLES SHALL NOT BE GREATER THAN 60°.
**Intermediate Crossframe Notes**

**General:**

- Standard crossframes are limited to tangent steel members.
- Crossframes Type A, B, and C are considered to be similar and interchangeable from a design perspective. Each may be substituted for the other without violation of this standard. Provide the total cost for structural steel using the total weight provided in the estimated quantities, regardless of any change to the total weight resulting from the selection of crossframe type.

The fabricator shall check longitudinal crossframe spacing so that interference with flanged splices, anchor bolts, and bearings stiffeners is avoided. Spacing shall be adjusted to provide at least six inches of longitudinal clearance.

**Materials:**

- All intermediate crossframe material shall be ASTM Grade 36, 50 or 50W. The type and grade shall be the same as that specified for the super-structure main steel.

**Fasteners:**

- For galvanized, metalized, and painted steel, Type 1 galvanized bolts shall be used for bare A709 steel. Type 2 bolts shall be used. Each anchor shall include a bolt, nut and two (2) washers.
- Minimum edge distances for bolts shall be 0.5".

**Limitations for Type A Intermediate Crossframe:**

- For L3x3x3 and L3x3x3 crossframe angles, use 1 column of 2 bolts for top gusset plates and 2 columns of 4 bolts for lower gusset plates with standard connection plates. For L4x4 and L3x3x3 crossframe angles, use 2 columns of 2 bolts for top gusset plates and 2 columns of 4 bolts for lower gusset plates with alternate connection plates.

**Limitations for Type C Intermediate Crossframe:**

- For deck overhangs >2", use 3 bolts per crossframe member with alternate connection plates.
INTERMEDIATE DIAPHRAGM NOTES

GENERAL:
These standard diaphragms are limited to tangent rolled beam members with beam spacings ≤ 10.5 ft.

The fabricator shall check longitudinal diaphragm spacing so that interference with bolted splines, anchor bolts, complete penetration welds, welded splices and bearing stoppers is avoided. Spacing shall be adjusted to provide at least six (6) inches of longitudinal clearance.

MATERIAL:
All intermediate diaphragm material shall be the same as that specified for the superstructure main steel.

BOLTS:
All bolts shall be 1" A325, grade 50s, with threads excluded from the shear plane.

For galvanized, metalized and painted steel, type 1 galvanized bolts shall be used. For bare A709 grade 36, 50 or 50W steel, type 3 bolts shall be used. Each anchor assembly shall include a bolt, nut and two (2) washers, tightened according to CMS 513 prior to deck placement.

Minimum edge distances for bolts shall be 1 1/2".

ALl holes to be 5/8" dia. in connection plates and 3/16" dia. in diaphragm.
END CROSSFRAME NOTES:

MATERIAL: END CROSSFRAME MATERIAL SHALL BE ASTM A709 GRADE 50W. WHEN THE SUPERSTRUCTURE MAIN STEEL IS ASTM GRADE 36, THEN THE END CROSSFRAME MATERIAL SHALL ALSO BE ASTM GRADE 36.


WORK POINTS: WORK POINTS SHALL BE COORDINATED BETWEEN EXPANSION JOINT AND STRUCTURAL STEEL SUPPLIERS TO ASSURE FIT UP AT ALL DESIGN LOCATIONS.

STIFFENER NOTES:

NOTES FOR STIFFENER DETAILS:
INSTALL STIFFENERS ACCORDING TO 513. UNLESS THE CONTRACT DOCUMENTS REQUIRE LARGER WELDS, PROVIDE A 5/8" WELD WHEN THE THICKER PLATE IS GREATER THAN 5/8" THICK. USE 5/8" PLATE WHEN THE THICKER PLATE IS GREATER THAN 5/8".
**SCUPPER NOTES:**

**GENERAL:** The designer shall show the location of the scuppers in a plan view of the bridge deck on the contract documents.

**SUPPLEMENTAL REINFORCEMENT:** Reinforce the concrete deck at the scupper corners oppositely. The curb line with one #4 bar, 3'-0" long oriented at 45° to the long axis of the scuppers, and located just below the transverse bars in the top mat of steel.

**MATERIAL:** Furnish structural steel tubing according to Section 3. Torque tests in accordance with AWS D5.6 shall be required. All other materials shall be ASTM Grade 70, 50 or 50W. Galvanize support angles, bars, bolts, nuts and washers in accordance with Section 10.02.

**DECK CROWN/SUPERELEVATION:** Cut the top of the steel tubing square for cross slopes 0 per foot and less. Cut the top of the tubing parallel to the deck surface for cross slopes greater than 0.5 per foot.

**FASTENER NOTES:**

1. The size of the slotted holes shall be 3/8" x 3/8". The slot shall be horizontal in the 3" x 6" bar and vertical in the angle. Holes shall be 3/8" connected and Type B, galvanized, with hex nuts and two washers, tightened according to Section 513.

2. The bolts shall be 1-1/4" diameter Type B galvanized for galvanized, metalized or painted structural or angle type 2 for bare weathering steel. Each assembly shall include a bolt, nut and two washers. Torque according to Section 513. For weathering steel structures, provide a 3/8" x 3/8" x 3/8" prefabricated bearing pad, 2-1/2", with a #4 stranded wire. Sandwich the pad between the top mat and the angle. After the deck concrete has been poured, finish the #4 stranded wire in the pad.

**BASIS OF PAYMENT:** The department will pay for the supplemental reinforcement described above separately under item 600.
**NOTES**

**APPLICATION:** Provide Full Height Headwalls for skewed and non-skewed culverts having a diameter or rise of 42" to 84" inclusive. Use Type "A" when the skew angle is over ten degrees or less and Type "B" when the skew angle is over ten degrees.

**DESIGN DATA:** The following design data is assumed:
- Internal Angle of Friction of Backfill Soil, $\phi = 30^\circ$
- Total Unit Weight of Backfill Soil = 30 psf
- Internal Angle of Friction (Drained), Foundation Soil, $\phi = 26^\circ$
- Undrained Shear Strength (Cohesive), Foundation Soil, $\phi = 500$ psf
- Unit Weight of Concrete = 150 lb/ft$^3$

Slope of Backfill = 2:1
Concrete Class QC1 - Compressive Strength = 4000 psi
Reinforcing Steel - Grade 60 Minimum Yield Strength = 60,000 psi (All Reinforcing Shall be Epoxy Coated)

Based on the assumed design data, the headwalls for the standard design achieve factored bearing resistances that are greater than their respective factored bearing pressures. If a backfill material with a higher internal angle of friction or a higher total unit weight is used or if a foundation soil with a higher drained internal angle of friction or a higher total unit weight is encountered, then the stability of the wall is satisfactory.

**DETAILS AND QUANTITIES** are shown for circular sections only. When used with reinforced elliptical concrete pipe or corrugated metal pipe grooves, adjust dimensions and quantities to conform to those listed for the nearest pipe size circular pipe. Apply the dimensions established by vertical diameter to span. Round all calculated dimensions established by horizontal diameter to the nearest 1". Chamfer all exposed corners.

**HEADWALL LOCATION:** Determine by intersection of the embankment slope at the back of the headwall at point "K". Provide 2:1 slopes adjacent to the headwall.

**PAYMENTS:** Item 602 Concrete Masonry includes reinforcing.
NOTES

Tightly wrap galvanized anchor cable one time completely around the circumference of the conduit. Furnish hook at least 4" long at the ends of the anchor cable as shown above.

Cut galvanized anchor cable to length required.

Furnish hook at least 4" long at the ends of the anchor cable as shown above.

Alternatively, place anchor cable in wet concrete at the dimensions shown above to secure conduit to headwall.

Fill any openings made for anchor cables with grout after the cables are placed to a taut fit.

Secure cables such that they are taut after the grout or concrete has cured.
NOTES

Drill openings a min. of 3" deep for eyebolts at the locations shown. Insert entire length of bolt shank into opening. Fill openings with grout and allow to harden before securing anchor cable. Alternatively, place eyebolts in wet concrete at the locations shown above.

Tightly wrap galvanized anchor cable one time completely around the circumference of the conduit.

Cut galvanized anchor cable to length required.

Place cable through eyebolt and form a loop as shown in the above detail. Ensure the cable is pulled to a tight fit and secured with a galvanized wire rope clip.
### General

Provide a riprap reinforced concrete slab according to SCD DM-1.1. If pipe is depressed or it is specified in the plan, Payment for the pipe is made per square yard of Item 601 Riprap using 8" Reinforced Concrete Slab and includes the cost of the capsheet wall.

This drawing is for cast-in-place half-height headwalls. Precast half-height headwalls are only approved for flat conduits with a maximum conduit diameter of 6'. When precast headwalls are furnished, provide openings for the anchor cable as shown and fill with grout after placement of the anchor cable. If anchor bolts are to be used with a precast headwall, fill the anchor cable openings with grout.

**CONCRETE**

Use 4000 psi compressive strength concrete for headwall. Concrete quantities are based on headwalls without the 6" extension under the channel protection. If anchor bolts are to be used with a precast headwall, fill the anchor cable as shown and fill with grout after placement of the anchor cable. The top 6" min. of the bolt must be galvanized according to ASTM A 153. Cost of anchor is included in the price bid per foot of Item 611.

**ANCHOR BOLT**

Furnish bolts (see detail sheet 2/3) that meet ASTM A 307 for anchoring both ends of metal pipe. The top 6" min. of the bolt must be galvanized according to ASTM A 153. Cost of anchors is included in the price bid per foot of Item 611.

**ANCHOR CABLE**

Furnish galvanized anchor cable (see detail sheet 2/4) that meets ASTM A 1023 for anchoring both ends of metal pipe. The top 6" min. of the bolt must be galvanized according to ASTM A 153. Cost of anchor cable and wire rope clip is included in the unit price bid per foot of Item 611.

**EYEBOLTS**

Furnish eyebolts (see detail sheet 3/4) that meet ASTM A 489 for anchoring both ends of metal or plastic pipe. The eyebolts must be galvanized according to ASTM A 153. One eyebolt with a min. I.D. eye of 3/8" per foot. The length of the eyebolt is included in the price bid per foot of Item 611.

**IMPROVED INLET FOR HDPE PIPE**

Furnish improved inlet at upstream end of culverts and seeped sealers using plastic pipe when specified in the plan. Use HDPE smooth cap and flange materials according to ASTM D 3350 or D 34564C.
INLET CHANNEL PROTECTION DETAIL

- Item 601 Riprap using 6" Reinforced Concrete, see SCD DM-11
- 6" extension required when Riprap is specified

OUTLET CHANNEL PROTECTION DETAIL

- Item 601 Rock Channel Protection (with filter)
- Thickness shown on plan and used for computing quantity of Item 601 R.C.P. (with filter)
- No. 3 or No. 4 granular bed, 6" thick or Geotextile Fabric as per CMS 601.09
- No extension required

CONCRETE PIPE

See Sheet 2 of 2 for Pipe Tables and NOTES.
<table>
<thead>
<tr>
<th>C.I.P. HEADWALL FOR CONCRETE PIPE (ENGLISH)</th>
<th>10'-6&quot;</th>
<th>12'-6&quot;</th>
<th>14'-6&quot;</th>
<th>16'-6&quot;</th>
<th>18'-6&quot;</th>
<th>20'-6&quot;</th>
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<tr>
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<td>143&quot;</td>
<td>128&quot;</td>
<td>34&quot;</td>
<td>91&quot;</td>
<td>20&quot;</td>
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<tr>
<td>Span</td>
<td>106&quot;</td>
<td>143&quot;</td>
<td>128&quot;</td>
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<td>Slab</td>
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<td>Precast half-square yds. of pipe</td>
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<td>Concrete</td>
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**NOTES**

1. **Height of the wall** shall be in conformance with the specified rise and span shown on the plans and specifications, unless otherwise noted.
2. **Concrete** is specified as 3000 psi compressive strength concrete. Specify a 6" explosive concrete under the headwall.
SECTION THRU PIER

SECTION L-L

RECOMMENDED PIER BEARING

GENERAL NOTES

LIMITATIONS: This design is intended for sites where there are no concerns about settlement or differential settlement. Skews not greater than 30°, for uncrowned structures. A bridge expansion length 3m to 25m - 0" and for a total length of 400 - 0". The abutment type must be flexible (capped pile or a single row of piles, regardless of pile type).

Bridge seat construction joints shall be straight between ends of backwall.

The structural steel is to be detailed in the project plans. Plane cutting of holes is not permitted.

CONSTRUCTION JOINT (INTEGRAL BACKWALL)

SECTION M-M

(SUPPORT BOLTS NOT SHOWN)
1. DESCRIPTION:
   THIS WORK CONSISTS OF PREPARING AND INSTALLING PRECAST CONCRETE NOISE BARRIERS, MANUFACTURING, TESTING, FABRICATING, INSTALLING, AND FIELD CEMENTING. THE BARRIERS WILL BE PRODUCED TO MEET THE REQUIREMENTS SPECIFIED ABOVE UNDER SECTION 6, MATERIAL SPECIFICATIONS. ALL MATERIALS SHALL BE CERTIFIED IN ACCORDANCE WITH SUPPLEMENT 1073. THE PROJECT SHALL BE CERTIFIED IN ACCORDANCE WITH SUPPLEMENT 1073. THE ODOT OFFICE OF ENVIRONMENTAL SERVICES. REPLACE DAMAGED FORM LINERS. DO NOT USE LINER ON BOTH FACES IF NOT OTHERWISE SHOWN IN THE PLANS. OTHER FORM LINERS MAY BE USED.

2. CONCRETE NOISE BARRIER PANELS AND POSTS:
   EVERY PREPARED PANEL OF PRECAST CONCRETE NOISE BARRIER COMPONENTS SUPPLIED TO THE PROJECT SHALL CONFORM TO THE MATERIAL SPECIFICATIONS. ALL MATERIALS SHALL BE CERTIFIED IN ACCORDANCE WITH SUPPLEMENT 1073. THE PROJECT SHALL BE CERTIFIED IN ACCORDANCE WITH SUPPLEMENT 1073. THE ODOT OFFICE OF ENVIRONMENTAL SERVICES. REPLACE DAMAGED FORM LINERS. DO NOT USE LINER ON BOTH FACES IF NOT OTHERWISE SHOWN IN THE PLANS.

--END OF DOCUMENT--
GENERAL CONTINUED

1. AVOIDANCE OF UNEXPECTED OBSTRUCTIONS:
   - IF THE AVOIDANCE OF UNEXPECTED UTILITIES OR OTHER OBSTRUCTIONS REQUIRES THE USE OF SPECIAL SHAPES, SIZES, OR DESCRIPTIONS OF THE POSTS OR PANELS TO FURNISH AND INSTALL ADDITIONAL FOUNDATIONS, POSTS, AND PANELS AS DIRECTED BY THE ENGINEER TO AVOID OR ELIMINATE ANY POSSIBLE VIBRATION, THE CONTRACTOR WILL CONFORM TO THESE STANDARDS AND REQUIREMENTS. THE TOP AND BOTTOM ELEVATION AND THE LOCATION OF THE POSTS, PANELS, AND BASE PLATE SHALL CONFORM TO THE ORIGINAL DESIGNS SHOWN IN THE PROJECT PLANS. THE DEPARTMENT WILL NOT ACCEPT FIELD CUTTING OF POSTS OR PANELS TO MATCH THE NEW POST LOCATIONS.

CONSTRUCTION METHODS

1. LAYOUT AND STACK EACH NOISE BARRIER IN THE FIELD AND VERIFY THE PROPER DIMENSIONS OF THE POSTS AND THE PANELS PRIOR TO DEVELOPING ANY NECESSARY SHOP DRAWINGS AND ORDERING FABRICATION OF THE MATTING.

3. CLEAR BRUSH AND HEATLY REMOVE TREES IN THE CONSTRUCTION TO THE PROPOSED NOISE BARRIER LOCATIONS. REMOVE ONLY THOSE TREES THAT ARE ASSESSED TO ALLOW THE MATTING TO BE INSTALLED WITHOUT ANY ASTROLOGICAL FIELD APPROVAL FROM THE PROJECT ENGINEER PRIOR TO CLEARING ANY ORGANIC MATERIALS. CARFULLY PERFORM THE CLEARING SO THAT THE GROWTH WILL NOT DAMAGE THE NEW TREES. MARK ALL TREES SCHEDULED TO BE PRUNED OR REMOVED AND OBTAIN APPROVAL FROM THE PROJECT ENGINEER PRIOR TO CLEARING.

4. WHEN TRANSPORTING THE CONCRETE POSTS, PANELS, AND CAPS, USE EXTREME CARE TO NOT CAUSE SPALLING OF THE CONCRETE DUE TO MISLIFING OR FRAGILE COMPONENTS. DO NOT USE LIFTING DEVICES THAT CHOP OR SHAVE THE CONCRETE.

5. DO NOT INSTALL COMPONENTS THAT ARE DEFECTIVE. THE DEPARTMENT WILL CONSIDER DUE TO MISHANDLING OR OVERLOADING OF THE COMPONENTS. DO NOT USE LIFTING CAPS, AND PANELS, USE EXTREME CARE TO NOT CAUSE SPALLING OF THE CONCRETE WHEN TRANSPORTING, HANDLING, STORING, OR INSTALLING THE CONCRETE POSTS, PANELS, AND CAPS.

6. THE CONTRACTOR SHALL RETURN ONE PANEL AND ONE POST TO THE DEPARTMENT. DO NOT PAY FOR THE PARTS AS EXTRA WORK ACCORDING TO CMS 109.05.

7. SEND ANY ATTEMPTED NOISE BARRIERS AND CARTERS TO THE ENGINEER TO AVOID UNEXPECTED OBSTRUCTIONS AS EXTRA WORK IN ACCORDANCE WITH CMS 109.05.

8. THE DEPARTMENT WILL PAY FOR CLEARING AND GRUBBING AND TRIMMING TREES UNDER ITEM 107 - CLEARING AND ERECTION OF TREES.


MANAGEMENT'S APPROVED LIST.

MATERIALS: SELECT AND USE PRODUCTS ONLY FROM THE OFFICE OF MATERIALS MANAGEMENT. THE NOISE WALL PLANS. IF THERE IS NO NUMBER, THE ENGINEER WILL SPECIFY THE COLOR. APPLY THE COLOR DEFINED BY THE FEDERAL COLOR STANDARD IDENTIFICATION NUMBER IN CONCRETE TO CONCRETE CONTACT SURFACES. DO NOT SEAL POSTS.

DESCRIPTION:

9. ABSORBED CHLORIDE - NOT TO EXCEED 10% OF UNTREATED CONCRETE NCHRP 244 SERIES IV - SOUTHERN EXPOSURE (NON-AIR ENTRAINED CONCRETE) AS COMPARED TO "SEVERE SCALING" ON RESISTANCE TEST WITH A RATING OF "NO SCALING" AFTER 50 CYCLES SCALING RESISTANCE TREATED CONCRETE SHALL PASS ASTM C672, SCALING IMMERSION SHALL NOT EXCEED 1.0% AFTER 48 HOURS OR 2.0% AFTER 50 DAYS SHALL SHOW NO BREAKING.

3. SPREADING RATE OF 50 +/- 10 SQUARE FEET PER GALLON TO BOTH SIDES AND TYPE D, AT AN OPERATING TEMPERATURE OF 145 DEGREES F. PERFORM THE END OF 300 CYCLES THE SPECIMENS SHALL SHOW NO VISIBLE DEFECTS. REPEAT STEPS c AND d ABOVE FOR A TOTAL OF 300 CYCLES. AT THE END OF 300 HOURS EXPOSURE TEST IN A TWIN-CARBON-ARC-WEATHEROMETER, ASTM G 23, ACCELERATED WEATHERING. SUBJECT THE APPLIED COATING TO A 5,000 HOUR EXPOSURE TEST IN A TWIN-CARBON-ARC-WEATHEROMETER, ASTM G 23, ACCELERATED WEATHERING. SUBJECT THE APPLIED COATING TO A 5,000 HOUR EXPOSURE.

1. TEST APPLICATION: APPLY THE COATING TO A CONCRETE PANEL PREPARED IN ACCORDANCE WITH FEDERAL SPECIFICATION SSPC-SP6 COMMERCIAL BLAST. CONTACT THE MANUFACTURER TO DETERMINE IF THE CONCRETE COMPONENT IS STILL ACCEPTABLE. IF THE ENGINEER APPROVES THE PIECE, RE-CLEAN THE AREA TO REMOVE RUST AND BLAST CLEAN ANY RUST STAINED AREAS ON THE CONCRETE TWICE.

2. FUNGUS RESISTANCE TEST IN ACCORDANCE WITH FEDERAL SPECIFICATIONS SP-2026-C. FUNGUS GROWTH SHALL NOT BE INDICATED AFTER A MINIMUM INCUBATION PERIOD OF 21 DAYS.

4. IMPACT RESISTANCE APPLY THE COATING TO A CONCRETE PANEL PREPARED ACCORDING TO FEDERAL TEST METHOD STANDARD-VIS, METHOD D3248. AT A SPREADING RATE OF 50 +/- 10 SQUARE FEET PER GALLON AND FOR 48 HOURS AT ROOM TEMPERATURE, IMPACT TESTER IN ACCORDANCE WITH ASTM B 270 USING A ONE-INCH DIAMETER WITH AN IMPACT LOAD OF 8 INCH-POUNDS. THE COATINGS SHALL SHOW NO CHIPPING OR LOSS IMPACT LOAD.

6. SALT-CRYSTAL RESISTANCE TEST COAT A CONCRETE SPECIMEN AT THE RATE OF 50 +/- 10 SQUARE FEET PER GALLON AND FOR 48 HOURS AT ROOM TEMPERATURE. EXPOSE THE COATED SPECIMEN TO A 1.0% SALT SOLUTION SUSPENDED AT 68 DEGREES F. FOR 120 HOURS AND THEN RINSE IN DIRECTIONS EAST TO WEST AND SOUTH TO NORTH. OBSERVE FOR EVIDENCE OF RUST OR CORROSION AT THE END OF 200 HOURS OF EXPOSURE. THE COATING SHALL SHOW NO EFFECTS, SUCH AS CORROSION OR DETRIMENTAL CONVERSIONS.

6. FLEXIBILITY TEST. CAST A SHEET METAL SPECIMEN WITH THE APPLIED FINISH COATING AT A RATE OF 50 +/- 10 SQUARE FEET PER GALLON AND FOR 48 HOURS AT ROOM TEMPERATURE. administrative TRACKS THE SPECIFIED CM228 Degrees C.2028. AFTER 7 DAYS, MANDATE A 28-DAY ROUND MANDANNER. AFTER THE TRACKING, THE COATING SHALL SHOW NO EFFECTS, SUCH AS CORROSION OR DETRIMENTAL CONVERSIONS.

7. ABSORPTION THE ABSTRACTION OF TREATED CONCRETE UNDER STANDARD IMMERSION TEST. COAT NOT EXPOSED SUBSURFACE OF CONTROLLING. AT A TEMPERATURE OF 85 DEGREES F. (29.4 DEGREES C.2029) WITH A SPECIFIED CM228 Degrees C.2028. APPLY THE COATING TO A CONCRETE SAMPLE OF 50 +/- 10 SQUARE FEET PER GALLON AND FOR 48 HOURS AT ROOM TEMPERATURE. AROUND 70 DEGREES C.2030. THEN TEST THE ABSORPTION SING THE METHOD OF ASTM C-207. THE COATINGS SHALL SHOW NO EFFECTS, SUCH AS CORROSION OR DETRIMENTAL CONVERSIONS.

8. CODERATION TEST. PASS ASTM C672. SCORING RESISTANCE TEST WITH A RATING OF "NO SCALING" AFTER 50 CYCLES S00829. AT AN OPERATING TEMPERATURE OF 145 DEGREES F. PERFORM THE END OF 300 CYCLES THE SPECIMENS SHALL SHOW NO VISIBLE DEFECTS. REPEAT STEPS c AND d ABOVE FOR A TOTAL OF 300 CYCLES. AT THE END OF 300 HOURS EXPOSURE TEST IN A TWIN-CARBON-ARC-WEATHEROMETER, ASTM G 23, ACCELERATED WEATHERING. SUBJECT THE APPLIED COATING TO A 5,000 HOUR EXPOSURE.

9. NONP 244 SERIES IV - SOUTHERN EXPOSURE. APPLIED ON CONCRETE NOT TO EXCEED 10% OF UNTREATED CONCRETE Material

APPLY THE SEALER AFTER NEW CONCRETE HAS AIR DRIED FOR AT LEAST THREE DAYS IN ACCORDANCE TO THE MANUFACTURER’S INSTRUCTIONS. IF THE SEALER HAS BEEN FILLED GUTS THE SAME AS THE NEW CONCRETE AND AIR-DRIED FOR THREE DAYS.

APPLY THE SEALER TO ACCELERATED DRY PRECAST. IF APPLIED TO A JOB IT IS 28 DAYS DRY PRECAST TO COMPLETE THE FILLING AND CURING, AND THE TOTAL COMPONENT IS AIR-DRIED FOR THREE DAYS.

IN ADDITION TO THE REQUIREMENTS IN THE TWO PRECEDING PARAGRAPHS, COMPLY WITH SD-33G.

BLAST CLEAN ANY RUST STAINED AREAS ON THE CONCRETE.

IF EXPOSED REINFORCING STEEL CHAIR LEGS OR OTHER BARE SUPPORT STEEL IS VISIBLE, PURGE SURFACE CLEAN TO LEAVE A TRULY CLEAN SURFACE. CONTACT THE MANUFACTURER TO DETERMINE IF THE CONCRETE COMPONENT IS STILL ACCEPTABLE. IF THE EXPOSED STEEL IS REINFORCING, REMOVE THE CONCRETE COMPONENT AND CONSIDER IT REJECTED. IF THE ENGINEER APPROVES THE PIECE, RE-CLEAN THE AREA TO REMOVE RUST AND BLAST CLEAN ANY RUST STAINED AREAS ON THE CONCRETE TWICE.

PROVIDE THE OFFICE OF MATERIALS MANAGEMENT AN APPLICATION PROCEDURE THAT DESCRIBES HOW ALL SURFACES WILL BE COATED AND HOW DAMAGED AREAS WILL BE Touched UP. PREPARING TO THE PRECASTER’S PAIN, WHETHER PARTIAL OR TOTAL IS ACCEPTABLE. THE ENGINEER MAY REQUIRE ADDITIONAL FIELD APPLICATION BEFORE FINAL ACCEPTANCE.

EQUIPMENT USE APPLICATION EQUIPMENT RECOMMENDED BY THE MANUFACTURER. GRAY EQUIPMENT TANKS, HOSES, FILLERS, ETC.; SHALL BE CLEAN AND FREE OF FOREIGN MATERIAL, OIL RESIDUE AND WATER PRIOR TO APPLYING THE CONCRETE SEALER.

APPLYING ALL MAJOR AMOUNTS OF GAS. DO NOT APPLY SEALER IF THE AMOUNT IS EXPECTED TO BE BELOW OR ABOVE THE AVERAGE AMOUNT. APPLY SEALER FOR 24 HOURS AFTER APPLICATION.

DO NOT APPLY THE SEALER IF IT IS ACCEPTED IN 12 HOURS AFTER APPLICATION.

FOLLOW THE MANUFACTURER’S RECOMMENDED TEMPERATURES OF MORE RESTRICTIVE THAN SPECIFIED ABOVE.

TESTING WHERE APPLICATION HAS STOPPED IF IT IS UNABLE TO COMPLETE THE ENTIRE APPLICATION CONTINUOUSLY, RE-INSPECT AND RESTAFF THE FIRST COMPLETELY TO MEET SPECIFICATIONS.

ASSUMER SEALER CORRECTING THE MANUFACTURERS’ RECOMMENDED WRITTEN PROCEDURES. WITH A NON-UNIFORM CONSISTENCY AND MAINTAIN THAT DURING THE APPLICATION.

TEST APPLICATION APPLY THE SEALER TO A MEASURED COVERAGE AREA OF DIFFERENT BASE COMPONENTS TO DEMONSTRATE THE DESIRED PHYSICAL AND VISUAL EFFECT OF THE COATING TO THE MANUFACTURER THAT COVERAGE IS ACHIEVED.

APPROVED APPLY THE SEALER TO A UNIFORM APPEARANCE. FOR WALLS WITH BRICK SEAL THE ENTIRE WALL WITH A GRAY SEALER AND APPLY THE BROWN COLOR IN A SECOND COAT USING ROLLERS. THE SEALER APPEARANCE SHALL BE UNIFORM FROM PANEL TO PANEL AND BAY TO BAY.

STORAGE STORE SEALER COMPONENTS IN TIGHTLY SEALED CONTAINERS IN A DRY LOCATION AND FOLLOW THE MANUFACTURER’S INSTRUCTIONS ON STORAGE AND REGULATED TEMPERATURE.

PROTECTION OF ADHESIVE SURFACES AND THE ELECTRIC WHEN APPLYING SEALER, PROTECT ADHESIVE SURFACES USING THE MANUFACTURER’S INSTRUCTIONS. OTHER THAN SPECIFIED MEANS, PROTECT THE PUBLIC WHEN APPLYING SEALER IN AN AREA USED BY THE PUBLIC.

PROTECT AIRPORTER AND MASTIC TYPE SURFACES FROM SPILLS AND NON-ADHERING. DO NOT APPLY THE SEALER ON JOINT SEALANTS WHICH HAVE NOT CURED ACCORDING TO THE MANUFACTURER. ENSURE THAT ALL SEALER COMPONENTS HAVE BEEN MIXED AND IS APPLIED ACCORDING TO THE MANUFACTURER’S INSTRUCTIONS.

ENVIROMENTRAL REQUIREMENTS PROTECT PLANTS AND VEGETATION FROM OVERSPRAY BY COVERING WITH DROP CLOTHS, COMPLY WITH ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

PRECAUTIONS FOLLOW PRECAUTIONS ON THE MANUFACTURER’S MSDS.

BASES OF PAYMENT THE DEPARTMENT WILL CONSIDER THE COST FOR MATERIALS, LABOR AND APPLICATION OF SEALER AS INCIDENTAL TO THE SQUARE FOOT COST OF THE NOISE WALL.
EXAMPLE ELEVATION ALONG FRONT FACE (ROADWAY SIDE)

1. FOR GENERAL NOTES REFER TO SHEETS 1-3/13.
2. ALL CONCRETE NOISE BARRIERS SHALL HAVE A CAP ON TOP OF THE BARRIER AND POSTS FOR AESTHETIC PURPOSES.
3. REFER TO THE PROJECT PLANS FOR POST, PANEL, AND FOUNDATION DESIGN DATA.
4. WORKING POINT IS DEFINED AS THE POINT OF INTERSECTION OF THE WALL ALIGNMENT TANGENT, IF THE REFLECTION ANGLE (¬) EQUALS ZERO.
5. POST REFERENCE LINE IS DEFINED AS A VERTICAL LINE THROUGH THE WORKING POINT.
6. MINIMUM HEIGHT OF BOTTOM PANEL SHALL BE 4'-0".

LEGEND:
- POST DESIGN AND LOCATION NUMBER OR DESIGNATION
- PANEL DESIGN NUMBER OR DESIGNATION
- CENTER OF DRILLED SHAFT (TYP.)
- POST & DRILLED SHAFT AXIS
- POST CAP SHOWN (SEE SHEET 7/13)
- FINAL GROUND LINE (WITH BACK-SLOPE)
- FINAL GROUND LINE (NO BACK-SLOPE)
- BASE PLATE
- STANDARD STEEL
- STANDARD STEEL BASE PLATE (SEE SHEET 6/13)
- TOP OF DRILLED SHAFT ELEVATION (LEVEL)
- TOP OF NOISE BARRIER PANEL ELEVATION (LEVEL)
- TOP OF NOISE BARRIER PANEL (TYP.)
- PRECAST CONCRETE POST (SEE SHEETS 7-14/13)
- PRECAST CONCRETE PANEL (SEE SHEETS 5-6/13)
- PRECAST CONCRETE PANEL CAP (TYP.) (SEE SHEET 6/13)
- TBE = TOP OF BARRIER ELEVATION
- TSE = TOP OF DRILLED SHAFT ELEVATION (LEVEL)
- TSP = TOP OF BARRIER ELEVATION (LEVEL)
- BASE PLATE (TYP)
- BASE PLATE (TYP) (FOR INFORMATIONAL PURPOSES ONLY)
- PRECAST CONCRETE PANEL (TYP) (SEE SHEETS 5-6/13)
- PRECAST CONCRETE POST (TYP) (SEE SHEET 10/13)
- PRECAST CONCRETE PANEL (TYP) (SEE SHEET 7/13)
- GAP (SEE SHEET 10/13)
- POST & DRILLED SHAFT FOUNDATION (SEE SHEET 7/13)
- POST & DRILLED SHAFT FOUNDATION (SEE SHEET 12/13)
- WORKING POINT
- WORKING POINT
- POST & DRILLED SHAFT AXIS
- POST & DRILLED SHAFT AXIS
- SHAFT AXIS
- SHAFT AXIS
- SHAFT ELEVATION
- DRILLED SHAFT ELEVATION
- DRILLED SHAFT FOUNDATION
- DRILLED SHAFT FOUNDATION
- TOP OF BARRIER PANEL LEVEL (TYP.)
- TOP OF NOISE BARRIER PANEL LEVEL (TYP.)
- PANEL HEIGHT
- PANEL HEIGHT
- BASE PLATE
- BASE PLATE
- MIN 2'-0", MAX 8'-0" (SEE SHEET 6/13)
- MIN 2'-0", MAX 8'-0" (SEE SHEET 6/13)

NOTES:
1. FOR GENERAL NOTES REFER TO SHEETS 1-3/13.
2. ALL CONCRETE NOISE BARRIERS SHALL HAVE A CAP ON TOP OF THE BARRIER AND POSTS FOR AESTHETIC PURPOSES.
3. REFER TO THE PROJECT PLANS FOR POST, PANEL, AND FOUNDATION DESIGN DATA.
4. WORKING POINT IS DEFINED AS THE POINT OF INTERSECTION OF THE WALL ALIGNMENT TANGENT, IF THE REFLECTION ANGLE (¬) EQUALS ZERO.
5. POST REFERENCE LINE IS DEFINED AS A VERTICAL LINE THROUGH THE WORKING POINT.
6. MINIMUM HEIGHT OF BOTTOM PANEL SHALL BE 4'-0".
NOTES:
1. FOR GENERAL NOTES REFER TO SHEETS 1-3/13.
2. INTEGRAL CAP DETAILS MAY VARY. REFER TO PROJECT PLANS FOR SPECIFIC DETAILS. BOTTOM PANELS AS NEEDED.
3. FOR GENERAL NOTES REFER TO SHEETS 1-3/13.
4. THE RUSTICATION GROOVE SHALL COINCIDE WITH THE TOP OF THE HIGHEST ADJACENT PANEL.

LEGEND:
* AS REQUIRED BY DESIGN AND SHOWN ON PROJECT PLANS

DETAIL A - REFLECTIVE PANEL WITH INTEGRAL CAP

DETAIL A - ABSORPTIVE PANEL WITH INTEGRAL CAP

DETAIL B - REFLECTIVE PANEL KEYWAY DETAIL

DETAIL B - ABSORPTIVE PANEL KEYWAY DETAIL
ELEVATION, REINFORCING, AND STORAGE PLAN

TYPICAL POST

DETIAL C - INTEGRAL POST CAP DETAIL

(16" TYPE A POST SHOWN, OTHERS SIMILAR)

1. TOP VIEW

VIEW F-F

TOP VIEW

SECTION G-G

SECTION H-H

NOTES:

1. DIMENSION VARIES WITH CAP DETAIL.
2. THRU HOLE (CAST INTO CAP) FOR 3/8" ANCHOR BOLT AND RECESS TO BE FILLED WITH NON-SHRINK CEMENT AS PER CMS 515.19;
3. 515.19 GROUT AS PER CMS WITH NON-SHRINK Recess TO BE FILLED SWIFT LIFT ANCHOR; 2-TON CAPACITY.
4. BOTTOM OF INTEGRAL CAP MUST HAVE RUSTICATION GROOVES OR OVERHANGS; PAINTED LINES ARE NOT ALLOWED.

1. FOR GENERAL NOTES REFER TO SHEETS 1-1/3.
2. FASTEN THE NON-INTEGRAL CAP ATOP THE POST BY THREADING A 3/8" ANCHOR BOLT INTO THE FERRULE LOOP INSERT.
3. NON-INTEGRAL CAP ANCHOR BOLT SHALL BE GALVANIZED ASTM A325;
4. BOTTOM OF INTEGRAL CAP MUST HAVE RUSTICATION GROOVES OR OVERHANGS; PAINTED LINES ARE NOT ALLOWED.

LEGEND:
- DIMENSION VARIES WITH CAP DETAIL.
- THRU HOLE CAST INTO CAP FOR 3/8" ANCHOR BOLT AND RECESS TO BE FILLED WITH NON-SHRINK CEMENT AS PER CMS 515.19;
- 515.19 GROUT AS PER CMS WITH NON-SHRINK Recess TO BE FILLED SWIFT LIFT ANCHOR; 2-TON CAPACITY.
- BOTTOM OF INTEGRAL CAP MUST HAVE RUSTICATION GROOVES OR OVERHANGS; PAINTED LINES ARE NOT ALLOWED.

FOR NON-INTEGRAL CAP SEE DETAIL D
FOR INTEGRAL CAP SEE DETAIL C

FOR CLARITY):
(REMOVED FROM OTHER VIEWS FOR CLARITY)

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF STRUCTURAL ENGINEERING
BY: GANNTT FLEMING, INC.
ORIGINALLY PREPARED BY:
DESIGN AGENCY

STORAGE AND SHIPPING SUPPORT LOCATION (16"
TYPE A POST SHOWN, OTHERS SIMILAR)

NON-INTEGRAL CAP
TOP View

PANEL CAP (TBE)
TOP OF INTEGRAL PANEL CAP (TYP)

TOP VIEW

SECTION G-G

SECTION H-H

NOTES:

1. FOR GENERAL NOTES REFER TO SHEETS 1-1/3.
2. FASTEN THE NON-INTEGRAL CAP ATOP THE POST BY THREADING A 3/8" ANCHOR BOLT INTO THE FERRULE LOOP INSERT.
3. NON-INTEGRAL CAP ANCHOR BOLT SHALL BE GALVANIZED ASTM A325;
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LEGEND:
- DIMENSION VARIES WITH CAP DETAIL.
- THRU HOLE CAST INTO CAP FOR 3/8" ANCHOR BOLT AND RECESS TO BE FILLED WITH NON-SHRINK CEMENT AS PER CMS 515.19;
- 515.19 GROUT AS PER CMS WITH NON-SHRINK Recess TO BE FILLED SWIFT LIFT ANCHOR; 2-TON CAPACITY.
- BOTTOM OF INTEGRAL CAP MUST HAVE RUSTICATION GROOVES OR OVERHANGS; PAINTED LINES ARE NOT ALLOWED.

FOR NON-INTEGRAL CAP SEE DETAIL D
FOR INTEGRAL CAP SEE DETAIL C

FOR CLARITY):
(REMOVED FROM OTHER VIEWS FOR CLARITY)
### Notes
1. For general notes refer to sheets 1-3/13.
2. Bending diagrams are shown in elevations on sheet 5/13.
3. For additional post details refer to sheet 1/13.
4. Working point is defined as the point of intersection of the wall alignment and the post axis.
5. Working point is defined as the point of intersection of the wall alignment and the post axis.

### Table: 20' Precast Concrete Post Data

<table>
<thead>
<tr>
<th>Geometry</th>
<th>Type A Post</th>
<th>Type B Post</th>
<th>Type D Post</th>
<th>Type E Post</th>
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<tbody>
<tr>
<td><strong>Barreir height (in)</strong></td>
<td><strong>Post spacing (in)</strong></td>
<td><strong>Post &amp; drilled shaft axis</strong></td>
<td><strong>Post &amp; drilled shaft axis</strong></td>
<td><strong>Post &amp; drilled shaft axis</strong></td>
</tr>
<tr>
<td><strong>Notch</strong></td>
<td><strong>Threaded Rod</strong></td>
<td><strong>Threaded Rod</strong></td>
<td><strong>Threaded Rod</strong></td>
<td><strong>Threaded Rod</strong></td>
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<tr>
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<td><strong>Size</strong></td>
<td><strong>Size</strong></td>
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<tr>
<td><strong>1'-0&quot;</strong></td>
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<td><strong>3'-3&quot;</strong></td>
<td><strong>4'-0&quot;</strong></td>
<td><strong>5'-0&quot;</strong></td>
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<tr>
<td><strong>1'-9&quot;</strong></td>
<td><strong>2'-4&quot;</strong></td>
<td><strong>3'-1&quot;</strong></td>
<td><strong>4'-2&quot;</strong></td>
<td><strong>5'-3&quot;</strong></td>
</tr>
<tr>
<td><strong>1'-6&quot;</strong></td>
<td><strong>2'-2&quot;</strong></td>
<td><strong>3'-0&quot;</strong></td>
<td><strong>4'-1&quot;</strong></td>
<td><strong>5'-2&quot;</strong></td>
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</tbody>
</table>

### Mark Schedule

<table>
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<tr>
<th>Mark</th>
<th>Type</th>
<th>Length</th>
<th>Dimensions</th>
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</thead>
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<td>S</td>
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<td>6&quot; x 2-3&quot;</td>
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<tr>
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<td>1</td>
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<td>2'-4&quot; x 2'-4&quot;</td>
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<tr>
<td>#2</td>
<td>2</td>
<td>2'-5&quot;</td>
<td>2'-5&quot; x 2'-5&quot;</td>
</tr>
</tbody>
</table>

### Legend
- **Panel length deduction (PLD)** dimension shown on PLD table on sheet 5/13.
- **Threaded Rod Embedment**: See sheet 1/13.
- **Minimum Nominal Thread Diameter**: SS = Stirrup Spacing, See Sheet 1/13.
- **Center of Drilled Shaft**

### Bending Diagrams

- **Type 1**
- **Type 2**
1. For general notes refer to sheets 1-13.
2. For section 1-14, see sheet 11-13.
3. Install all threaded connections according to the anchor bolt nut requirements of CWS 630-06.
4. Provide headed anchor bolts with standard circular washers, hooked ends are not allowed.
5. In lieu of providing separate threaded rods, the "A" rebars may be fabricated with threaded ends and extended to connect the base plate to the bottom of the post. Extended "A" rebars shall be galvanized pole length. (Fabricator to detail hole locations and sizes on shop drawings).
6. Unless a bolted plate connection, the base plate holes may be tapped to accommodate the threaded rod or of "A" threaded rods, "A" rebars or "A" threaded rods shall be threaded into the baseplate in "P" + "F" men and tack welded in place. The assembly shall be cast into the post.
7. Fabricator shall detail anchor bolt projection on shop drawings. When installed, the end of the bolt shall project at least two threads length outside the face of the nut.

### Base Plate Data for 16" Precast Concrete Posts

<table>
<thead>
<tr>
<th>GEOMETRY</th>
<th>TYPE A POST</th>
<th>TYPE B POST</th>
<th>TYPE C POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier Height (in)</td>
<td>MAX. POST SPACING</td>
<td>PLATE THICKNESS (in)</td>
<td>D&quot; ANCHOR BOLT</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>105 (1&quot; X 2&quot;)</td>
<td>1&quot;</td>
<td>0&quot;</td>
</tr>
<tr>
<td>3'-6&quot;</td>
<td>105 (1&quot; X 2&quot;)</td>
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<td>0&quot;</td>
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</table>

### Base Plate Data for 20" Precast Concrete Posts

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<tr>
<th>GEOMETRY</th>
<th>TYPE A POST</th>
<th>TYPE B POST</th>
<th>TYPE C POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier Height (in)</td>
<td>MAX. POST SPACING</td>
<td>PLATE THICKNESS (in)</td>
<td>D&quot; ANCHOR BOLT</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>105 (1&quot; X 2&quot;)</td>
<td>1&quot;</td>
<td>0&quot;</td>
</tr>
<tr>
<td>3'-6&quot;</td>
<td>105 (1&quot; X 2&quot;)</td>
<td>1&quot;</td>
<td>0&quot;</td>
</tr>
</tbody>
</table>

### Notes:
- Use 20" precast concrete post.

**Legend:**
- A D = Unified National Coarse as per M4400 and Mi 4.0
- "F" = D" Anchor Bolt Embedment Length
- "P" = Steel Base Plate Thickness
- "F" = Center of Drilled Shaft

---

**D" Anchor Bolt**

13 (IN.) 25 (IN. X IN.) 1" X 1"

**Embedment (IN.)**

25 (IN. X IN.) 1" X 1"

---

**Steel Base Plate (Galvanized)**

---

**Fabricator to detail hole locations and sizes on shop drawings based on selected connection type.**

---

**Notes:**

1. Use 20" precast concrete post.

---

**Type A Post**

105 (1" X 2") 1" 0"

---

**Type B Post**

105 (1" X 2") 1" 0"

---

**Type C Post**

105 (1" X 2") 1" 0"

---

**Steel Base Plate (Galvanized)**

---

**Fabricator to detail hole locations and sizes on shop drawings based on selected connection type.**

---

**Notes:**

1. Use 20" precast concrete post.

---

**Type A Post**

105 (1" X 2") 1" 0"

---

**Type B Post**

105 (1" X 2") 1" 0"

---

**Type C Post**

105 (1" X 2") 1" 0"

---

**Steel Base Plate (Galvanized)**

---

**Fabricator to detail hole locations and sizes on shop drawings based on selected connection type.**

---

**Notes:**

1. Use 20" precast concrete post.
**Panel Seat Elevation**

1. **Required Anchors**
   - 1'-2" Max
   - 1'-0" Max

2. **Dimensions**
   - HB = Step Block Height; 3" Min, 4'-0" Max

3. **NOTES:**
   - Detail E - Integral Step Block
   - 3" Min
   - 5" (Typ)
   - 7" (Typ)

4. **GAP**
   - THRU STEP BLOCK

**Panel Seat Plan with Integral Step Block**

**(6", Type E Post Shown; Other Posts Similar)**

**Panel Seat Plan with Non-Integral Step Block**

**(18", Type A Post Shown; Other Posts Similar)**

**Legend:**
- + Center of Drilled Shaft

**NOTES:**
1. For general notes refer to sheets 1-3/13.
2. Non-integral precast concrete step blocks shall be used from a minimum height of 3" to a maximum height of 4'-0" up to and including 4'-0" as detailed on this sheet.
3. Precast concrete post shall be used for heights over 1'-0" up to and including 4'-0" as detailed on this sheet.
4. Place the step block directly on the steel base plate, then place the preformed bearing pads on top of the step block.
5. Dimensions to be equal from each end of step block, may be unequal, when necessary to avoid post shear reinforcing.
6. ENSURE THAT THE STEP BLOCK IS TIDLY SEATED ON THE STEEL BASE PLATE.
7. Ensure that step block anchor locations do not interfere with precast concrete post shear reinforcing. Refer to "Detail F" on this sheet for anchor location requirements.
**TYPICAL DRILLED SHAFT ELEVATION**

**LEGEND:**
-  a center of drilled shaft

**NOTES:**
1. FOR GENERAL NOTES REFER TO SHEETS 1-3/13.
2. REFER TO THE REINFORCING STEEL LIST IN THE PROJECT PLANS FOR THE REINFORCING STEEL DETAILS FOR EACH DRILLED SHAFT DESIGN.
1. Construct a trench with a minimum longitudinal slope of 1.0% under the noise barrier panels as shown in the typical elevation.

2. Provide underdrain slope of 1% minimum or as specified in project plans. Install in accordance with Item 605.

3. Outlet conduit to be spaced at 500' max.; install in accordance with Item 605.

4. At sag points, specify raised panel section.
4-NO. 5 BARS. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS.

2. ALTERNATE TOP STIRRUPS TO LAP BOTTOM STIRRUPS AT EACH END OF BEAM WHERE TWO TYPES OF TOP STIRRUPS ARE PROVIDED.

3. THE MINIMUM TOP LONGITUDINAL REINFORCING STEEL SHALL BE BEAM WHERE TWO TYPES OF TOP STIRRUPS ARE PROVIDED.

OF THE BEAM. DEBONDED STRANDS SHALL BE IN THE BOTTOM LAYER. DEBOND LENGTH SHALL BE SYMMETRICAL ABOUT THE VERTICAL SYMMETRICALLY OVER THE BEAM WIDTH. STRAND PATTERN AND THE

NOTES:

SYMMETRICAL AROUND THE VERTICAL SYMMETRICAL ABOUT THE VERTICAL SYMMETRICALLY OVER THE BEAM WIDTH. STRAND PATTERN AND THE STRAND PATTERN TYPICAL FOR ALL 36" WIDE BEAMS

FOR ALL SECTIONS)

48" WIDE NON-COMPOSITE BEAMS

36" WIDE NON-COMPOSITE BEAMS

48" WIDE COMPOSITE BEAMS

36" WIDE COMPOSITE BEAMS

4" NO. 5 BARS. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS.

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FOR ALL SECTIONS)
PARTIAL PLAN OF BEAM CONNECTION OVER PIER

60" OF BRIDGE FULL WIDTH

*No. 4 OR No. 5 BARS

OF THE TOTAL NUMBER OF STRANDS BENT UP
APPROXIMATELY ONE HALF OF THE TOTAL NUMBER OF STRANDS BENT UP. 36" WIDE BEAMS OF 6 STRANDS BENT UP. 48" WIDE BEAMS WITH LESS THAN 12 STRANDS TOTAL SHALL HAVE BARS. 48" WIDE BEAMS WITH A TOTAL OF 12 OR MORE STRANDS SHALL HAVE A MINIMUM AT THE FABRICATOR'S OPTION, STRANDS MAY BE EXTENDED AND BENT UP IN LIEU OF No. 6 STIRRUPS AND SHALL BE UNIFORMLY SPACED ACROSS THE BEAM.

EACH BEAM END IN 36" WIDE BEAMS. No. 6 BARS SHALL BE LOCATED ON TOP OF

* LAP BARS SAME SIZE AND NUMBER AS BEAM BARS. HOOKS MAY BE ROTATED FROM

No. 6 BAR 6"x 6" PEJF AROUND DOWELS (TYP.)

PARTIAL LENGTH LONGITUDINAL BARS.

ELASTOMERIC BEARING (TYP.)

PREFORMED EXPANSION JOINT UNDER THE BEAM CONNECTION, 10" WIDE

6' ' 12' ' 2'-7'' 2'-1''

Pier Section A-A

SECTION PROPERTIES FOR COMPOSITE SECTIONS ARE COMPUTED WITH A SLAB Thickness OF 6" which includes a monolithic wearing surface.

X-X AXIS (IN )

I  = MOMENT OF INERTIA OF THE COMPOSITE BEAM ABOUT THE X-X AXIS (IN )

COMPOSITE BEAM (IN )

Z  = SECTION MODULUS FOR THE EXTREME TOP FIBER OF THE NON-COMPOSITE BEAM (IN )

A  = CROSS-SECTIONAL AREA OF THE NON-COMPOSITE BEAM (IN )

D = TOTAL DEPTH OF THE NON-COMPOSITE BEAM (IN)

DEFINITIONS:

D = TOTAL DEPTH OF THE NON-COMPOSITE BEAM (IN)

A = CROSS-SECTIONAL AREA OF THE NON-COMPOSITE BEAM (IN )

X-X AXIS (IN )

I  = MOMENT OF INERTIA OF THE NON-COMPOSITE BEAM ABOUT THE X-X AXIS (IN )

COMPOSITE BEAM (IN )

Z  = SECTION MODULUS FOR THE EXTREME TOP FIBER OF THE NON-COMPOSITE BEAM (IN )

A  = CROSS-SECTIONAL AREA OF THE NON-COMPOSITE BEAM (IN )

D = TOTAL DEPTH OF THE NON-COMPOSITE BEAM (IN)

Stirrups and strand review 2-20-18 Final Drawing

36" OR 48" WIDE COMPOSITE BEAM WITH SLAB

36" OR 48" WIDE COMPOSITE BEAM

36" OR 48" WIDE BOX BEAM - SECTION PROPERTIES

01-21-11

OFFICE OF ENGINEERING

PRESTRESSED CONCRETE BOX BEAM DETAIL

36" OR 48" WIDE BOX BEAM - SECTION PROPERTIES
**Sheet 2 Notes and Legend**

1. **WF36-49** (62 Permissible Bottom Flange Strand Locations)

2. **WF42-49** (62 Permissible Bottom Flange Strand Locations)

3. **WF48-49** (62 Permissible Bottom Flange Strand Locations)

4. **WF54-49** (62 Permissible Bottom Flange Strand Locations)

5. **WF60-49** (62 Permissible Bottom Flange Strand Locations)

---

**WWR = WELDED WIRE REINFORCEMENT**

All reinforcing steel may be replaced with equivalent WWR. Additional reinforcing bars may be added on plans if required by analysis. Additional bars shall be placed symmetrically about & meet all AASHTO requirements.

(a) - One longitudinal bar from the bottom may of reinforcing shall be placed under each 401 bar. This bar is included in payment with the order reinforcing steel and shall epoxy coated.

(b) - The WWR shall be provided as shown. Additional reinforcing bars may be added on plans if required by analysis. Additional bars shall be placed symmetrically about & meet all AASHTO requirements.

(c) - See Sheet 4 of 10 for WWR details. See Sheet 3 of 10 for reinforcing steel details.

All reinforcing steel may be replaced with equivalent WWR. If utilized, these strand locations must be draped.

**WWR = Welded Wire Reinforcement**

---

**D20 WWR @**

---

**WF54-49** (62 Permissible Bottom Flange Strand Locations)

---

**WF60-49** (62 Permissible Bottom Flange Strand Locations)

---

**WF65-49** (62 Permissible Bottom Flange Strand Locations)
SECTION A-A
- If utilized in WF girders, these strands shall be draped. 401 bars not shown for clarity.

SECTION B-B
- If utilized in WF girders, these strands shall be draped. 401 bars not shown for clarity.

SECTION C-C
- If utilized in WF girders, these strands shall be draped. 401 bars not shown for clarity.

ANCHORAGE ZONE REINFORCING STEEL
Strands not shown for clarity

SHIPPING HOLES (f)
- For 601, 401 & 27 beams
401 bars not shown for clarity

TOP FLANGE FINISHING
APPLIES TO MODIFIED AASHTO AND WF GIRDERS ONLY

SEALING OF FASCIA BEAMS
APPLIES TO MODIFIED AASHTO AND WF GIRDERS ONLY

LIMITS
SEALING LIMITS

NOTE:
- 401 bar shall be epoxy coated.
- 401 bar spacing shall be determined by analysis to achieve composite design.
- Anchorage zone reinforcement shall be shown in structure plans and shall be designed to meet AASHTO 5.10.10.
- Discontinue 305 bars at a distance of 1.5 times the depth of the beam beyond the termination of strand debonding.
- Trowel exterior 9" of top flange smooth. Apply two coats of C&MS 705.07, Type I or II membrane curing compound with a roller to act as a bond breaker.
- The maximum difference in cross-sectional area of intersecting wires shall be ±40%.
- Shipping holes are not allowed on beams 54" deep or less.
- If shipping holes are utilized, two #3 bars shall be added on each face of the web. The #3 bars shall be tied to the outside face of the #3 and extend for a minimum of 1'-0" beyond the shipping holes.
- 1 1/2 x beam depth of strand
- #3 bar e.f., 1'-8" £ holes through web for shipping
- 5/8" holes through web for shipping
- 5/8" holes shown for clarity
- 2'-8" minimum
- 1'-10" minimum
- 3'-0" minimum
- 2'-8" minimum
- Plate
- Plate
- Plate

REVISIONS
- Structural Engineering Office of
- State of Ohio Department of Transportation
- Design Agency
**Expansion Abutment Partial Plan**

- All vertical bars shall be placed parallel to beams.
- Diaphragm concrete to follow the outside edge of exterior girder.
- See standard drawing EXJ-6-06 for dimension definition.
- For beam spacings exceeding 9'-0", use 4-#8 bars.
- Distance shall be measured from the larger of the top or bottom flange width.
- This dimension is measured from the vertical face of the end diaphragm to the nearest point on the end of the beam.
- Measured to steel load plate.
- Top flanges may be clipped a maximum of 6".
- Diaphragm concrete to follow the outside edge of exterior girder.

**Expansion Joint End Diaphragm**

- See standard drawing EXJ-6-06 for dimension definition.
- For beam spacings exceeding 9'-0", use 4-#8 bars.
- Top flanges may be clipped a maximum of 6".

**Sheet 6 Notes and Legend**

- All vertical bars shall be placed parallel to beams.
- See standard drawing EXJ-6-06 for dimension definition.
- For beam spacings exceeding 9'-0", use 4-#8 bars.
- Distance shall be measured from the larger of the top or bottom flange width.
- Top flanges may be clipped a maximum of 6".
- Measured to steel load plate.
- Top flanges may be clipped a maximum of 6".
- LARGER OF \( 4\times 6 \times \sin \phi + 6\times \cos \phi \) \( \leq 6" \)
- LARGER OF THE TOP OR BOTTOM FLANGE WIDTH, ACCOUNTING FOR ANY CLIP.
- \( T = \) THICKNESS OF WEB.
**BARS**

- S401 & S402 BARS MAY BE MOVED TO ACCOMODATE 3 S401 & S402 BARS FOR 60", 66", & 72" DEEP BEAMS.
- (b) - 2 S401 & S402 BARS FOR GIRDLERS 54" OR LESS.

**Draped Strands**

- DRAPED STRANDS.

**Table: Bending Diagrams**

<table>
<thead>
<tr>
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</tr>
<tr>
<td>S402</td>
<td>3</td>
<td>4-8&quot;</td>
</tr>
<tr>
<td>S403</td>
<td>6</td>
<td>1-5&quot;</td>
</tr>
</tbody>
</table>

- BAR SIZE IS INDICATED IN THE BAR MARK. THE FIRST DIGIT INDICATES THE BAR SIZE AND THE REMAINING DIGITS ITS SEQUENCE NUMBER. ALL STEEL SHALL BE EPOXY-COATED.

**Notes and Legend**

- (a) - SEE PROJECT PLANS
- (b) - PLACE CONSTRUCTION JOINT 6" ABOVE BOTTOM OF WEB.
- (c) - TOP FLANGE MAY BE CLIPPED A MAXIMUM OF 6".
- (d) - LARGER OF $\sqrt{N^2 + (W/\sin \theta)}$
- (e) - THICKNESS OF WEB
- F.F. - FAR FACE
- N.F. - NEAR FACE
- ALL VERTICAL BARS SHALL BE PLACED PARALLEL TO BEAMS.
**Sheet 9 Notes and Legend**

1. **AASHTO Type 2**
   - NA
   - NA
   - NA
   - NA
   - NA

2. **AASHTO Type 3**
   - NA
   - NA
   - NA
   - NA
   - NA

3. **AASHTO Type 4**
   - NA
   - NA
   - NA
   - NA
   - NA

4. **MODIFIED AASHTO TYPE 4 (66")**
   - NA
   - NA
   - NA
   - NA
   - NA

5. **MODIFIED AASHTO TYPE 4 (72")**
   - NA
   - NA
   - NA
   - NA
   - NA

6. **HYBRID I-BEAM (60")**
   - NA
   - NA
   - NA
   - NA
   - NA

7. **HYBRID I-BEAM (66")**
   - NA
   - NA
   - NA
   - NA
   - NA

8. **HYBRID I-BEAM (72")**
   - NA
   - NA
   - NA
   - NA
   - NA

9. **HYBRID I-BEAM (54")**
   - NA
   - NA
   - NA
   - NA
   - NA

10. **HYBRID I-BEAM (48")**
    - NA
    - NA
    - NA
    - NA
    - NA

11. **HYBRID I-BEAM (42")**
    - NA
    - NA
    - NA
    - NA
    - NA

12. **HYBRID I-BEAM (36")**
    - NA
    - NA
    - NA
    - NA
    - NA

**NOTE - THE GIRDER FABRICATOR MAY USE DOUBLE THREADED INSERTS IN LIEU OF TWO SINGLE INSERTS SPACED AT 4" ON CENTER AT THE CONCRETE INTERMEDIATE DIAPHRAGM LOCATIONS.**

**STATE OF FABRICATION AND ERECTION**

**DESIGN AGENCY**

**DATE**

**REVISIONS**

**STANDARD BRIDGE DETAILS**

**STATE OF FABRICATION AND ERECTION**

**DESIGN AGENCY**

**DATE**

**REVISIONS**

**STANDARD BRIDGE DETAILS**
DESIGN STRESSES:

PRESTRESSED CONCRETE: F'c = 50 (0-4Ksi) F'c = 60 (0-6Ksi)

ABUTMENT, INTERMEDIATE, AND PIER DIAPHRAGM CONCRETE: F'c = 4000 psi

REINFORCING STEEL - WSD, YIELD STRENGTH = 60 ksi.

WEIGHTED AVERAGE REINFORCEMENT - WSD, YIELD STRENGTH = 70 ksi.

PRESTRESSING STRAND - FURNISH MATERIAL CONFORMING TO THE DESIGN SPECIFICATIONS: THIS STRUCTURE CONFORMS TO THE DESIGN SPECIFICATIONS (AT A MINIMUM) THE I-BEAM SPACING, DECK THICKNESS, AND CONSTRUCTION JOINTS SPACED AT 8'-0" PARALLEL TO AND AIR SHAL BE 40°F OR HIGHER AT THE TIME OF CONCRETE PLACEMENT IN THE ADJACENT SPAN. BEFORE PLACING THE CONCRETE, ALLOW THE SURFACE TO DRY SUFFICIENTLY TO PRODUCE SATISFACTORY RESULTS. THOROUGHLY DRENCH THE SURFACE WITH CLEAN WATER. OR ANY OTHER METHOD THAT PRODUCES SATISFACTORY RESULTS. THE CONTRACTOR MAY ADD SHIPPING MIXTURE TO THE CONCRETE TO IMPROVE ITS INITIAL SET.

CAST-IN-PLACE DECK CONCRETE: THOROUGHLY CLEAN THE TOP SURFACE OF THE CONCRETE. THE DESIGNER SHALL SPECIFY THE STRAND AREA IN THE STRUCTURE'S GENERAL NOTES. THE DESIGNER SHALL SPECIFY A RELEASE STRENGTH IN THE STRUCTURE'S GENERAL NOTES. THE DESIGNER SHALL SPECIFY A 28-DAY COMPRESSIVE STRENGTH IN THE STRUCTURE'S GENERAL NOTES. THE DESIGNER SHALL SPECIFY a 28-DAY STRENGTH IN A SINGLE CASTING (AT A MINIMUM) THE I-BEAM SPACING, DECK THICKNESS, AND CONSTRUCTION JOINTS SPACED AT 8'-0", PARALLEL TO AND AIR SHALL BE 40°F OR HIGHER AT THE TIME OF CONCRETE PLACEMENT IN THE ADJACENT SPAN. BEFORE PLACING THE CONCRETE, ALLOW THE SURFACE TO DRY SUFFICIENTLY TO PRODUCE SATISFACTORY RESULTS. THOROUGHLY DRENCH THE SURFACE WITH CLEAN WATER. OR ANY OTHER METHOD THAT PRODUCES SATISFACTORY RESULTS. THE CONTRACTOR MAY ADD SHIPPING MIXTURE TO THE CONCRETE TO IMPROVE ITS INITIAL SET.

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EDGE BEAM SLAB DATA

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<th>E</th>
<th>SIZE</th>
<th>NO. BARS</th>
<th>E</th>
<th>SIZE</th>
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</tr>
</tbody>
</table>

GENERAL: This drawing provides design and construction specifications for single span slab bridges. The project plans for each structure will show span lengths, roadway widths, skew, curve, and super-elevation of any field-sawn slab reinforcement details in plan and cross section; reinforcing steel list and other necessary details and special notes.

ROADWAY WIDTH: The slab on this sheet is designed for the following roadway widths, measured between face of bridge rails, width not to exceed 25'-0".


DESIGN DATA:
- DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN
- DESIGN LOADING: HL-93
- SUPERIMPOSED DEAD LOAD = 60 LB/FT
- WEARING SURFACE = ONE INCH MONOLITHIC
- WEARING SURFACE - ONE INCH WORKING THICKNESS
- DESIGN STRESSES:
  - WEARING SURFACE - ONE INCH MONOLITHIC
  - SUPERIMPOSED DEAD LOAD = 60 LB/FT
  - ROADWAY WIDTH = 25'-0"
  - DESIGN DATA:
    - OFFICIALS AND THE OHIO BRIDGE DESIGN MANUAL, 2006
    - GENERAL:
      - EDGE BEAM OPTION: IN 1-3'-0" FORMING AN EDGE BEAM AT NO
      - ADDITIONAL COST TO THE OWNER. THE CONTRACTOR MAY FURNISH AN 18" SLAB OR A SLAB HAVING IN THICKNESS FROM 1'-0" TO 1'-11" CENTER OF THE ROADWAY. SEE SHEET C-21 FOR EDGE BEAM DETAILS.
      - CEMENT TO COMPENSATE FOR FALSEWORK DEFLECTION AND FOR THE DEFLATION OF THE SLAB AFTER THE FALSEWORK IS REMOVED, BUILD CEMENT INTO THE FALSEWORK ACCORDING TO CMS 509.01.

CONCRETE:
- FOR BRIDGES WITH SKEW, PLACE LONGITUDINAL BARS PARALLEL TO THE CENTERLINE OF THE ROADWAY AND TRANSVERSE BARS PARALLEL TO THE PIEDS AND ABUTMENTS. DO NOT USE THIS STANDARD FOR SKEWS GREATER THAN 30°.

REINFORCING STEEL:
- FURNISH THE REINFORCING STEEL LENGTHS AS TO BE USED IN THE SLABS, EXCEPT FOR SKEWS GREATER THAN 30°.
- USE WHEN T<18"
- NO. 4 LAP = 2'-11"     NO. 8 LAP = 6'-9"
- NO. 5 LAP = 3'-2"     NO. 9 LAP = 6'-5"
- NO. 7 LAP = 4'-2"     NO. 10 LAP = 6'-25"

INFILL WIDTHS, MEASURED BETWEEN FACE OF ABUTMENTS, WIDTH LESS THAN 18 FEET.

edge beam detail (for slabs with t < 18")

LEGEND:
- * CLEARS SHOULD NOT EXCEED SPACING OF * "A" BARS
- ** CLEARS SHOULD NOT EXCEED SPACING OF ** "A" BARS
- 3" MIN. 5" MAX.
- 6" MAX.
- NO. 4 BARS OR NO. 5 BARS
- NO. 6 BARS OR NO. 7 BARS
- NO. 8 BARS OR 9 BARS
- NO. 10 BARS, USE ONLY WITH 15'-0" DW WORK

SPACING AS GIVEN IN TABLE (A BARS)

LEGEND:
- 1'-0" HEAVY TYPE
- 1'-0" ROUND DRIP GROOVE (TOP)

SEE SHEET E-26 FOR EDGE BEAM DETAILS.

EDGE BEAM DETAIL (FOR SLABS WITH T < 18")
NOTES:

1. FOR ALL SINGLE SLOPE CONCRETE BRIDGE RAILINGS INCLUDING THE 14'-0" TRANSITIONS, PROJECT PLANS SHALL INCLUDE PLAN VIEW, ELEVATION VIEW, SECTIONS, REINFORCING MARKS, REINFORCING BENDING DIAGRAMS, AND REINFORCING WEIGHTS.

2. SEE APPROPRIATE STANDARD BRIDGE DRAWING FOR ABUTMENT DETAILS.

3. FOR BRIDGE TERMINAL ASSEMBLY, SEE STD. CONSTR. DWGS. MGS-3.1 AND MGS-3.2.

4. FOR SAWCUT PERMETER LENGTH, SEE DETAIL A ON SHEET 55.

5. FOR DEFORMATION JOINT DETAILS AND ADDITIONAL NOTES, SEE SHEET 55.

LEGEND:

E.S. = EACH SIDE
F.S. = FAR SIDE
N.S. = NEAR SIDE

REINFORCING STEEL FOR 42° SBR-1 TRANSITION MOUNTED ON BRIDGE

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</tr>
<tr>
<td>X504</td>
<td>A + B + 8&quot;</td>
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BENDING DIAGRAMS:

CONSULT PROJECT PLANS AND FIELD BEND BARS WHERE NECESSARY.
PLAN VIEW
42" SBR-1 PARAPET TRANSITION MOUNTED ON TURNBACK WINGWALL
WITH TYPICAL ABUTMENT SHOWN

SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E

REINFORCING STEEL FOR 42" SBR-1 TRANSITION MOUNTED ON WINGWALL

NOTES:
1. FOR ALL SINGLE SLOPE CONCRETE BRIDGE RAILINGS INCLUDING THE 42" SBR-1 TRANSITIONS, PROJECT PLANS SHALL INCLUDE PLAN VIEW, ELEVATION VIEW, SECTIONS, REINFORCING MARKS, REINFORCING BENDING DIAGRAMS, AND REINFORCING WEIGHTS.
2. SEE APPROPRIATE STANDARD BRIDGE DRAWING FOR ABUTMENT DETAILS.
3. FOR BRIDGE TERMINAL ASSEMBLY, SEE STD. CONSTR. DWGS. MGS-3.1 AND MGS-3.2.
4. FOR DEFLECTION JOINT DETAILS AND ADDITIONAL NOTES, SEE SHEET #55.
NOTES:
1. FOR THE ENTIRE LENGTH OF SINGLE SLOPE CONCRETE BRIDGE RAILINGS, PROJECT PLANS SHALL SHOW THE LOCATIONS OF DEFLECTION JOINTS.
2. DEFLECTION JOINT SPACING SHALL NOT EXCEED 1'-1" ON CENTERS. FOR CONTINUOUS STRUCTURES, THE DEFLECTION JOINTS WITHIN THE DEAD LOAD CONTACT LEASE NIGI LOWE MOMENT REGIONS OVER PIER LOCATIONS SHALL BE SPACED NOT LESS THAN 0'-0" NOR MORE THAN 1'-0" ON CENTERS.
3. Payment FOR 3'-6" GLASS FIBER REINFORCED POLYMER (GFRP) STIFFENING REINFORCEMENT SHALL BE INCLUDED WITH CONTRACT PRICE FOR FINISH SBS - EPS R COATED REINFORCING STEEL.

REINFORCEMENT - MINIMUM YIELD STRENGTH = 60 KSI
CONCRETE - COMPRESSIVE STRENGTH = 4.5 KSI

DESIGN CRITERIA:

DESIGN DATA:
CONCRETE - COMPRESSIVE STRENGTH = 4.5 KSI
REINFORCING STEEL - MINIMUM YIELD STRENGTH = 60 KSI

AREA OF STANDARD 42" SBR-1 CROSS SECTION = 588.0 SQ. IN.
VOLUME OF 42" SBR-1 TRANSITION SECTION = 1.82 CU. YD.

DEFLECTION JOINTS FOR CONCRETE PARAPETS:
FOR SAWCUTS CONCRETE PARAPETS:
AS SOON AS CURING OF THE CONCRETE IS COMPLETE OR THE CONTRACTOR THINKS IT IS SAFE, PERFORM 4" SAWCUT AT SHOWN IN DETAIL A, SHEET 25. APPLIED PARAPET LOAD INCLUDES: CONSTRUCTION LOADS ON THE DECK EXCLUDING MANUALLY OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO THE PARAPET AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.

MAXIMUM SPACING OF VERTICAL REINFORCING BARS FOR STANDARD 42" SBR-1 CONCRETE PARAPETS:
THE MAXIMUM SPACING OF VERTICAL REINFORCING BARS FOR THE STANDARD 42" SBR-1 CONCRETE PARAPET SHALL BE 1'-0", UNLESS NOTED OTHERWISE.

MINIMUM EMBEDMENT OF VERTICAL REINFORCING BARS:
IF THE MINIMUM EMBEDMENT SHOWN FOR THE VERTICAL REINFORCING BARS INTO THE BRIDGE DECK, APPROACH SLAB, OR MAINSDALL IS NOT MET, THEN THE DESIGNER SHALL CALCULATE THE REQUIRED REINFORCEMENT ACCORDING TO SECTION 15 OF THE "MASHIBO LRP BRIDGE DESIGN SPECIFICATIONS" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS.

MAXIMUM SPACING OF VERTICAL REINFORCING BARS FOR 42" SBR-1 TRANSITIONS:
The maximum spacing of vertical reinforcing bars for the 42" SBR-1 transition section shall be as shown on sheets 25-25, 25-26, or 25-27.
NOTES:

1. FOR 57° SINGLE SLOPE CONCRETE MEDIAN BRIDGE RAILING, PROJECT PLANS SHALL INCLUDE PLAN VIEW, ELEVATION VIEW, SECTIONS, REINFORCING MARKS, REINFORCING BENDING DIAGRAMS, AND REINFORCING WEIGHTS.

2. FOR THE ENTIRE LENGTH OF SINGLE SLOPE CONCRETE MEDIAN BRIDGE RAILINGS, PROJECT PLANS SHALL SHOW THE LOCATION OF CONTRACTION JOINTS, SPACED AT 20'-0" MAX.

3. CONTRACTION JOINT IS NOT REQUIRED WITHIN THE APPROACH SLAB MEDIAN BARRIER.

4. PLACE #8 EPOXY COATED DOWEL BARS (Y801 BARS), 12" LONG, SPACED AT 45" - 3" MAXIMUM, AT STAGGERED LOCATIONS WITHIN THE UNREINFORCED MEDIAN BARRIER.

5. See APPROPRIATE STANDARD BRIDGE DRAWING FOR ABUTMENT DETAILS.

6. PROVIDE 3" OPEN GAP JOINT AT THE END OF APPROACH SLAB TO ACCOMMODATE THE LONGITUDINAL MOVEMENT FROM SUPERSTRUCTURE WITH SEMI-INTEGRAL OR INTEGRAL ABUTMENTS.

7. PROVIDE 3" OPEN GAP JOINT AT THE END OF APPROACH SLAB TO ACCOMMODATE THE LONGITUDINAL MOVEMENT FROM SUPERSTRUCTURE WITH SEMI-INTEGRAL OR INTEGRAL ABUTMENTS.

8. FOR GENERAL NOTES, SEE SHEET 55.
NOTES:
1. FOR SINGLE SLOPE CONCRETE MEDIAN BRIDGE RAILING, PROJECT PLANS SHALL INCLUDE PLAN VIEW, ELEVATION VIEW, SECTIONS, REINFORCING MARKS, REINFORCING BENDING DIAGRAMS, AND REINFORCING WEIGHTS.
2. FOR THE ENTIRE LENGTH OF SINGLE SLOPE CONCRETE MEDIAN BRIDGE RAILING, PROJECT PLANS SHALL SHOW THE LOCATION OF CONTRACTIONS JOINTS, SPACED AT 20'-0" MAX.
3. CONTRACTIONS JOINT IS NOT REQUIRED WITHIN THE APPROACH SLAB MEDIAN BARRIER SECTIONS.
4. PLACE #8 EPOXY COATED DOWEL BARS (Y801 BARS), 12" LONG, SPACED AT 45" 3" MAXIMUM, AT STAGGERED LOCATIONS WITHIN THE UNREINFORCED MEDIAN BARRIER.
5. SEE APPROPRIATE STANDARD BRIDGE DRAWING FOR ABUTMENT DETAILS.
6. FOR ROADWAY SINGLE SLOPE BARRIER, SEE STD. ROADWAY CONSTR. DWG. RH-4.3 THROUGH RH-5.3.
7. FOR GENERAL NOTES, SEE SHEET 55.

LEGEND:
E.S. = EACH SIDE
P.E.J.F. = PREFORMED EXPANSION JOINT FILLER

SECTION A-A

REINFORCING STEEL LIST

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BENDING DIAGRAMS

- APPROACH SLAB THICKNESS W/INS 3"
1. For the entire length of single slope concrete median bridge railings, project plans shall show the locations of deflection joints.

2. Deflection joint spacing shall not exceed 9'-0" on centers. For continuous structures, the deflection joints within the dead load transfer/reinforcement negative moment regions over pier locations shall be spaced not less than 9'-0" nor more than 7'-0" on centers.

3. For 5" dia. glass fiber reinforced polymer (GFRP) stiffening reinforcement shall be included with contract price for item 509 - epoxy coated reinforcing steel.

4. Limits of sawcut is shown in detail A. The 4" sawcut depth shown in detail A is the minimum required. However, the contractor has an option to perform full depth sawcut.

DESIGN CRITERIA:
57" single slope concrete median bridge railings type B1 meet the requirements of NCHRP 350 test level 5 and "AASHTO LRFD Bridge Design Specifications" 2012.

57" single slope back-to-back concrete median bridge railings meet the requirements of NCHRP 350 test level 5 and "AASHTO LRFD Bridge Design Specifications" 2012.

DESIGN DATA:
Concrete - Compressive Strength = 4,000 psi
Reinforcing Steel - Minimum yield strength = 60,000 psi

MAXIMUM SPACING OF VERTICAL REINFORCING BARS:
The maximum spacing of vertical reinforcing bars for the 57" single slope concrete median bridge railings type B1 shall be 2'-0".
The maximum spacing of vertical reinforcing bars for the 57" single slope back-to-back concrete median bridge railings shall be 1'-0".

MINIMUM EMBEDMENT OF VERTICAL REINFORCING BARS:
If the minimum embedment shown for the vertical reinforcing bars into the bridge deck is not met, then the designer shall calculate the required reinforcement according to section 13.11 of the "AASHTO LRFD Bridge Design Specifications" adopted by the American Association of State Highway and Transportation Officials.

OPTIONAL REINFORCING STEEL:
In lieu of the single vertical bar, the contractor may provide vertical reinforcement in the form of a layered bars at the vertical bar spacing and size shown and as follows:
A. The steel extending from the deck into the barrier shall be a single bar hooked around the second horizontal parapet bar above the deck surface at each face and hooked around the longitudinal deck street in the bottom half of the deck.
B. The vertical steel in the barrier above the deck shall be a single bar that closely follows the profile of the parapet. The bar shall be hooked around the first horizontal parapet bar above the deck surface at each face and shall maintain same concrete cover as the vertical bar shown.

The department will not adjust the total quantity of reinforcing steel to accommodate this optional reinforcement. The department will consider delays resulting from this optional reinforcement as non-excusable delays.

CONTRACTION JOINTS FOR 57" SINGLE SLOPE UNREINFORCED CONCRETE MEDIAN BRIDGE RAILINGS TYPE B1 (SHEETS 1A AND 1B) SEE NOTES.

DEFLECTION JOINTS FOR 57" SINGLE SLOPE UNREINFORCED CONCRETE MEDIAN BRIDGE RAILINGS (SHEETS 3A AND 3B) USE 4'-0" DEEP FOR ALL JOINTS FOR NOTES.


REM OVAL OF TRAFFIC CONTROL DEVICES.

CONSTRUCTION FOR UNCONVENTIONAL LOADING:
As soon as cutting operations can begin without damaging the concrete, sawcut 1 ½ inch deep deflection control joints along the perimeter of the median bridge railing.

AFTER THE CURING PERIOD AND BEFORE APPLYING LOAD TO THE MEDIAN BRIDGE RAILING, PERFORM 4 INCH SAWCUT AS SHOWN IN DETAIL A. APPLIED BRIDGE RAILING LOAD INCLUDES CONSTRUCTION LOADS ON THE DECK EXCLUDING PERSONNEL, HAND OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO MEDIAN BRIDGE RAILING AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.

CONTRACTION JOINTS FOR 57" SINGLE SLOPE UNSEALED TO ALLOW ANY WATER WHICH MAY ENTER THE JOINT TO ESCAPE.

AT EACH DEFLECTION JOINT LOCATION, USE GLASS FIBER REINFORCED POLYMER (GFRP) REINFORCEMENT TO MAINTAIN THE RIGIDITY OF THE CAGE ACROSS THE PROPOSED JOINTS.

DEFLECTION JOINT IS NOT REQUIRED WITHIN THE APPROACH SLAB MEDIAN BARRIER SECTIONS.

DEFLECTION JOINTS FOR 57" SINGLE SLOPE BACK-TO-BACK REINFORCED CONCRETE MEDIAN BRIDGE RAILINGS (SHEETS 5A AND 5B) USE 4'-0" DEEP FOR ALL JOINTS FOR NOTES.

AFTER THE CURING PERIOD AND BEFORE APPLYING LOAD TO THE MEDIAN BRIDGE RAILING, PERFORM 4 INCH SAWCUT AS SHOWN IN DETAIL A. APPLIED BRIDGE RAILING LOAD INCLUDES CONSTRUCTION LOADS ON THE DECK EXCLUDING PERSONNEL, HAND OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO MEDIAN BRIDGE RAILING AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.

CONSTRUCTION FOR UNCONVENTIONAL LOADING:
As soon as cutting operations can begin without damaging the concrete, sawcut 1 ½ inch deep deflection control joints along the perimeter of the median bridge railing.

AFTER THE CURING PERIOD AND BEFORE APPLYING LOAD TO THE MEDIAN BRIDGE RAILING, PERFORM 4 INCH SAWCUT AS SHOWN IN DETAIL A. APPLIED BRIDGE RAILING LOAD INCLUDES CONSTRUCTION LOADS ON THE DECK EXCLUDING PERSONNEL, HAND OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO MEDIAN BRIDGE RAILING AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.

CONSTRUCTION FOR UNCONVENTIONAL LOADING:
As soon as cutting operations can begin without damaging the concrete, sawcut 1 ½ inch deep deflection control joints along the perimeter of the median bridge railing.

AFTER THE CURING PERIOD AND BEFORE APPLYING LOAD TO THE MEDIAN BRIDGE RAILING, PERFORM 4 INCH SAWCUT AS SHOWN IN DETAIL A. APPLIED BRIDGE RAILING LOAD INCLUDES CONSTRUCTION LOADS ON THE DECK EXCLUDING PERSONNEL, HAND OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO MEDIAN BRIDGE RAILING AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.

CONSTRUCTION FOR UNCONVENTIONAL LOADING:
As soon as cutting operations can begin without damaging the concrete, sawcut 1 ½ inch deep deflection control joints along the perimeter of the median bridge railing.

AFTER THE CURING PERIOD AND BEFORE APPLYING LOAD TO THE MEDIAN BRIDGE RAILING, PERFORM 4 INCH SAWCUT AS SHOWN IN DETAIL A. APPLIED BRIDGE RAILING LOAD INCLUDES CONSTRUCTION LOADS ON THE DECK EXCLUDING PERSONNEL, HAND OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO MEDIAN BRIDGE RAILING AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.

CONSTRUCTION FOR UNCONVENTIONAL LOADING:
As soon as cutting operations can begin without damaging the concrete, sawcut 1 ½ inch deep deflection control joints along the perimeter of the median bridge railing.

AFTER THE CURING PERIOD AND BEFORE APPLYING LOAD TO THE MEDIAN BRIDGE RAILING, PERFORM 4 INCH SAWCUT AS SHOWN IN DETAIL A. APPLIED BRIDGE RAILING LOAD INCLUDES CONSTRUCTION LOADS ON THE DECK EXCLUDING PERSONNEL, HAND OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO MEDIAN BRIDGE RAILING AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.

CONSTRUCTION FOR UNCONVENTIONAL LOADING:
As soon as cutting operations can begin without damaging the concrete, sawcut 1 ½ inch deep deflection control joints along the perimeter of the median bridge railing.

AFTER THE CURING PERIOD AND BEFORE APPLYING LOAD TO THE MEDIAN BRIDGE RAILING, PERFORM 4 INCH SAWCUT AS SHOWN IN DETAIL A. APPLIED BRIDGE RAILING LOAD INCLUDES CONSTRUCTION LOADS ON THE DECK EXCLUDING PERSONNEL, HAND OPERATED EQUIPMENT AND MANUALLY POWERED VEHICLES AND VEHICLE TRAFFIC IN THE LANE IMMEDIATELY ADJACENT TO MEDIAN BRIDGE RAILING AFTER REMOVAL OF TRAFFIC CONTROL DEVICES.
BRIDGE RAILING GENERAL NOTES

THREE BEAM BRIDGE RAILING: SPACING VARIES ACCORDING TO THE PROVISIONS OF 70.0.6 EXCEPT THE MATERIAL SHALL BE ASTM A36, TYPE 21, CLASS B OR C15.

STRUCTURAL STEEL: FABRICATE STRUCTURAL STEEL ACCORDING TO CAMS 70.6.11. ANGLES SHALL CONFORM TO CAMS 70.6.11. TUBING SHALL CONFORM TO THE PROVISIONS OF 70.6.11.

FASTENERS: BUTTON HEAD BOLTS SHALL BE 3/8"-16 ASTM A307 WITH A PLATE WASHER UNDER THE HEAD AND A STANDARD WASHER UNDER THE NUT.

ANCHORS: HIGH STRENGTH TAPERED ANCHORS, NUTS AND WASHERS SHALL CONFORM TO ASTM A393. GALVANIZE ACCORDING TO ASTM A618 INSTALL ANCHORS ACCORDING TO CAMS 70.6.11 USING NON-SHRINK CEMENT 70.6.20. ANCHORS SHALL BE EMBEDDED A MINIMUM OF 7" INTO THE EXISTING CONCRETE PARAPET.

CONCRETE: MINIMUM COMpressive STRENGTH = 4,000 PSI

BRIDGE RAILING - ITEM 511

ALTERNATE CURB DETAILS

These details may be used in lieu of those shown on sheet 2 or 3 for SR-435 or SR-432 on offsets with straight runnals where anchorage of steel expansion joints in the curbing is not required. This detail is acceptable for use on the IHS.

PART PLAN

EXISTING CURB DETAIL

SECTION N-N

PART PLAN

EXISTING GROUND LINE ON TOP OF PLACEMENT

SECTION P-P

EXISTING CURB DETAIL

PART PLAN

EXISTING GROUND LINE ON TOP OF PLACEMENT

SECTION N-N

PART PLAN

EXISTING GROUND LINE ON TOP OF PLACEMENT

SECTION P-P

EXISTING CURB DETAIL
**STANDARD BRIDGE DRAWING**

**INFORMATION**

- **DATE**:
- **SCD NUMBER**:
- **ADMINISTRATOR**:
- **ENGINEERING**:
- **STRUCTURAL OFFICE OF REVIEWED**:
- **DESIGNED**:
- **CHECKED**:
- **DREW**:

**REVISIONS**

**STANDARD BRIDGE DRAWING**

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- **DESIGNED**:
- **CHECKED**:
- **DREW**:

**REVISIONS**

**STANDARD BRIDGE DRAWING**

**INFORMATION**

- **DATE**:
- **SCD NUMBER**:
- **ADMINISTRATOR**:
- **ENGINEERING**:
- **STRUCTURAL OFFICE OF REVIEWED**:
- **DESIGNED**:
- **CHECKED**:
- **DREW**:

**REVISIONS**
**GENERAL:** This drawing provides design and construction details. The project plans for each structure shall provide necessary additional railing dimensions including railing lengths, post spacings, post lengths and any other pertinent information including special notes and details. For additional details, see STD. CONSTR. DWGS. MGS-3.1, MGS-2.1 and other drawings pertaining to design of specific guardrail types.

**APPLICATION:** This railing system has been accepted to the TL-4 criteria of NCHRP Report 512. The twin steel tube railing shall be used on structures designed to drain surface water over the sides of the structure. This railing is not applicable to composite box beam bridges with design overhangs greater than 2° or top flange thicknesses less than 5°.

**FASTENERS:** Furnish material conforming to the following:
- All anchor bolts, sleeve nuts, nuts and washers shall conform to ASTM A 490.
- End welded studs shall conform to ASTM A108.
- The tube rail to post connection bolts and hex nuts shall conform to 711.10 (ASTM A357). Refer to standard construction drawing MGS-3.1 for the bridge terminal assembly connection hardware.
- The hex cap screws (bolts), hex nuts and washers shall conform to ASTM A 449.

**DESIGN DATA:**
- **Reinforcing steel:** Minimum yield strength = 60,000 PSI
- **Steel tubing:** Minimum yield strength = 46,000 PSI
- **All other steel:** Minimum yield strength = 50,000 PSI

**MATERIALS:**
- Furnish shaped structural tubes according to TDP-10 (ASTM A500, Grade B). In lieu of the "swg" weight tear test (ASTM 426), the manufacturer may choose to supply tubes that meet impact toughness according to A570 Type B, "notched bar impact testing of metallic materials (spec)." The CVN impact requirements shall be 15 FT-LBS at 0°F. For each heat supplied, the manufacturer shall furnish one 2" x 18" specimen, marked with its heat number, for impact testing.
- Furnish structural steel shapes, plates and plate washers according to TDP-10.

**TUBE SPLICES:**
- Locate splices so that each tube segment is connected to not less than two posts. staggered splices in the top and bottom tubes to avoid occurrences in the same panel.

**HORIZONTAL CURVATURE:**
- This standard is applicable to structures having a railing curvature radius of 20 feet or more. For a radius of less than 20 feet, the design shall be special. For all curved structures, heat curve the horizontal rail elements according to the AASHTO LFD Bridge Construction Specifications.

**BASIS OF PAYMENT:** The department will consider the costs associated with furnishing and installing steel tubing, steel posts, post anchor devices, anchor plates, tube splice plates, steel shim plates, guardrail connection plates, anchor bolts, 3/8 round head bolts, sleeve nuts, nuts, cap screws, washers and other hardware to be included with the twin steel tube railing. The department will pay for accepted quantities at the contract price for item 517, railing (twin steel tubes).

**METHOD OF MEASUREMENT:** The department will measure twin steel tube bridge railing by the number of feet. The department will measure the length of railing as the bridge terminal assembly connection hardware.
GENERAL NOTES

DESCRIPTION
This work consists of furnishing, installing, maintaining, and subsequently removing temporary vandal fencing on new and existing bridges. Construct fencing taot and within 1 foot to and closely conforming to the surface of the deck, including barrier, safety curb, or portable concrete barrier. Where specifically designated in the plans, install temporary posts and post sleeves permeable to the surface to which it is anchored.

Temporary vandal fencing, type A and B are anchored to the deck surface or the top of an existing barrier. Temporary vandal fencing, type B are anchored to the phase construction joint edge of the new bridge deck.

REMOVE
Leave temporary vandal fencing installed on an existing barrier in place until the barrier is removed from the bridge. Leave all other types of temporary vandal protection fencing in place until the engineer determines that it is no longer necessary. RINRESTALNT OF THE FENCING IS NOT REQUIRED.

FENCE POSTS
Fence Posts shall be 2.875 inch outside diameter grade 2, A500, CWMS 710.02 (type 2) 300x 0.18 inch tube, 4 6/8 lb/ft. Posts shall be Galvanized per CWMS 711.02.

EXISTING BARRIER
When installing temporary vandal protection fencing is to be mounted on an existing barrier, the fence shall be installed using the 1.84 inch tube, 4 6/8 lb/ft, or 0.8" base plate per standard drawing FY-660. Fabricate and install the post sleeves, base plates, and adhesive anchors as specified. Remove and reinstall the existing aluminum/steel railing as necessary to erect the fencing.

FABRIC TIES AND HOG RINGS
Fabric Ties are 0.120 inch diameter Galvanized Steel Wire and are 0.20 inch annealed stainless steel wire conforming to ASTM A666. respectively, to fabricate to the line to the posts, supply one fabric tie for each one foot of fabric height. Connect the fabric to the tension wire using hog rings 2-3 inches on each side of the posts and at spacings not to exceed 12 inches between posts.

PLATES AND PLATE WASHERS
All plates and plate washers shall be ASTM A49 grade 5D. Plates and plate washers shall be Galvanized according to CWMS 711.02.

HIGH STRENGTH THREADED ROD
The threaded rod Dia. 0.375 inch threaded rod shall be ASTM A49 with ASTM A49 nuts. Threaded rod and nuts shall be Galvanized according to CWMS 711.02.

POST MOUNT PIPES, ANCHOR SLEEVES AND POST SLEEVES
Post Mount Pipes, Anchor Sleeves, and Post Sleeves shall be 3.500 inch outside diameter pipe, ASTM A53, 30,000 psi minimum yield strength, 2,580 lb/ft, Galvanized according to CWMS 711.02, hot dip socket set screws shall be 0.400 inch alloy steel, heat treated, with flat on oval point.

ADHESIVE CONCRETE ANCHORS (SITE BOLTS)
The 3/4 inch dia. threaded rod for adhesive anchors shall be ASTM A307, 2.000 inch outside diameter, with ASTM A53 Nuts and ASTM A49 washers.

INSTALL ADHESIVE ANCHORS ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS PUBLISHED IN THE ICC-ES REPORT LISTED BELOW.

The holes for the adhesive anchors shall be drilled with a hammer drill, and carriage bolt, prior to the installation of the anchors, the holes shall be cleaned out of any dirt or dirtier within the manufacturer's requirements for dry concrete.

SELECT FROM THE FOLLOWING APPROVED PRODUCTS:

- Delmec Perma Epoxy Adhesive Anchor System (ICC-ES REPORT ESR-2638)
- Chemkast (CME-58) Epoxy Adhesive Anchor (ICC-ES REPORT ESR-2638)

The contractor may use a substitute adhesive anchor evaluated by ICC-ES. The substitute anchors shall have sufficient capacity to withstand the factored loading for each anchor. The anchor adhesive shall be evaluated according to AS 36 219 chapter 15, "anchoring to concrete", for cracked and uncracked concrete applications.

The contractor shall supply documentation sealed by an Ohio registered Professional Engineer ensuring that the selected adhesive provides sufficient capacity for this application in accordance with AS. 36 219 chapter 15. Install the selected anchors according to the manufacturer's installation instruction published in the ICC-ES REPORT. Published ICC-ES reports for acceptable products are available at www.icc-es.org/evaluation/reports/

ADHESIVE CONCRETE ANCHORS (BRIDGE DECK)
The 1/2 inch diameter anchors installed in the bridge deck shall be 6 inches. Anchors shall be installed a minimum of 6 inches from the edge of the deck.

The factored loading on each anchor consists of 2.0 kips of tension and 0.5 kips of shear. When no longer needed, remove anchors as directed by the engineer. Where the deck is to remain, fill holes with the same material used to install the forms, the connector shall be attached to a fully developed transverse deck rebar that will be obstructed by the side mounted connector plate. Mechanical connectors shall be approved for use to a fully developed transverse rebar reinforcing bar. Mechanical connectors shall be epoxy coated per CWMS 509.09.

SELECT FROM ONE OF THE FOLLOWING APPROVED PRODUCTS:

- Dayton Superior 500 DGR Coupler System
- Meadow Burke Re-04 threaded rebar coupler
-Threaded Rebar Coupler

THE CONTRACTOR MAY USE A SUBSTITUTE MECHANICAL CONNECTOR. THE SUBSTITUTE CONNECTORS SHALL HAVE SUFFICIENT CAPACITY TO WITHSTAND THE FACTORED LOADING ON EACH CONNECTOR. MECHANICAL CONNECTORS SHALL BE EPOXY COATED PER CWMS 509-09.

MECHANICAL CONNECTORS
All mechanical connectors shall conform to CWMS 509-09. Supply a mechanical connector for each transverse deck rebar that will be obstructed by the side mounted connector plate. Mechanical connectors shall be 0.375 inch outside diameter. Mechanical connectors shall be epoxy coated per CWMS 509-09.

SELECT FROM ONE OF THE FOLLOWING APPROVED PRODUCTS:

- Dayton Superior 500 DGR Coupler System
- Meadow Burke Re-04 threaded rebar coupler
-Threaded Rebar Coupler

The contractor may use a substitute mechanical anchorage. The substitute anchors shall have sufficient capacity to withstand the factored loading on each anchor. Mechanical anchors shall be epoxy coated per CWMS 509-09.

SELECT FROM ONE OF THE FOLLOWING APPROVED PRODUCTS:

- Dayton Superior 500 DGR Coupler System
- Meadow Burke Re-04 threaded rebar coupler
-Threaded Rebar Coupler

FABRIC
Fabric shall consist of a 2 inch Galvanized Diamond mesh. Maximum opening of 0.300 inch. A 30' mesh conforming to CWMS 710.03.

TENSION BANDS
Tension bands shall be 1/2 inch x 1 inch Galvanized steel, assembled with a 1/2 inch diameter x 3/4 inch Galvanized bolts. One tension band shall be supplied for each foot of Fabric height for the end panels and the remainder bands shall be Galvanized according to CWMS 710.02. 3/8 inch diameter bolts shall be ASTM A307.

MALLEABLE OR CAST IRON FITTINGS
Malleable or cast iron fittings shall be used for line end rigs. All fittings shall be Galvanized according to CWMS 710.03.

FENCING CORROSION
Install all anchoring of the fencing with active corrosion as directed by the Engineer.

DESIGN LIMITATIONS
Do not use this standard when temporary vandal protection fencing is to be mounted on temporary barrier that does not conform to PS-4.

FENCING LIMITS
Provide the length shown in the plans. If no length is shown then the fencing on the bridge shall extend between its end posts placed at the locations selected from the following list.

A. 30' + 2.5' FT BEYOND THE UPPER BRIDGE EDGE OF TRAVELED WAY NEAREST THE FENCE TERMINAL
B. THE CENTERLINE OF THE ABUTMENT EXPANSION JOINT (-2.5-FT+, +0-FT)
C. THE END OF THE BRIDGE (-2.5-FT+, +0-FT+)

METHOD OF MEASUREMENT
The Department will pay for the completed and acceptable quantities of temporary vandal fencing as follows:

 BASIS OF PAYMENT
The department will make payment for the completed and acceptable quantities of temporary vandal fencing as follows:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>607</td>
<td>foot</td>
<td>Temporary vandal fence, type A</td>
</tr>
<tr>
<td>607</td>
<td>foot</td>
<td>Temporary vandal fence, type B</td>
</tr>
<tr>
<td>607</td>
<td>foot</td>
<td>Temporary vandal fence, type C</td>
</tr>
</tbody>
</table>

ABBREVIATIONS
M.K. = METER KILOMETER
MIN. = MINIMUM
FT. = FOOT
IN. = INCH
C/C = CENTER TO CENTER
C.O.D. = OUTSIDE DIAMETER
DIA. = DIAMETER
PCB = PORTABLE CONCRETE BARREL
M/H/S = MICRO/HEMS
B/S = BOTH SIDES
TEMPORARY FENCE ELEVATION

FENCE MOUNTED ON THE TOP OF DECK

- TENSION BAND
- FABRIC TIES FOR POST AT 12" C/C MAX.
- DOUBLE WRAP FABRIC TIES FOR RAILS AT 12" C/C
- 1.66" O.D. LINE RAIL (TYP.)
- 2.875" O.D. POST

MALLEABLE IRON OR CAST IRON RAIL END FITTING

- 1.6" Dia. Adjustable Tension Rod (TYP. AT END AND PULL PANELS)
- 1/2" x 9/16" Bolts

- MESH FABRIC
- 2" DIAMOND

- TENSION BAND

NOTES:
1. FABRICATE BASE PLATES AND POST SLEEVES AS SHOWN IN STD. DWG. VP-1-90. FOR DECK AND CURB MOUNTED POSTS INSTALL THE ANCHORS PER THIS DRAWING. FOR POSTS MOUNTED ON EXISTING BARRIER INSTALL THE ANCHORS PER STD. DWG. VP-1-90.
2. FOR ADDITIONAL PARAPET TYPES, SEE SHEET 323 OF STD. DWG. VP-180.

PARAPET TOE OF END AND PULL PANELS)
TRUSS ROD (TYP. AT 1" DIA. ADJUSTABLE END AND PULL PANELS)

IRON RAIL END FITTING
MALLEABLE IRON OR CAST RAIL (TYP.)

TIES FOR RAILS AT 12" C/C
DOUBLE WRAP FABRIC

TRAFFIC

Curb May Vary

TRAFFIC

EXISTING ALUMINUM POST (SEE NOTE 2)

TRAFFIC

EXISTING DEFLECTOR PARAPET (SEE NOTE 2)

BP-1 POST SLEEVE (SEE NOTE 0)

BP-5 WITH POST SLEEVE (SEE NOTE 0)

NOTE 1)
POST SLEEVE (SEE NOTE 1)
BP-1 OR BP-2 WITH POST SLEEVE (SEE NOTE 0)

NOTE 2)
PARAPET (SEE NOTE 2)
EXISTING DEFLECTOR

NOTE 3)
5/16" STA. ADHESIVE ANCHORS EDGE OF DECK

NOTE 4)
1" DIA. H.S. ANCHOR BOLT (AS NECESSARY)

NOTE 5)
6" MIN.

NOTE 6)
6" EFFECTIVE EMBRACE

NOTE 7)
2.875" O.D. POST (10'-6" MAX. SPACING)

NOTE 8)
2.875" O.D. POST (10'-6" MAX. SPACING)

NOTE 9)
2.875" O.D. POST (10'-6" MAX. SPACING)

NOTE 10)
2.875" O.D. POST (10'-6" MAX. SPACING)
POST AND SET SCREWS NOT SHOWN

SIDE MOUNTED CONNECTION DETAIL

TENSION BAR (2.875" O.D. POST)

ROD (B.S.) H.S. THREADED †" DIA. 6" LONG

DECK REBAR TRANSVERSE #5 TOP CONNECTORS #5 MECH. PLATE WASHER (TYP.)

HEX NUT W/ 2"x2"x" SOCKET SET SCREW, EACH SIDE …" - 20 x …" HEXAGON THREADED HOLES FOR SIDES OF PIPE

SIDE MOUNTED CONNECTION (SEE DETAIL)

3.6" O.D. POST SHAFT

MALLEABLE IRON OR CAST IRON RAIL END FITTING

HOLE (TYP.) 2"x2"x" SLOTTED

TRAFFIC MESH FABRIC 2" DIAMOND

TRUSS ROD (TYP. AT †" DIA. ADJUSTABLE, AT 12" C/C MAX.)

TENSION BAND

FABRIC TIES FOR POST AT 0° C/C MAX.

TENSION WIRE WITH MOC RINGS AT 12° C/C

FABRIC TIES FOR RAILS AT 12° C/C

3.5" O.D. POST SLEEVE 3.5" O.D. POST SLEEVE

SIDE MOUNTED CONNECTION DETAIL POST AND SET SCREWS NOT SHOWN

TEMPORARY FENCE ELEVATION

FENCE MOUNTED ON THE DECK EDGE

POST SLEEVE DETAIL

E THREAD HOLES FOR †" - 20 x †" HEXAGON SOCKET SET SCREW, EACH SIDE

H.S. THREADED ROD (B.S.)

TENSION BAND

CUT SLOT IN BOTH SIDES OF PIPE

SIDE MOUNTED CONNECTION DETAIL POST AND SET SCREWS NOT SHOWN
**GENERAL NOTES**

(9) **TENSION BANDS AND BRAID BANDS** SHALL BE 5/16 INCH X 1 INCH DIAMETER X 2000 INCHES LONG, HIGH STRENGTH ROPE, GALLVANIZED. EACH TENSION BAND SHALL BE STRUNG THROUGH A MALLEABLE OR CAST IRON SHACKLE AND TIED TO THE LINE POSTS. THE TENSION BANDS SHALL BE GALVANIZED ACCORDING TO ASTM A153.


(11) **ADJUSTABLE TRUSS RODS** SHALL BE 5/8 INCH X 20 FEET, STEEL, GALVANIZED ACCORDING TO ASTM A153. HEXAGON SOCKET SCREW NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH C&MS 711.09.

(12) **EXPANSION BANDS** SHALL BE 2 INCH X 20 FEET, STEEL, GALVANIZED ACCORDING TO ASTM A153. EXPANSION BANDS TO CONNECT THE FABRIC TO THE MALLEABLE OR CAST IRON SHACKLE AND TIED TO THE LINE POSTS. THE EXPANSION BANDS SHALL BE GALVANIZED ACCORDING TO ASTM A153.

(13) **DOUBLE WRAP FABRIC TIES** SHALL BE 0.019 INCH DIAMETER X 3000 INCHES LONG, HIGH STRENGTH ROPE, GALLVANIZED. THE DOUBLE WRAP FABRIC TIES SHALL BE STRUNG THROUGH A MALLEABLE OR CAST IRON SHACKLE AND TIED TO THE LINE POSTS. THE DOUBLE WRAP FABRIC TIES SHALL BE GALVANIZED ACCORDING TO ASTM A153.


(16) **EXPANSION BANDS** SHALL BE 2 INCH X 20 FEET, STEEL, GALVANIZED ACCORDING TO ASTM A153. HEXAGON SOCKET SCREW NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH C&MS 711.09.


(18) **ADJUSTABLE TRUSS RODS** SHALL BE 5/8 INCH X 20 FEET, STEEL, GALVANIZED ACCORDING TO ASTM A153. HEXAGON SOCKET SCREW NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH C&MS 711.09.

(19) **EXPANSION BANDS** SHALL BE 2 INCH X 20 FEET, STEEL, GALVANIZED ACCORDING TO ASTM A153. EXPANSION BANDS TO CONNECT THE FABRIC TO THE MALLEABLE OR CAST IRON SHACKLE AND TIED TO THE LINE POSTS. THE EXPANSION BANDS SHALL BE GALVANIZED ACCORDING TO ASTM A153.

(20) **DOUBLE WRAP FABRIC TIES** SHALL BE 0.019 INCH DIAMETER X 3000 INCHES LONG, HIGH STRENGTH ROPE, GALLVANIZED. THE DOUBLE WRAP FABRIC TIES SHALL BE STRUNG THROUGH A MALLEABLE OR CAST IRON SHACKLE AND TIED TO THE LINE POSTS. THE DOUBLE WRAP FABRIC TIES SHALL BE GALVANIZED ACCORDING TO ASTM A153.


(22) **POST SLEEVES** SHALL BE 3.500 INCH OUTSIDE DIAMETER X 2000 INCHES LONG, HIGH STRENGTH ROPE, GALLVANIZED. THE POST SLEEVES SHALL BE STRUNG THROUGH A MALLEABLE OR CAST IRON SHACKLE AND TIED TO THE LINE POSTS. THE POST SLEEVES SHALL BE GALVANIZED ACCORDING TO ASTM A153.
BR-1-65, BR-2-67 AND BR-2-82 RAILINGS NOT SHOWN.
BR-2-98 RAILING NOT SHOWN.
AR-1-57 WITH TYPE B POSTS.

EXISTING ALUMINUM RAIL, SHALL BE REMOVED PRIOR TO FENCE INSTALLATION AND THEN REINSTALLED. TOP ALUMINUM RAIL FOR BR-1-65, BR-2-67 AND BR-2-82 RAILING NOT SHOWN. BP-1 SHALL BE USED WITH PS-3 OR PS-4 POST SECTIONS. INSTALL FENCE BY REMOVING AND REINSTALLING THE HORIZONTAL RAIL ELEMENTS BP-1 REQUIRE A SLEEVE. SEE POST SLEEVE DETAILS ON THIS SHEET.

BP-2 SHALL BE USED WITH PS-3 OR PS-4 POST SECTIONS ON CONCRETE PARAPETS WITH HORIZONTAL RAIL ELEMENTS AS SHOWN ON STANDARD BRIDGE DRAWING BP-2-98, BP-2-97, BP-2-87. BP-2-98 AND AR-1-57 POSTS, DO NOT USE WITH PS-3 AND PS-4 POST SECTIONS. INSTALL FENCE BY REMOVING AND REINSTALLING THE HORIZONTAL RAIL ELEMENTS BP-1 REQUIRE A SLEEVE. SEE POST SLEEVE DETAILS ON THIS SHEET.
POST SECTION PS-1
(2-0" CURVED FENCE)

NOTE: ARC FABRIC AT BASE PLATE. MAXIMUM GAP BETWEEN FABRIC AND CONCRETE PARAPET = 1"

POST SECTION PS-2
(2-0" CURVED FENCE)

POST SECTION PS-3
(6-0" STRAIGHT FENCE)

NOTE: INSTALL 1.66" O.D. BOTTOM RAIL FOR POST SECTIONS Ps-1, Ps-2 AND Ps-3 WHERE INTERFERENCE WITH TRAFFIC RAILING POSTS DOES NOT OCCUR.

NOTE: FOR BASE PLATE DETAILS, SEE SHEETS 37 & 47.

NOTE: BP-1 IS SHOWN, 58H-69 IS SIMILAR.

NOTE: SEE GENERAL NOTES FOR OPTIONAL ANCHORAGE IN NEW CONCRETE.
INSIDE ELEVATION OF STRAIGHT VANDAL PROTECTION FENCE

INSIDE ELEVATION OF CURVED VANDAL PROTECTION FENCE

NOTES

- The centerline of the nearest base plate anchor shall not be placed closer than 8" to a parapet deflection control joint nor shall base plates span across a parapet deflection control joint.
- Top rails shall be continuous over two or more line posts.
- Details for other railing types are similar.
NOTE:

For traffic railings that will not permit the installation of a bottom line rail, install tension wire. Connect tension wire to fence fabric using hog rings at 12" maximum spacing. Tension wire shall span a maximum of three post spacings. The maximum sag at the midpoint of the wire shall be 1/4" after tensioning.