General Notes:

All concrete for the bridge approach slab and sleeper slab shall be in accordance with Sec 303 (f'c = 4,000 psi).

The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with fy = 60,000 psi.

Drain pipe may be either 6" diameter corrugated metallic-coated pipe underdrain, 4" diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4" diameter corrugated polyethylene (PE) drain pipe.

Minimum clearance to reinforcing steel shall be 3 1/2", unless otherwise shown.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 28 inches for #5 bars and 46 inches for #6 bars, or by mechanical bar splice.

Mechanical bar splices shall be in accordance with Sec 716.

All joint filler shall be in accordance with Type A Curb per square yard.

Refer to Missouri Standard Plan 809.00 for details of Type A Curb.

Payment for furnishing all materials, labor and excavation necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other materials, shall be at unit price for Bridge Approach Slab (Major) per square yard. The contractor shall pour and satisfactorily finish the approach slab complete in place, will be considered completely covered appurtenances and incidental work as shown on this sheet, including excavation necessary to construct the approach slab, for furnishing all materials, labor and excavation.

All joint filler shall be in accordance with Sec 503 (f'c = 4,000 psi). Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab. The contractor shall pour and satisfactorily finish the bridge approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 28 inches for #5 bars and 46 inches for #6 bars, or by mechanical bar splice.

Mechanical bar splices shall be in accordance with Sec 716.

All joint filler shall be in accordance with Type A Curb per square yard.

Payment for furnishing all materials, labor and excavation necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other materials, shall be at unit price for Bridge Approach Slab (Major) per square yard. The contractor shall pour and satisfactorily finish the approach slab complete in place, will be considered completely covered appurtenances and incidental work as shown on this sheet, including excavation necessary to construct the approach slab, for furnishing all materials, labor and excavation.

All joint filler shall be in accordance with Sec 503 (f'c = 4,000 psi). Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab. The contractor shall pour and satisfactorily finish the bridge approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 28 inches for #5 bars and 46 inches for #6 bars, or by mechanical bar splice.

Mechanical bar splices shall be in accordance with Sec 716.

All joint filler shall be in accordance with Type A Curb per square yard.

Payment for furnishing all materials, labor and excavation necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other materials, shall be at unit price for Bridge Approach Slab (Major) per square yard. The contractor shall pour and satisfactorily finish the approach slab complete in place, will be considered completely covered appurtenances and incidental work as shown on this sheet, including excavation necessary to construct the approach slab, for furnishing all materials, labor and excavation.

All joint filler shall be in accordance with Sec 503 (f'c = 4,000 psi). Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab. The contractor shall pour and satisfactorily finish the bridge approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 28 inches for #5 bars and 46 inches for #6 bars, or by mechanical bar splice.

Mechanical bar splices shall be in accordance with Sec 716.

All joint filler shall be in accordance with Type A Curb per square yard.

Payment for furnishing all materials, labor and excavation necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other materials, shall be at unit price for Bridge Approach Slab (Major) per square yard. The contractor shall pour and satisfactorily finish the approach slab complete in place, will be considered completely covered appurtenances and incidental work as shown on this sheet, including excavation necessary to construct the approach slab, for furnishing all materials, labor and excavation.

All joint filler shall be in accordance with Sec 503 (f'c = 4,000 psi). Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab. The contractor shall pour and satisfactorily finish the bridge approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab before placing the bridge approach slab.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 28 inches for #5 bars and 46 inches for #6 bars, or by mechanical bar splice.

Mechanical bar splices shall be in accordance with Sec 716.
**SECTION A-A**

Transition from roadway crown to bridge crown as necessary

(Estimated ___ splices per slab)

Standard Drawing Guidance (do not show on plans):

- #6 Bars at 5" cts.
- #5 Bars at 12" cts.

**Staged Const. Jt.**

- 13" Chamfer
- 1" Chamfer
- Joint Filler

- Type A Curb
- End of Wing
- Transition Chamfer
- Type A Curb
- Gutter line to match

- Show & call out any required staged construction joints.
- When mechanical bar splices are required due to staged construction, add the following after the indicated note.
- Input the estimated number of required mechanical bar splices including those in the sleeper slab.
- See Note 1.12 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

**ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)**

- Show any required construction joints and show and call out any mechanical bar splices.
- Input the estimated number of required mechanical bar splices including those in the sleeper slab.
- When mechanical bar splices are required due to staged construction, add the following after the indicated note.
- Input the estimated number of required mechanical bar splices including those in the sleeper slab.
- See Note 1.12 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.
- If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.
**Standard Drawing Guidance (do not show on plans):**

See Structural Project Manager or Liaison for preference on revising details as follows to specify staged construction:

1. Show & call out any required staged construction joints.
2. Show any required construction joints and show and call out any mechanical bar splices.

**Note:**

- Mechanical Bar Splice (Typ.)

**Additional Notes:**

3. When mechanical bar splices are required due to staged construction, and the following after the indicated note:

   *(Estimated ___ splices per slab)*

   Input the estimated number of required mechanical bar splices including those in the sleeper slab.

4. See Notes K.11 and K.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

5. If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

**ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)**
**General Notes:**

- All concrete for the bridge approach slab and sleeper slab shall be in accordance with Sec 503 (f’c = 4,000 psi).
- The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with fy = 60,000 psi.
- Drainage pipe may be either 6" diameter corrugated metallic, coated pipe underdrain, 4" diameter corrugated polyethylene (PE) drain pipe, or 4" diameter corrugated polystyrene (PS) drain pipe.
- Minimum clearance to reinforcing steel shall be 3 1/2", unless otherwise shown.
- The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 24 inches for #4 bars, and 36 inches for #6 bars, or by mechanical bar splice.

**Note:** This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):

- See Structural Project Manager or Liaison for preference on revising details as follows to specify staged construction:
  1. Show & call out any required staged construction joints.
  2. Show any required construction joints and show and call out any mechanical bar splices.

When mechanical bar splices are required due to staged construction, add the following after the indicated note:

- Input the estimated number of required mechanical bar splices including those in the sleeper slab.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)
General Notes:
All concrete for the bridge approach slab and sleeper slab shall be in accordance with Sec 303 if: 5, 000 psi.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with fy = 60,000 psi.

Drain pipe may be either 6" diameter corrugated metallic coated pipe under drain, 4" diameter corrugated polyethylene (PE) drain pipe, or 4" diameter corrugated polyvinyl chloride (PVC) drain pipe.

Minimum clearance to reinforcing steel shall be 3/2", unless otherwise shown.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 24 inches for #5 bars and 44 inches for #6 bars, or by mechanical bar splice.

Joint filler shall be in accordance with Sec 310.
All joint filler shall be in accordance with Sec 1053 for preferred fiber expand joint filler except as noted.

All payments for furnishing all materials, labor and equipment necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other appurtenances and incidental work as shown on this sheet, for concrete approach pavement details, see roadway plans.

See Missouri Standard Plan 609.00 for details of Type A Curb.

For concrete approach pavement details, see roadway plans.

Detailed:

- With the approval of the engineer, the contractor may crown the counter of the bridge approach slab to match the crown of the roadway surface.

- Reinforcement: #5 bars at 12" cts.
- Type 5 aggregate placed between bridge approach slab and granular base, #5 bars at 12" cts.
- Type 5 aggregate base placed between bridge approach slab and granular base, #5 bars at 12" cts.
- Timber header @ 12" (Min.) at bridge crown.
- Timber header @ 12" (Min.) in accordance with ASTM E 1745 Performance Class A.
- Timber header @ 12" (Min.) in accordance with ASTM C 776 Performance Class A.
- Timber header @ 12" (Min.) in accordance with ASTM C 776 Performance Class A.
ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)

Standard Drawing Guidance (do not show on plans):
See Structural Project Manager or Liaison for preference on revising details as follows to specify staged construction:

1. Show & call out any required staged construction joints.
2. Show any required construction joints and show and call out any mechanical bar splices.
3. When mechanical bar splices are required due to staged construction, add the following after the indicated note:
   (Estimated ___ splices per slab)
   Input the estimated number of required mechanical bar splices including those in the sleeper slab.
4. Show & call out any required staged construction joints.
5. If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

Show & call out any required staged construction joints.
Show any required construction joints and show and call out any mechanical bar splices.

If mechanical bar splices are required due to staged construction, add the following after the indicated note:
(Estimated ___ splices per slab)
Input the estimated number of required mechanical bar splices including those in the sleeper slab.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

Show & call out any required staged construction joints.
Show any required construction joints and show and call out any mechanical bar splices.

If mechanical bar splices are required due to staged construction, add the following after the indicated note:
(Estimated ___ splices per slab)
Input the estimated number of required mechanical bar splices including those in the sleeper slab.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

Show & call out any required staged construction joints.
Show any required construction joints and show and call out any mechanical bar splices.

If mechanical bar splices are required due to staged construction, add the following after the indicated note:
(Estimated ___ splices per slab)
Input the estimated number of required mechanical bar splices including those in the sleeper slab.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.
General Notes:

All concrete for the bridge approach slab and sleeper slab shall be in accordance with Sec 303 if: $f_{c} = 4,000$ psi.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with $f_y = 60,000$ psi.

Drain pipe may be either 6" diameter corrugated metal, coated pipe underdrain, 4" diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4" diameter corrugated polyethylene (PE) drain pipe.

Minimum clearance to reinforcing steel shall be 3 1/2", unless otherwise shown.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum top splice of 24 inches for #5 bars and 48 inches for #6 bars, or by mechanical bar splice.

Mechanical bar splices shall be in accordance with Sec. 310.

All joint filler shall be in accordance with Sec 1053 for preformed fiber expansion joint filler except as noted.

For concrete approach pavement details, see roadway plans. See Missouri Standard Plan 609.00 for details of Type A curb.

Payment for furnishing all materials, labor and equipment necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other excavations necessary to construct the approach slab, shall be determined by the contract unit price for Bridge Approach Slab (Major) per square yard.

* See joint between vertical face of approach slab and wing with sealant in accordance with Sec 717 for silicone joint sealant for saw cut and formed joints.

Note: This drawing is not to scale. Follow dimensions.
ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)

Standard Drawing Guidance (do not show on plans):
- See Structural Project Manager or Liaison for preference on revising details as follows to specify staged construction.
- Use #6 Bars at 5" cts.
- Use #5 Bars at 12" cts.

When mechanical bar splices are required due to staged construction, add the following after the indicated note:
(Estimated ___ splices per slab)
Input the estimated number of required mechanical bar splices including those in the sleeper slab.

Show any required staged construction joints and call out any mechanical bar splices.

If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

SECTION BETWEEN BARRIER AND CURB

2 Show any required construction joints and show any mechanical bar splices.
3 When mechanical bar splices are required due to staged construction, add the following after the indicated note:
(Estimated ___ splices per slab)
Input the estimated number of required mechanical bar splices including those in the sleeper slab.

4 See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

5 If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

6 See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

7 If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.
With the approval of the engineer, the contractor may crown the #5 bars at abt. 12" cts. (See end bent sheets) #5 Bars at 12" cts. (Top and bottom)

#3 Bars at 5" cts.

1 1/4" Joint Filler (Typ.)

1" Chamfer

Transition chamfer to joint at Type A curb for gutter line to catch 1/4" radius edging

Gutter line of curb shall align with the chamfer at the transition end of barrier

SECTION BETWEEN CURB AND BARRIER

SECTION D-D

6" x 10" Timber Header

3/4" x 5" Leg Bolt Washer under head with 4" Coil Tie Insert

Wedge Block

3" x 8" Wood Block or Optional 3" Wedge Block

6" x 1" Wood Scab (Nail to block)

_HEADER Supports

Roadway Surface and 3" x 10" Timber Header

Remove timber header when concrete pavement is placed.

General Notes:

All concrete for the bridge approach slab and sleeper slab shall be in accordance with Sec 303 if f'c = 4,000 psi.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with f_y = 60,000 psi.

Drain pipe may be either 6" diameter corrugated metallic coated pipe or 4" diameter corrugated polyethylene (PE) drain pipe.

Minimum clearance to reinforcing steel shall be 3 1/2", unless otherwise shown.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 24 inches for #5 bars and 48 inches for #6 bars, or by mechanical bar splice.

Mechanical bar splices shall be in accordance with Sec 710.

All joint filler shall be in accordance with Sec 1053 for preformed fiber expansion joint filler except as noted.

For concrete approach pavement details, see roadway plans.

See Missouri Standard Plan 609.00 for details of Type A Curb.

Payment for furnishing all materials, labor and excavation necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other appurtenances and incidental work as shown on this sheet, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other appurtenances and incidental work as shown on this sheet, shall be considered completely covered by the contract price for Bridge Approach Slab (Major) per square yard.

For concrete approach pavement details, see roadway plans.
ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)

1. When mechanical bar splices are required due to staged construction, add the following after the indicated note:
   (Estimate___splices per slab)
   Input the estimated number of required mechanical bar splices including those in the sleeper slab.

2. See Notes K1.11 and K1.12 in EPG 751.50 for wording of notes when semi-deep abutments are used.

3. If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to revise the length of the sleeper slab shown and to redirect the perforated drain pipe adjacent to the sleeper slab to go under the sleeper slab and then turn to daylight. This should be nonperforated drain pipe at this point.

4. Show & call out any required staged construction joints.

5. Show any required construction joints and show and call out any mechanical bar splices.
Standard Drawing Guidance
( do not show on plans):

Asphalt approach slab should not be used for rehabilitation projects unless a vertical drain system is installed or is in place at end bent fill face.

Roadway drainage should be addressed by the core team & the consensus decision noted on the Bridge Memorandum. For roadway drainage options for Bridge Approach Slab (Typ.), see APP 05-10 Bridge Approach Slab.

See Project Manager or Liaison for preference on revising details as follows to specify staged construction:

1. Show & call out any required staged construction joints.

When mechanical bar splices are required due to staged construction, add the following after note:

(Estimated ___ splices per slab)

Input estimated number of required mechanical bar splices.

2. Show any required construction joints and show and call out any mechanical bar splices.

If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to redirect the perforated drain pipe at the end of the bridge approach slab to turn to daylight. This should be nonperforated drain pipe at this point.

If either slab option is not required, either delete or cross out the option not used and delete or modify the first general note.

All wing lengths should have the curb extended beyond their ends as shown to assist with directing bridge end drainage away from bridge ends. The standard drawing will work for most bridges with average wing lengths. For long wings, adjustments to the length of curbs may be necessary when the length of wings would prevent extending a full 5'-6" of curb length from the end of the wing to the end of the bridge approach slab. It may be necessary to extend the curb beyond the end of the bridge approach slab integral with concrete pavement or adjacent to asphalt pavement. Work any adjustments to the curb lengths with the details as shown on Standard Plan 609-40 & modify those details as necessary by either a note or detail.

ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)

Asphalt approach slab should not be used for rehabilitation projects unless a vertical drain system is installed or is in place at end bent fill face.

Roadway drainage should be addressed by the core team & the consensus decision noted on the Bridge Memorandum. For roadway drainage options for Bridge Approach Slab (Typ.), see APP 05-10 Bridge Approach Slab.

See Project Manager or Liaison for preference on revising details as follows to specify staged construction:

1. Show & call out any required staged construction joints.

When mechanical bar splices are required due to staged construction, add the following after note:

(Estimated ___ splices per slab)

Input estimated number of required mechanical bar splices.

2. Show any required construction joints and show and call out any mechanical bar splices.

If the end of a wing wall extends beyond the end of the bridge approach slab, it will be necessary to redirect the perforated drain pipe at the end of the bridge approach slab to turn to daylight. This should be nonperforated drain pipe at this point.

If either slab option is not required, either delete or cross out the option not used and delete or modify the first general note.

All wing lengths should have the curb extended beyond their ends as shown to assist with directing bridge end drainage away from bridge ends. The standard drawing will work for most bridges with average wing lengths. For long wings, adjustments to the length of curbs may be necessary when the length of wings would prevent extending a full 5'-6" of curb length from the end of the wing to the end of the bridge approach slab. It may be necessary to extend the curb beyond the end of the bridge approach slab integral with concrete pavement or adjacent to asphalt pavement. Work any adjustments to the curb lengths with the details as shown on Standard Plan 609-40 & modify those details as necessary by either a note or detail.
Replacement of timber header is to be used for approach slab replacement only.

Roadway drainage should be addressed by the core team and the consensus noted on the Bridge Memorandum and the Standard Drawing. For roadway drainage options for Prestressed Bridge Approach Slab, see EPG 503 Bridge Approach Slab.

1. Replace “Skew” with actual skew angle.
2. Top of approach notch must be flat or uniformly sloped (no crown) and sleeper slab must be parallel in elevation to top of approach notch.
3. Identify asphalt overlay and thickness. Coordinate with district if better to make a roadway item and then note accordingly and revise pay item note.
4. Waterproof membrane is required when slab is overlaid with asphalt. Omit “Special Provisions” as needed.
5. Timber header will not normally be needed, since prestressed beams will be used for replacements only. Use only if requested by District RE to protect ends of beams during construction.
6. Request field measurements between wings at end of slab and end of wings before dimensioning width of approach slab and determining beam widths to be used.
7. The 20'-0" slab dimension can be changed to 25'-0"; the title can then be changed from (20 FEET) to (25 FEET).
8. Modify or remove based on actual conditions of the job.
9. Fill with asphalt or seal.
10. Number of tie rods: Ideally, install 3 tie rods at midpoint and quarter points; one will have to go through wing wall; drill hole in wing, install, grout and seal. Realistically, install 2 tie rods as shown. (Only 2 tie rods were used successfully with favorable results in the correlated research.)
11. For “Placement and Full Width Posttensioning Instructions,” see Development Section. Partial width posttensioning is preferred.
12. Unlike conventional bridge approach slabs, prestressed concrete bridge approach slabs still require formed access holes for required investigation as specified prior to 2018 Standard Specifications.

USE ONLY WITH APPROVAL OF ASSISTANT STATE BRIDGE ENGINEER
**General Notes (Pretensioned Beams):**

Concrete for pretensioned beams shall be Class A with f/c = 6,000 psi, f/c = 3,500 psi.

(*) indicates pretensioning strand.

Initial prestressing force = 31 kips/strand.

Pretensioning tendon shall be uncoated seven-wire low-relaxation strands for pretensioned concrete in accordance with AASHTO M 203 Grade 270, with nominal diameter of strand = 0.197" and minimum ultimate strength = 186 kips (20 ksi). Larger strands may be used with the same spacing and layout.

The method and sequence of releasing the strands shall be shown on the shop drawings.

Prestressing strands at ends of beams shall be trimmed to within 1/8" of concrete. Ends of beams shall be given 2 coats of an approved bituminous paint.

Lifting devices may be cast in beams. The device shall be shown on the shop drawings and approved by the engineer.

The top surface of all beams shall receive a smooth finish.

All holes in beams shall be cast. Drilling is not allowed.

Keyway surface shall be cleaned to remove all or other bond breaking material prior to shipment of the prestressed concrete approach slab. Cleaning shall be done by sandblasting the keyway areas between top of the beam and the bottom edge of the key.

Three 2 3/4-inch diameter (clear opening) underseal access holes shall be cast into each beam near the centerline of the beam, clearing pretensioning strands and 2-inch diameter conduit by at least 1 1/2 inches. Shift reinforcement as needed to clear access holes by 1 1/2 inches minimum. Drilling is not allowed.

Contractor may adjust dimensions based on actual field measurements with approval of the engineer.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):
Turn off level “Bridge-Guidance” to hide.

1. Replace "skew" with actual skew angle.
2. Use "smooth finish" if slab is to be overlaid with membrane and asphalt. When slab is to be overlaid with concrete wearing surface, use "surface finish in accordance with Sec. 1029.6.16."
3. Standard beam widths are 6’ and 8’, and should be used wherever possible. The 8’ beam is the fabricator’s preferred width. However, beam widths may be reduced up to 6” to get them to fit with 3/2” clearance to wing wall. Use same strands and reinforcing steel and adjust spacing.
4. A beam width that is less than the standard beam widths should be shown with adjusted spacing.
5. Calculate dimension using guidelines shown here (8’-0” Max.):

For squared structures, use Shape 10.
6. The 20’-0” slab dimension can be changed to 25’-0”, the title can be changed from (20 FEET) to (25 FEET) and the "Bill of Reinforcing Steel" dimensions shall be changed accordingly.
7. Number of tie rods: Ideally, install 3 tie rods at midpoint and quarter points; one will have to go through wing wall; drill hole in wing, install, grout and seal. Realistically, install 2 tie rods as shown. (Only 2 tie rods were used successfully with favorable results in the correlated research.)
8. For 25-foot prestressed bridge approach slab, use four access holes at spacings of 3’-0” - 6’-0” - 6’-0” - 6’-0” - 4’-0”.

USE ONLY WITH APPROVAL OF ASSISTANT STATE BRIDGE ENGINEER
GENERAL NOTES:

1. All concrete and reinforcement shall be in accordance with Missouri Standard Plans.
2. Concrete in the barrier shall be Class B-1.
3. Joint sealant and backer rods shall be in accordance with Sec 717 for silicone joint sealant for saw cut and formed joints.
4. For slip-formed option, both sides of barrier shall have a vertically broomed finish and the top shall have a transversely broomed finish.

ELEVATION OF BARRIER

Left barrier shown; right barrier similar

Longitudinal dimensions are horizontal.

Note: This drawing is not to scale. Follow dimensions.
In the available space, draw the elevation of the left barrier showing:
- Span ranges.
- All horizontal #5-R bars in each span with all specified by bar marks.
- First & last vertical #5-R bars dimensioned with total number in barrier.
- All joints and joint filler joints and centerlines with one centerline labeled as:
  - 1/4" Joint (Barrier only) (Typ.)
- If slip forming is allowed then add the following two items:
  - All #5-C bars in each span with all specified by bar marks (include asterisk)
  - All fiberglass bars with bars at one location labeled as:

Adjust longitudinal dimensions note under elevation title as necessary.

If right barrier differs from left (typical with curved bridges), show both Elevation of Left Barrier and Elevation of Right Barrier. The longitudinal dimensions note can be relocated as the first note under the General Notes.

Dimensions are based on a 2.0%-sloped deck. Modify accordingly the outside dimensions in X-Bar Permissible Alternate Shape and Section A-A, and the 2.27 sq. ft. area in Section A-A for super-elevated decks.

If conduit is required, indicate left or right or both barriers in a note.

EXAMPLE (SINGLE SPAN)
General Notes:

Reinforcing Steel:
Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan BAC4a. Concrete traffic barrier delineators shall be made of Type B retroreflective sheeting on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Type B retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be made of Type B retroreflective sheeting on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Type B retroreflective sheeting on both sides.

Minimum clearance to reinforcing steel shall be 1 1/2" except as shown for bars embedded into end bent.

For slopes greater than 3 degrees, use standard placing bars. The K2 bar for the end K3 bar.

Dimensions are based on 2.0% sloped deck. Subtract 1/8" for a 3/16" per foot sloped deck.

Use a minimum lap of 2'-7" between K9 and K10 or K13 bars.

K1-K2 Bar Permissible Alternate Shape
(K3 or K4 thru K8 bars not shown for clarity)

The K1-K2 bar combination may be furnished as one bar as shown, at the contractor's option.

All dimensions are cut to suit.
ELEVATION OF BARRIER

General Notes:

Conventional forming shall be used, and saw cut joints may be used.

Top of barrier shall be built parallel to grade with barrier curb joints (except at end bents) normal to grade.

All exposed edges of barrier shall have either a 1/2-inch radii or a 1/8-inch bevel, unless otherwise noted.

Payment for all concrete and reinforcement, complete in place, will be considered completely covered by the contract unit price for Type B Barrier per linear foot.

Concrete in the barrier shall be Class B-1.

Measurement of barrier is to the nearest linear foot for each structure, measured along the outside top of slab from end to end of each.

Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and as specified in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Type B Barrier.

Joint sealant and backer rods shall be in accordance with Sec 717 for silicone joint sealant for saw cut and formed joints.

Plastic waterstop shall not be used with saw cut joints.

Coil inserts shall have a concrete ultimate pullout strength of not less than 35,000 pounds in 5,000 psi concrete and an ultimate tensile strength of not less than 50,000 pounds.

Threaded coil rods shall have an ultimate capacity of 36,000 pounds. All coil inserts and threaded coil rods shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.

Payment for furnishing and installing coil inserts and threaded coil rods will be considered completely covered by the contract unit price for Type B Barrier.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):

In the available space, draw the elevation of the left barrier showing:

- Span ranges
- All horizontal #5-R bars in each span with all specified by bar marks
- First & last vertical #5-R bars dimensioned with total sum per barrier
- All joints (as joint filler joints) and centerlines with one centerline labeled as
  
  1/4" Joint [Barrier only] (Typ.)

Adjust longitudinal dimensions note under elevation title as necessary.

If right barrier differs from left (typical with curved bridges), show both Elevation of Left Barrier and Elevation of Right Barrier. The longitudinal dimensions note can be relocated as the first note under the General Notes.

Dimensions are based on a 2.0%-sloped deck. Modify accordingly in Section A-A and the 2.27 sq. ft. area in Section A-A for superelevated decks.

If conduit is required, indicate left or right or both barriers in a note.

1. For barrier ending at end of slab:
   - Exclude "(except at end bents)" in first note.
   - Revise measurement to "end of slab to end of slab" in second note.

2. Plastic waterstop detail and notes are required for all grade separations

3. Subtract 1/8" for a 3/16"-per-foot sloped deck.

Plastic waterstop shall be placed in all formed joints, except structures with superelevation, use on lower joints only.

Cost of plastic waterstop, complete in place, will be considered completely covered by the contract unit price for Type B Barrier.

(Use for grade separations)

(Waterstop Detail)

(Silicone joint sealant)

(Use when conduit is required)

(B) 2'-5" (Typ.)

(K) 4'-1" (Typ.)

(H) 1'-18"

(C) 2'-13" (Typ.)

(F) 2'-17"

Shape 19 R1 Bar

Shape 33 R2 Bar

Reinforcing Bar Dimensions
Use when distance between upper and lower construction joint in wings is less than 28 1/2".

NOTE: This drawing is not to scale. Follow dimensions.
ALTERNATE DETAILS FOR SKEWED BRIDGES REQUIRING K3 BARS

Standard Drawing Guidance: (do not show on plans)

For skews greater than 3 degrees, use alternate details above, which substitutes a K3 bar for the end K2 bar. For skews greater than 41 degrees, two K3 bars are required.

Dimensions are based on a 2.0% sloped deck. Subtract 1/8" for a 3/16" per foot sloped deck.

For skews greater than 3 degrees, use alternate details above, which substitutes a K3 bar for the end K2 bar. For skews greater than 41 degrees, two K3 bars are required.

Dimensions are based on a 2.0% sloped deck. Subtract 1/8" for a 3/16" per foot sloped deck.
Use the following formulas for determining bar dimensions. These formulas work for all cross slopes.

**K3 BARS**
- \[ B = \text{SLAB} \,(t) + \text{W.S.} \,(t) + 10\frac{1}{2}" \]
- \[ E = \text{SLAB} \,(t) + \text{W.S.} \,(t) - \frac{3}{4}" \]

**K4 BARS**
- \[ C = \text{SLAB} \,(t) + \text{W.S.} \,(t) + 10" \]

**K5, K6, K7 & K8 BARS**
- \[ E = \text{SLAB} \,(t) + \text{W.S.} \,(t) + \frac{1}{2}" \]

**R3 BARS**
- \[ B = \text{SLAB} \,(t) + \text{W.S.} \,(t) + 9\frac{1}{2}" \]

**R4 BARS**
- \[ E = \text{SLAB} \,(t) + \text{W.S.} \,(t) - \frac{3}{4}" \]

Add Standard Note H9.1a, or H9.1b or H10.7.1 depending upon the use of guardrail or barrier system.
Stiffener Plate Dimensions and Quantities Per Assembly

<table>
<thead>
<tr>
<th>ID</th>
<th>Quantity</th>
<th>Shape</th>
<th>Dimensions (A x B x C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>1</td>
<td></td>
<td>20&quot; x 16&quot;</td>
</tr>
<tr>
<td>S2</td>
<td>1</td>
<td></td>
<td>15&quot; x 12&quot;</td>
</tr>
<tr>
<td>S3</td>
<td>4</td>
<td></td>
<td>15&quot; x 12&quot;</td>
</tr>
<tr>
<td>S4</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S5</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S6</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S7</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S8</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S9</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S10</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S11</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
<tr>
<td>S12</td>
<td>1</td>
<td></td>
<td>12&quot; x 8&quot;</td>
</tr>
</tbody>
</table>

General Notes:
- All fillet welds shall be one inch long spaced at 2 inches.
- Stiffener plates shall be 1/4 inch thick.
- Connector plate shall be fabricated from ASTM Grade A36 steel and galvanized. For galvanized requirements, see Sec 1040.
- All hole diameters shall be one inch.

Cover plates shall be 3/16 inch thick.
ELEVATION OF BARRIER

(Left barrier shown, right barrier similar)

Longitudinal dimensions are horizontal:

- All #5-R bars with bars at one location labeled as:
- All #5-C bars in each span with all specified by bar marks (include asterisk)
- If slip forming is allowed then add the following two items:
  - All joints (as joint-filler joints) and centerlines with one centerline labeled as:
  - First & last vertical #5-R bars dimensioned with total number in barrier.
- All horizontal #5-R bars in each span with all specified by bar marks.
- Span ranges.
- In the available space, draw the elevation of the left barrier showing:

  Standard Drawing Guidance (do not show on plans):
  - (Typ.)
  - @ abt. 12" cts.
  - 3'-6" (Each face)
  - Saw Cut)
  - #5-R Bars
  - #5-C1 (Typ.)
  - 2"
  - 1/4" Joint
  - Const. Joint

  Note: This drawing is not to scale. Follow dimensions.

General Notes:

- Slip-formed option only.
- Conventional forming or slip forming may be used. Saw cut joints may be used with conventional forming.
- Top of barrier shall be built parallel to grade and barrier joints shown at end.
- Bar joint sealant normal grade
- All expanded edges of barrier shall have either a 1/2-inch radius or a 3/4-inch bev. unless otherwise noted.
- Payment for all concrete and reinforcement complete in place, will be considered completely covered by the contract unit price for Type D Barrier per linear foot.
- Concrete in barrier shall be Class B-1.
- Measurement of barrier is to the nearest linear foot for each structure, measured along the outside top of slab, measured at end of wing.
- Concrete traffic barrier delineators shall be placed on top of the barrier, as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617.10.1. Concrete traffic barrier delineators shall be placed at 50 linear foot intervals. Non-traffic shall have reflectorizing, when on both sides. Concrete traffic barrier delineators shall be considered a part of the contract unit price.
- Concrete traffic barrier delineators shall be in accordance with Sec 617.10.1 for slip-formed joint sealant for saw cut and formed joints.
- For slip-formed option, both sides of bar forming shall have a permanently broomed finish and the top shall have a transversely broomed finish.
- Plastic waterstop shall not be used in the saw cut joints.

**Note:** The drawing is not to scale. Follow dimensions.
Plastic waterstop shall be placed in all formed joints, except structures with superelevation, use on lower joints only.

Cost of plastic waterstop, complete in place, will be considered completely covered by the contract unit price for Type D Barrier.

EXAMPLE - REDECK

EXAMPLE - NEW BRIDGE
DETAILED GUARD RAIL ATTACHMENT

(Left barrier shown, right barrier similar)

**TYPE D BARRIER AT END BENTS**

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 1 of 1

**General Notes:**
Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 612. Delineators on bridges with two lanes, two way traffic shall have reflective sheathing on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Type D Barrier.

Reinforcing Steel: Minimum clearance to reinforcing steel shall be 1 1/2" except as shown for bars embedded into end bent.

**K10-K11 BAR PERMISSIBLE ALTERNATE SHAPE**

(Other K bars not shown for clarity)

The K10-K11 bar combination may be furnished as one bar as shown, at the contractor's option.

All dimensions are not to scale.
Standard Drawing Guidance: (do not show on plans)

For skew greater than 3 degrees, use alternate details, which substitute a K3 bar for the end K2 bar. For skews greater than 41 degrees, two K3 bars are required.

Dimensions are based on a 2.0% sloped deck. Subtract 1/8" for a 3/16" per foot sloped deck.

Alternate Details for Skewed Bridges Requiring K3 Bars
**Integral End Bent with Shallow Superstructure**

Use when distance between upper and lower construction joints in wings is less than 28 1/2".

**General Notes:**

- **Maintaining Steel:** Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan K 10 to aid in alignment with the traffic signal. The preference is to use a reflective surface. The delineators shall be fixed to the top of the barrier and shall be considered completely covered by the contract unit price for Type D Barriers.

- **Minimum coverage to reinforcing steel:** the top 3 1/2" layer of cover of each face is considered 20% and is shown for bars intended to end bent.

**Type D Barrier at End Bents**

(left barrier shown, right barrier similar)

**K10-K11 Bar Permissible Alternate Shape**

(Other K bars not shown for clarity)

The K10-K11 bar combination may be furnished as shown or as shown at the contractor’s option.

All dimensions are out to out.
ALTERNATE DETAILS FOR SKEWED BRIDGES REQUIRING K3 BARS

Standard Drawing Guidance: (Do not show on plans)

For skews greater than 3 degrees, use alternate details above, which substitutes a K3 bar for the end K2 bar. For skews greater than 41 degrees, two K3 bars are required.

Dimensions are based on a 2.0% sloped deck. Subtract 1/8" for a 3/16" per foot sloped deck.

For skews greater than 3 degrees, use alternate details above, which substitutes a K3 bar for the end K2 bar. For skews greater than 41 degrees, two K3 bars are required.

Dimensions are based on a 2.0% sloped deck. Subtract 1/8" for a 3/16" per foot sloped deck.
**General Notes:**

Concrete traffic barrier delineators shall be placed on top of the barrier as shown in Missouri Standard Plan 617.10, and in accordance with Sec 617.11. Delimiters on bridges with two lanes, two-way traffic shall have retroreflective sheeting on both sides. Minimal clearance to rebar shall be 1 1/2". Use a minimum lap of 3 1/2" between horizontal K bars and R bars.

**Reinforcing Steel:**

Minimum clearance to reinforcing steel shall be 1 1/2".

1. Show part of existing end bent.

**Standard Drawing Symbols:**

- Do not show on plans:
- Show part of existing end bent.

**Details of Guard Rail Attachment**

- Transition to bar
- #1 Type A curb for gutter bars to match

**Type D Barrier at End Bents**

(Left barrier shown, right barrier similar)

- Plan
- Elevation

**Dimensions:**

- (1) 5-#5-K1 @ 4" cts.
- (2) 2 spaces @ 4"
- (3) 5-#5-K4 & K5
- (4) 5-#5-SK & SK
- (5) #5-K13 @ 4" cts., each face
- (6) 3 spaces @ 6"
- (7) Spaced as shown, each face
- (8) 1-1/2' Holes
- (9) #5-K1 @ 4" cts.

**Elevation G-G**

- Transition to bar
- Type A curb for gutter bars to match

**Elevation D-D**

- Transition to bar
- Type A curb for gutter bars to match

**Elevation C-C**

- Transition to bar
- Type A curb for gutter bars to match

**Elevation B-B**

- Transition to bar
- Type A curb for gutter bars to match

**Elevation A-A**

- Transition to bar
- Type A curb for gutter bars to match

**Details of Guard Rail Attachment**

- Transition to bar
- Type A curb for gutter bars to match
If conduit is required, indicate left or right or both barriers in a note.

**Dimensions are based on a 2.0%-sloped deck.** Modify accordingly the outside dimensions in R-Bar Barrier and Elevation of Right Barrier. The longitudinal dimensions note can be relocated as the right barrier differs from left (typical with curved bridges), show both Elevation of Left Barrier and Elevation of Right Barrier. The longitudinal dimensions note can be relocated as necessary.

- All fiberglass bars with bars at one location labeled as:
- #5-R1, R2 & R3 Fiberglass Bar (1)
- #4 Textured Fiberglass Bars (Typ.)

### Joints
- Joint (Barrier only) (Typ.)
- Joint (Barrier only) (Typ.)

## Joints
- #4 Textured Fiberglass Bars (Typ.)
- #8 Textured fiberglass bars [1]" @ 8" cts. (Each face)
- #8 Textured fiberglass bars [1]" @ 8" cts. (Each face)

### Sections
- SECTION A-A
- SECTION B-B

### Elevation of Barrier

**General Notes:**
- Slip-formed option only.
- Conventional forming or slip forming may be used. Saw cut joints may be used with conventional forming. Saw cut joints must be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 717. Concrete traffic barrier delineators shall be considered completely covered by the contract unit price for Type H Barrier per linear foot.
- Concrete in barrier shall be Class B-1.
- Measurement of barrier is to the nearest linear foot for each structure, measured along the particle top of slab from end to end of each span.
- Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on the left side of the barrier shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Type H Barrier per linear foot.
- Concrete joint sealant and backer rods shall be in accordance with Sec 617.10 and in accordance with Sec 617. Delineators on the left side of the barrier shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Type H Barrier per linear foot.
- Concrete joint sealant and backer rods shall be in accordance with Sec 717 for silicone joint sealant.
WATERSTOP DETAIL
Plastic waterstop shall be placed in all formed joints, except structures with superelevation, use on lower joints only.
Cost of plastic waterstop, complete in place, will be considered completely covered by the contract unit price for Type H Barrier.

EXAMPLE ELEVATION

SECTION THRU SAW CUT JOINT
(Use when conduit is required)

PART PLAN SHOWING JOINT LOCATION
(For skewed structures only)

PART ELEVATION OF BARRIER
(1) Four feet long, centered on joint, slip-formed option only

ALTERNATE DETAIL
FOR SINGLE SPAN
**Detailed Notes**

- Transition to joint for barrier lines to match.

**Details of Guard Rail Attachment**

**Type H Barrier at End Bents**

*Left barrier shown, right barrier similar.*

**General Notes:**

Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617.

Delineators on bridges with two lanes, two-way traffic, shall be spaced as shown. K4-K5 and K4-K6 bar combinations may be considered complete by the contract unit price for Type H Barrier. The top two bars shall be kept with a present close to those shown.

Reinforcing Steel:

*Minimum clearances to reinforcing steel shall be 1 1/2" except as shown for bars embedded into end bents.*

**PERMISSIBLE ALTERNATE SHAPES**

*(Other K bars not shown for clarity)*

**MISURR HIGHWAYS AND TRANSPORTATION**

*1-888-ASK-MODOT (1-888-275-6636)*
Alternate Details for Skewed Bridges Requiring K3 Bars
General Notes:

Concrete traffic barrier delineators shall be placed on top of the barrier as shown. Concrete traffic barrier delineators shall be furnished as shown with each Type H barrier. Width, height, retroreflective sheeting on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Type H barrier.

Reinforcing Steel:
Minimum clearance to reinforcing steel shall be 1 1/2" except as shown for bars embedded into end bent.

Permissible Alternate Shapes
(Other K bars not shown for clarity)
The K4-K5 and K6-K8 bar combinations may be furnished as one bar as shown. The top two K bars shall be kept with positive clearance in Sections B-B thru D-D. Type A bars shall be kept with positive clearance in Sections A-A thru D-D.

All dimensions are out to out.

Type H Barrier at End Bents
(Left barrier shown, right barrier similar)

Transition to Top of Type A Bar and to Type K Bar
All dimensions are out to out.

Details of Guard Rail Attachment
Note: This drawing is not to scale. Follow dimensions.
Alternate Details for Skewed Bridges Requiring K3 Bars

Dimensions are based on a 2.0% sloped deck. Subtract 1/8" for a 3/16" per foot sloped deck.

Based on 8 1/2" slab. Adjust for different slab thickness.

For skews greater than 3 degrees, use alternate details above, which substitutes a K3 bar for the end K2 bar. For skews greater than 41 degrees, two K3 bars are required.
**General Notes:**
Concrete traffic barrier delineators shall be placed on top of the Barrier as shown on this drawing. Standard Plan K7-05 and in accordance with K4-K5. Barriers on bridges with two lanes, two-way traffic shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators will be considered completely covered by the contract unit.

**PERMISSIBLE ALTERNATE SHAPES**
(Other K bars not shown for clarity)
The K4-K5 and K4-K6 bar combinations may be furnished as one bar as shown, at the contractor’s option.

All dimensions are out to out.

**Details of Guard Rail Attachment**
Intersection to Par B, Type A, jog for better lines to match.

**Note:** This drawing is not to scale. Follow dimensions.
ELEVATION A-A

SECTION B-B

ELEVATION C-C

SECTION D-D

DETAILS OF GUARD RAIL ATTACHMENT

PART PLAN

General Notes:
- Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard BP 10 and in accordance with Sec 617. Delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides.

PERMISSIBLE ALTERNATE SHAPES

OTHER K BARS NOT SHOWN FOR CLARITY

The K4-K5 and K4-K6 bar combination may be furnished as one bar as shown, at the contractor's option. All dimensions are out to out.
Standard Drawing Guidance (do not show on plans):
- All horizontal #5-C bars in each span with all specified by bar marks.
- All joints (bar jointer joints) and centerlines with one centerline labeled as:
  - E. "E" Joint (Barrier joint) (Typ.)

If slip forming is allowed then add the following two items:
- All joints (as joint-filler joints) and centerlines with one centerline labeled as:
- First & last vertical #5-R bars dimensioned with total number in barrier.

In the available space, draw the elevation of the left barrier showing:
- All fiberglass bars with bars at one location labeled as:
  - All #5-C bars in each span with all specified by bar marks (include asterisk)

All exposed edges of barrier shall have either a 1/2-inch radius or a 3/8-inch bevel, unless otherwise noted.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be constructed in accordance with Sec 1049 and in accordance with Missouri Standard Plan 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut and formed joints.

The contractor shall use one of the qualified resin anchor systems in accordance with 1039.

Cost of furnishing and installing the resin anchor systems in accordance with 1039.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab.

Concrete in the barrier shall be Class B-1.

General Notes:
- Slip-formed option only

Concrete traffic forming or slip forming may be used.

Conventional forming or slip forming may be used with conventional forming.

Concrete traffic barrier delineators shall be constructed in accordance with Sec 1049 and in accordance with Missouri Standard Plan 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.

Concrete traffic barrier delineators shall be installed on top of the barrier as shown on Missouri Standard Plan 617 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both sides. Concrete traffic barrier delineators shall be considered completely covered by the slab when the junction is at the surface of the slab to the slab.

Joint sealant and backer rods shall be in accordance with Sec 707 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall be constructed in accordance with Sec 717 for silicone joint sealant for saw cut joints.

Concrete in the barrier shall be Class B-1.
**Backer Rod**

**SECTION THRU SAW CUT JOINT**

- See when conduit is required

**Saw Cutting Conduit** during damage to prevent.

**Locate Conduit** during damage to prevent.

**PART PLAN SHOWING JOINT LOCATION**

- For skewed structures only

**EXAMPLE ELEVATION**

**Silicone Joint Sealant**

**1" Backer Rod**

**PART PLAN SHOWING JOINT LOCATION**

- Use when conduit is required

**EXAMPLE ELEVATION**

**Resin Anchor Systems** (Spa. as shown in Part Elevation of Barrier)
Standard Drawing Guidance (do not show on plans):
- In the outline sheets, draw the elevation of the test barrier showing:
  
  - All horizontal #5 bars in each span with all designated by bar marks.
  - All vertical #5 bars dimensioned with solid line in barrier.
  - All joints (e.g., centerline) and centerlines with one centerline labeled on:
    - 6" joint (barrier only) (Typ.)
    - 5/8" joint (barrier only) (Typ.)
  
If slip forming is allowed then add the following two items:
- All #5 bars in each span with all designated by bar marks
- All fiberglass bars with bar or one location labeled on:
- All Textured fiberglass bars (Typ.)

Adjust length not dimensions note under elevation title as necessary.
- All bars for the slit-formed option only.
- Length of C bars is 12'-0".

Do not include #5 bars for resin anchors in the bar bill.
- F'c = 4,000 psi for the resin anchor system with a minimum ultimate pullout strength of 7.5 MPA.

Governing reinforcing shall be that required to meet the minimum ultimate pullout strength in accordance with Sec 1039 but shall not be less than 5 kips.
- Joint reinforcement shall be used. Saw cut joints may be used with the slip-formed option only.
- The cross-sectional area of the tie shall be 0.017 square feet on a 0.125 square feet basis, unless otherwise noted.

Payment for all concrete and reinforcing shall be computed by the cubic yards of concrete and reinforcing, respectively, needed to produce the length of C1 bars to end of project. The contract unit price for Type C Barrier per linear foot will be considered completely covered by the contract unit price for all concrete and reinforcing, complete in place, will be based on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators shall have retroreflective sheeting on both faces. Concrete traffic barrier delineators shall be installed in the following locations:
- Approach slab.
- Bridge approach slab to end of bridge.

Concrete traffic barrier delineators shall be marked as follows:
- Type C Barrier.
- Measurement of barrier is to the nearest linear foot, measured along the top of barrier. Concrete traffic barrier delineators shall be used. Saw cut joints may be used with the slip-formed option only.
- Conventional forming or slip forming may be used. Saw cut joints may be used with the slip-formed option only.

General Notes:
- Joint reinforcement shall be used. Saw cut joints may be used with the slip-formed option only.
- Joint reinforcement shall consist of one 1/2-inch radius or a 3/8-inch radius, as shown in the figure. Joint reinforcement shall be formed with a minimum clear distance of 3" between bars in the joint.
- Joint reinforcement shall consist of one 1/2-inch radius or a 3/8-inch radius, as shown in the figure. Joint reinforcement shall be formed with a minimum clear distance of 3" between bars in the joint.
- Joint reinforcement shall consist of one 1/2-inch radius or a 3/8-inch radius, as shown in the figure. Joint reinforcement shall be formed with a minimum clear distance of 3" between bars in the joint.
- Joint reinforcement shall consist of one 1/2-inch radius or a 3/8-inch radius, as shown in the figure. Joint reinforcement shall be formed with a minimum clear distance of 3" between bars in the joint.

Concrete traffic barrier delineators shall be installed in the following locations:
- Approach slab.
- Bridge approach slab to end of bridge.
- Conventional forming or slip forming may be used. Saw cut joints may be used with the slip-formed option only.
- Joint reinforcement shall be used. Saw cut joints may be used with the slip-formed option only.
- Joint reinforcement shall consist of one 1/2-inch radius or a 3/8-inch radius, as shown in the figure. Joint reinforcement shall be formed with a minimum clear distance of 3" between bars in the joint.
- Joint reinforcement shall consist of one 1/2-inch radius or a 3/8-inch radius, as shown in the figure. Joint reinforcement shall be formed with a minimum clear distance of 3" between bars in the joint.
- Joint reinforcement shall consist of one 1/2-inch radius or a 3/8-inch radius, as shown in the figure. Joint reinforcement shall be formed with a minimum clear distance of 3" between bars in the joint.
### BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>NO.</th>
<th>SECTION</th>
<th>LOCATION</th>
<th>DIMENSIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>B C D E F H K</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ft. in. in.</td>
<td></td>
</tr>
</tbody>
</table>

#### DETAILING

- **Location**: The location is specified for each bar.
- **Dimensions**: The dimensions are provided in both feet and inches.

#### HOOKS AND BENDS

- **90° Hook**: 180°
- **135° Hook**: Approx.
- **No. EA.**: Number of bars of each length.

#### WEIGHTS

- **Nominal weights** are based on actual lengths, with payweights based on nearest inch.

#### SHEET NO.

- **Sheet No.**: The specific sheet number for the document.
- **Sheet No. of**: The total number of sheets in the document.

---

**Note:** This drawing is not to scale. Follow dimensions as specified.
## Bill of Reinforcing Steel

<table>
<thead>
<tr>
<th>Location</th>
<th>Dimensions</th>
<th>Quantity</th>
<th>Actual Length</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Epoxy (E)

- **Shape No.**
- **Stirrup (S)**
- **Variates (V)**
- **No. EA.**

### Bill of Reinforcing Steel

<table>
<thead>
<tr>
<th>Diameter (IN.)</th>
<th>Bar Size</th>
<th>Nominal Length</th>
<th>Actual Length</th>
<th>Pay Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>#4</td>
<td>2&quot;</td>
<td>4.5&quot;</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>2.5</td>
<td>#5</td>
<td>2 1/2&quot;</td>
<td>5 1/2&quot;</td>
<td>3 3/4&quot;</td>
</tr>
<tr>
<td>3</td>
<td>#6</td>
<td>4 1/2&quot;</td>
<td>8&quot;</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>3.25</td>
<td>#7</td>
<td>5 1/4&quot;</td>
<td>10&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>3.5</td>
<td>#8</td>
<td>6&quot;</td>
<td>11&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>4</td>
<td>#9</td>
<td>9 1/2&quot;</td>
<td>15&quot;</td>
<td>11 3/4&quot;</td>
</tr>
<tr>
<td>4.5</td>
<td>#10</td>
<td>10 3/4&quot;</td>
<td>17&quot;</td>
<td>13 1/4&quot;</td>
</tr>
<tr>
<td>5</td>
<td>#11</td>
<td>12&quot;</td>
<td>19&quot;</td>
<td>14 3/4&quot;</td>
</tr>
</tbody>
</table>

### End Hook Dimensions

- **180° Hooks**
- **90° Hooks**

<table>
<thead>
<tr>
<th>Diameter (IN.)</th>
<th>Bar Size</th>
<th>Nominal Length</th>
<th>Actual Length</th>
<th>Pay Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>#4</td>
<td>2&quot;</td>
<td>4 1/2&quot;</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>2.5</td>
<td>#5</td>
<td>2 1/2&quot;</td>
<td>5 1/2&quot;</td>
<td>3 3/4&quot;</td>
</tr>
<tr>
<td>3</td>
<td>#6</td>
<td>4 1/2&quot;</td>
<td>8&quot;</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>3.25</td>
<td>#7</td>
<td>5 1/4&quot;</td>
<td>10&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>3.5</td>
<td>#8</td>
<td>6&quot;</td>
<td>11&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>4</td>
<td>#9</td>
<td>9 1/2&quot;</td>
<td>15&quot;</td>
<td>11 3/4&quot;</td>
</tr>
<tr>
<td>4.5</td>
<td>#10</td>
<td>10 3/4&quot;</td>
<td>17&quot;</td>
<td>13 1/4&quot;</td>
</tr>
<tr>
<td>5</td>
<td>#11</td>
<td>12&quot;</td>
<td>19&quot;</td>
<td>14 3/4&quot;</td>
</tr>
</tbody>
</table>

### Notes

- *This drawing is not to scale. Follow dimensions.*

---

For further information, please contact:

**Jefferson County, Mo.**

105 West Capitol

**Missouri Highways and Transportation**

**I-858-Ask-MODOT (1-888-275-6636)**

**May 18, 2014**

**June 13, 2013**

**Superceded: Aug. 2008**

**Effective: June 2013**

**Singleboxculvert.dgn**

**12:49:53 PM 6/13/2013**

**Singleboxculvert.png**
### Bill of Reinforcing Steel

<table>
<thead>
<tr>
<th>NO.</th>
<th>MARK No.</th>
<th>LOCATION</th>
<th>DIMENSIONS</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>E</th>
<th>H</th>
<th>K</th>
<th>LBS.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Shape No.**
- Shape 10
- Shape 15
- Shape 20
- Shape 19
- Shape 27

**Stirrup (S)**
- Shape 10
- Shape 15
- Shape 20
- Shape 19
- Shape 27

**Variation (V)**
- Number of each

**Length**
- Nominal Length
- Actual Length

**Epoxy Coated Reinforcement (E)**

**Details**
- 180° Hooks
- 90° Hooks

**Bar Size**
- #4
- #5
- #6
- #7
- #8
- #9
- #10
- #11

**Dimensions**

**Verifications**
- This drawing is not to scale. Follow dimensions.

**Notes**
- Payweights are based on actual lengths.
- Bars may be bent in the field to fit.
- Lengths which exceed maximum allowable lengths.
- Bars may require additional length to be added to the bar.

**Procedure**
- For 90° Standard Hooks.
- For fabricsators use.

**Fabricators' Use**
- (Nearest Inch)

**Specifications**
- Grade 60 (FY = 60,000 PSI)

**Procedure**
- As for 90° Standard Hooks.
FT.

FT.

FT.

FT.

FT.

FT.

FT. IN. FT. IN.

A CERTIFIED
DOCUMENT."

LBS.

D

SHAPE 10

DATE PREPARED

6/13/2013
ROUTE

STATE

MO
SHEET NO.

H

SHEET IT HAS BEEN

*
DISTRICT

BR

*
COUNTY

C

K

JOB NO.

SHAPE 15
CONTRACT ID.

SEAL IS PRESENT ON THIS

PROJECT NO.

B

BRIDGE NO.

Vertical Leg

B

IF A

DESCRIPTION

C

SHAPE 19

NON-EPOXY

21 IN.

#4

60 FT.

#5

26 IN.

#5

60 FT.

#6

31 IN.

#6

60 FT.

#7

39 IN.

#7

60 FT.

#8

51 IN.

#8

60 FT.

#9

65 IN.

#9

60 FT.

#10

82 IN.

#10

60 FT.

#11

101 IN.

#11

60 FT.

NOTE:
THE BAR LIST IS BASED ON THE MISSOURI
STANDARD PLANS.

65102
MO

CAPITOL
WEST

CITY,

105

JEFFERSON

BAR
SIZE

#4

1-888-ASK-MODOT

TRANSPORTATION

MAX BAR LENGTH

HIGHWAYS

NON-EPOXY

MISSOURI

SPLICE LENGTH
BAR
SIZE

AND

E

COMMISSION

C
K

H

SHAPE 27

(1-888-275-6636)

DATE

SHAPE 20

B

THIS BAR LIST IS FOR QUANTITY
ESTIMATION PURPOSE ONLY AND SHALL BE
VERIFIED OR MODIFIED BY THE CONTRACTOR.

SIZE

H

HOOK

(IN.)

A OR G

135
HOOK
A OR G

APPROX.

180 HOOKS

PROCEDURE AS FOR 90 DEGREE STANDARD HOOKS.

90 HOOKS

HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.
FB = BARS MAY BE BENT IN FIELD TO FIT.

A OR G

J

A OR G

E = EPOXY COATED REINFORCEMENT.
#4

3"

#5
HOOK
A OR G

H

S = STIRRUP.
V = BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE

6"

4"

8"

3 3/4"

7"

5"

10"

#6

4 1/2"

8"

6"

12"

IN THE FIRST LINE. IT IS THE CONTRACTOR’S RESPONSIBILITY TO ADD A SPLICE LENGTH TO A BAR

#7

5 1/4"

7"

14"

LENGTH WHICH EXCEEDS ITS MAXIMUM ALLOWABLE LENGTH.

8"

16"

AND THE FOLLOWING LINE. A BLANK IN THE SECOND LINE REPRESENTS THE SAME BAR DIMENSION AS THAT
#4

2"

4 1/2"

4 1/2"

DETAILING DIMENSION

3"

#5

2 1/2"

#6

4 1/2"

6"

5 1/2"

3 3/4"

d

12"

8"

#8

4 1/2"

135 STIRRUP

#9

J

"D" IS THE SAME FOR ALL BENDS AND HOOKS

6"

10"
11"

NO. EA. = NUMBER OF BARS OF EACH LENGTH.
NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED

D

D

d

NOTE: UNLESS OTHERWISE NOTED, DIAMETER

90 STIRRUP

90

HOOK

D
(IN.)

D

DIMENSION

DETAILING

DIMENSION

DETAILING

D

HOOK

SIZE
12d

BAR

90

BAR

A OR G

d

d

A OR G

ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEGREE ARE TO BE BENT WITH SAME

GRADE 60

6

D

END HOOK DIMENSIONS
D

STIRRUP HOOK DIMENSIONS

D

d

NOTE:

DETAILING DIMENSION

A OR G

6d FOR #4 AND #5,
12d FOR #6

180

#10

9 1/2"
10 3/4"

15"
17"

11 3/4"

19"

13 1/4"

22"

14 3/4"

24"

FOR FABRICATORS USE. (NEAREST INCH)
ACTUAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.
PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

#11

12"

19"

REINFORCING STEEL (GRADE 60) FY = 60,000 PSI.

ON A BAR.
4d OR 2 1/2" MIN.

Detailed
Checked

Note: This drawing is not to scale. Follow dimensions.

Sheet No.

of
Tripleboxculvert.dgn

AND

NOT BE CONSIDERED

C

(S)

NO.

"THIS MEDIA SHOULD

WEIGHT

C

K

LENGTH

H

ACTUAL

E

LENGTH

or F
D

NOMINAL

C

SEALED

LBS.

DIMENSIONS

B

ELECTRONICALLY

FT. IN. FT. IN.

(V)

FT.

(E)

FT.

VARIES

FT.

SHAPE

FT.

EPOXY

FT.

LOCATION

STIRRUP

FT.

WEIGHT

NO.

MARK

K

REQ’D.

H

MARK

SIZE

E

NO.

or F
D

LENGTH

C

ACTUAL

B

LENGTH

NOMINAL

(V)

EACH

(E)

BILL OF REINFORCING STEEL

DIMENSIONS

NO.

(S)

NO.

VARIES

SHAPE

EPOXY

LOCATION

STIRRUP

MARK

REQ’D.

NO.

SIZE

NO.

MARK

DATED.

Supercedes: Aug. 2008

BILL OF REINFORCING STEEL

EACH

Effective: June 2013

NO.

Tripleboxculvert

12:51:10 PM

6/13/2013


U.I.P. & Rehabilitate Existing \((x', x')\) X Spans

**No Wearing Surface**

Guidance: (Do not show on plans.)

Substitute alternate Plan for skewed structures. Modify details as needed to suit your structure.

Use with D631-2 (Bill of Reinforcing Steel).

### Part Elevation Showing Concrete Removal

**General Notes:**

- **Design Specifications:** 2002 AASHTO LFD (17th Ed.) Standard Specifications
- **Design Unit Stresses:**
  - Reinforcing Steel (Grade 60): \( f_y = 60,000 \text{ psi} \)
  - Minimum clearance to reinforcing steel shall be at least 1 1/2" unless otherwise shown.
  - Minimum longitudinal reinforcement not shown for clarity.

- **Miscellaneous:**
  - One lane of traffic shall remain open during construction. See roadway plans for traffic control.
  - Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.

- **Contractor shall verify all dimensions in field before ordering new material.**

- **All reinforcement in barrier end modification shall be epoxy coated.**

- **Bars bonded in existing concrete not removed shall be cleaned, stripped, and embedded into new concrete where possible.** If length is available, existing bars shall extend into new concrete at least 40 diameters for plain bars and 30 diameters for deformed bars, unless otherwise noted.

- The area exposed by the removal of concrete and not covered with new concrete shall be treated with a qualified special mortar in accordance with Sec 704.

- Cost of removing existing barrier substrate, cost of preparing and installing new concrete, and any other work incidental to the barrier end modification, complete in place, will be considered completely covered by the contract unit price for barrier end modification.

### Estimated Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Sheet/Sec</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier End Modification (each)</td>
<td>Sheet</td>
<td>Sec/Sur</td>
</tr>
<tr>
<td>Barrier End Modification (each)</td>
<td>Sheet</td>
<td>Twp</td>
</tr>
<tr>
<td>Barrier End Modification (each)</td>
<td>Sheet</td>
<td>Rge</td>
</tr>
</tbody>
</table>

### Design Specifications:

- Reinforcing Steel:
  - Grade 60: \( f_y = 60,000 \text{ psi} \)

- Concrete:
  - Class B-1: \( f'_c = 4,000 \text{ psi} \)

- Design Unit Stresses:
  - Reinforcing Steel: \( f_y = 60,000 \text{ psi} \)

- Minimum clearance to reinforcing steel shall be at least 1 1/2" unless otherwise shown.

- Minimum longitudinal reinforcement not shown for clarity.

- Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.

- Contractor shall verify all dimensions in field before ordering new material.

- All reinforcement in barrier end modification shall be epoxy coated.

- Bars bonded in existing concrete not removed shall be cleaned, stripped, and embedded into new concrete where possible. If length is available, existing bars shall extend into new concrete at least 40 diameters for plain bars and 30 diameters for deformed bars, unless otherwise noted.

- The area exposed by the removal of concrete and not covered with new concrete shall be treated with a qualified special mortar in accordance with Sec 704.

- Cost of removing existing barrier substrate, cost of preparing and installing new concrete, and any other work incidental to the barrier end modification, complete in place, will be considered completely covered by the contract unit price for barrier end modification.

### Miscellaneous:

- Bars bonded in existing concrete not removed shall be cleaned, stripped, and embedded into new concrete where possible. If length is available, existing bars shall extend into new concrete at least 40 diameters for plain bars and 30 diameters for deformed bars, unless otherwise noted.

- The area exposed by the removal of concrete and not covered with new concrete shall be treated with a qualified special mortar in accordance with Sec 704.

- Cost of removing existing barrier substrate, cost of preparing and installing new concrete, and any other work incidental to the barrier end modification, complete in place, will be considered completely covered by the contract unit price for barrier end modification.

### Notes:

- This drawing is not to scale. Follow dimensions.

- Sheet No. 1 of 2
### BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>NO.</th>
<th>SHEET</th>
<th>LOCATION</th>
<th>SHAPE NO.</th>
<th>WIDTH</th>
<th>THICK</th>
<th>LENGTH</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>NO.</th>
<th>SHEET</th>
<th>LOCATION</th>
<th>SHAPE NO.</th>
<th>WIDTH</th>
<th>THICK</th>
<th>LENGTH</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHAPE 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### STIRUP MECH. DIMENSIONS

<table>
<thead>
<tr>
<th>STIRUP</th>
<th>MECH.</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>135°</td>
<td></td>
</tr>
</tbody>
</table>

### END MECH. DIMENSIONS

<table>
<thead>
<tr>
<th>END MECH.</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DETAILING

- **NOTE:** This drawing is not to scale. Follow dimensions.  
- Sheet No. 2 of 2
Skewed Plan
### Bill of Reinforcing Steel

<table>
<thead>
<tr>
<th>Shape No.</th>
<th>Description</th>
<th>Dimensions</th>
<th>Location</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHAPE 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Guidelines:**
- Dimensions shown are for a 2" wearing surface.
- Modify if wearing surface is more or less than 2" thick.

**Notes:**
- This drawing is not to scale. Follow dimensions.

**Bending Diagram:**
- The bending diagrams show the recommended bend sizes and positions for the different shapes. These are based on AASHTO specifications and are intended to provide a guide for proper bending.

**SPC:**
- The SPC (Splice Chart) provides information on the lengths and weights of column spirals, as well as the number of bars required for each length. This chart is essential for ensuring the proper reinforcement of the structure.

**Epoxy:**
- Epoxy is used as a bonding agent between the reinforcement bars and the concrete. The table lists the required number of bars for each shape and the corresponding epoxy requirements.

**Splicing:**
- Splices or spacers are used to connect the bars at the ends. The table specifies the number of splices and their locations to ensure proper reinforcement.

**Checks:**
- The checks section provides a summary of the checks and details required for the project. This includes the project number, contract ID, bridge number, etc.

**Effective Date:**
- Effective: July 2021

**Supersedes:**
- Supersedes: Feb. 2021

---

**Dimensions:**
- The dimensions table provides the required dimensions for each shape, including the length and weight.

---

**Weight:**
- The weight table lists the weight requirements for each shape, based on the bending diagrams.
<table>
<thead>
<tr>
<th>NO.</th>
<th>BRIDGE NO.</th>
<th>STATE</th>
<th>COUNTY</th>
<th>DISTRICT</th>
<th>PROJECT NO.</th>
<th>CONTRACT ID.</th>
<th>DATE PREPARED</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>

*Note: This drawing is not to scale. Follow dimensions.*

Standard Drawing Guidance:
*(Do not show on plans)*

See Technician Info/TipsAndHelp/
AttachBoringPDFsToBridgePlans
on Development Section Sharepoint page for
instructions for attaching PDFs as rasters.

For one 11x17 Geotechnical Data sheet, snap
to top left corner of left guidance box and
snap anywhere for other corner, filling
as much of the available space as possible.
Delete boxes or turn off Constructions level.

**BORING DATA**

*Note: For locations of borings, see Sheet No. 1.*
Construction point key not shown for clarity, see standard plans for details.

If any part of the barrel is exposed, the roadway fill shall be warped to clarity, see standard plans for details.

Reinforcing Steel (Culverts-Bridge) Class B-1 Concrete (Culverts-Bridge) f'c = 4,000 psi

Concrete Box Culvert Used

Precast Concrete Box Used

When alternate precast concrete box sections are used, the minimum distance from inside face of roadway to break sections maintained along the travel way over the culvert shall be in accordance with Missouri Standard Plans.

Traffic Handling: Overtopping flood discharge shall be determined during construction. Traffic to be maintained on traffic control plans for traffic control.

General Notes:
Design Specifications: 2010 AASHTO LRFD Bridge Design Specifications and 2010 Interim Revisions

Design Loading:
Vehicular = HL-93 minus lane load, Earth = 120 lb/cf Equivalent Flood Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Base Flood Discharge = ___ cfs
Base Flood Elevation = _____

Design Flood (D.F.) Elevation = _____
Design Flood Discharge = ___ cfs
Design Flood Frequency = ___ years

Overtopping Flood Discharge = ___ cfs
Overtopping Flood Frequency = ___ years

Outlet Velocity = __ ft/s
Estimated Backwater = __ ft

Downstream (Elev. 2) = __ ft
Upstream (Elev. 1) = __ ft
Downstream (RT) = __ ft
Upstream (RT) = __ ft

Culvert-Bridge: Route * Over *
Routing = "X" at "X" MILES from "X" TO "X" MILES from "X" TO "X"

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance
Do not show on plans. Turn off the Bridge Construction level to hide!

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press <Ctrl> U.

1. Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2. Modify Estimated Quantities as required. Don't leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item to be added during construction. See Alternate Details for culvert extensions, or if five items are required.

3. Add any required transverse joints proportionally spaced along the barrel. Label units and add actual lengths of units along the barrel.

4. Insert S/D 703.47 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add Inlet data with notes where space allows, or use xx+xx.xx in the Offset column.

5. For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

6. No need to revise General Elevation A-A for dual roadways. In Fill Heights table add lane designation after Rdwy and insert another row for the other lane.

*** VARIABLE DESIGN FILL HEIGHTS ***

Select and delete the details grouped with the fill heights listed. Select and move alternate grouped details to drawing.

Plan: See Member Thickness table. In Equation column place "Varies" in the Dim. column if Dimension F varies, place "Varies" in the Dim. column.

Remove blank rows. End units may have different design fill heights but both units need to have the same member thicknesses.

This portion of table required when design fill height exceeds limits of the standard plan or when culvert cell height or span is not standard. If only a portion of the units are nonstandard, fill out entire table using the values applicable. Omits if not required.

Supplemental Pipe Inlet Details

Inlets sized for Elevation A-A (Pipe Diameter/Culvert HT)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Top Slab Reinforcement Table (Nonstandard Culverts With Only One Design Fill Height)

Supplemental Reinforcement Table (Nonstandard Culverts)

Alternate Plan of Transverse Joints
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

---

**Estimate Quantities**

<table>
<thead>
<tr>
<th>Final</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Alternates Estimated Quantities for Culvert Extensions or when Five Items are Required**

---

**Estimated Quantities**

<table>
<thead>
<tr>
<th>Item</th>
<th>Final (Units 1 &amp; 2)</th>
<th>Final (Units 3 &amp; 4)</th>
<th>Final (Units 5 &amp; 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class B-1 Concrete (Culverts-Bridge)</td>
<td>cu. yard</td>
<td>cu. yard</td>
<td>cu. yard</td>
</tr>
<tr>
<td>Partial Removal of Culvert-Bridge Concrete</td>
<td>lump sum</td>
<td>lump sum</td>
<td>lump sum</td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridge)</td>
<td>pound</td>
<td>pound</td>
<td>pound</td>
</tr>
</tbody>
</table>

---

**Dimensions are based on end units, except AA is based on Unit. Fill heights are measured from the top of top slab to the top of earth fill or roadway.**

---

**Plan of Layout Dimensions**

- Granular Backfill Limits
- Flow
- Culvert
- Tie Station
- Construction Joint (Typ.)
- Granular Backfill Limits

---

**Alternate Details for Multiple Design Fill Heights**

---

**Guidance & Alternate Details (2 of 2)**

---

**Alternate Details for Multiple Design Fill Heights**

---

**Corresponds to the border of the standard drawing for ease in moving alternate details (Snap to corner)**

---

**Substitute Table for Tables shown on Standard Plan 70347**
Provide 12 inches minimum cover. (Roadway Item)
If any part of the barrel is exposed, the roadway fill shall be warped to clarity, see standard plans for details.

Construction joint key not shown for

流量 joint key not shown for

General Notes:
Design Specifications:
2010 AASHTO LRFD Bridge Design Specifications and 2010 Interim Revisions

Design Loading:
Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:
Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:
Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:
Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:
Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:
Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:
Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:
Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:
Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:
Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Defined as per the AASHTO LRFD Bridge Design Specifications

Estimated Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>SU. Yd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reinforcing Steel (Culvert-Bridge)</td>
<td>1.00</td>
</tr>
<tr>
<td>2</td>
<td>Cast-in-Place Concrete Box</td>
<td>1.00</td>
</tr>
<tr>
<td>3</td>
<td>Precast Concrete Box</td>
<td>1.00</td>
</tr>
<tr>
<td>4</td>
<td>Miscellaneous</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Specifications:

Concrete:

General Notes:

Design Specifications:

2010 AASHTO LRFD Bridge Design Specifications and 2010 Interim Revisions

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Unit Stresses:

Class B-1 Concrete (Box Culvert) f'c = 4,000 psi

Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max)

Design Loading:

Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Equivalent Filled Pressure = 30 lb/cf (min.), 60 lb/cf (max)
Standard Drawing Guidance

Some details have been grouped together to allow easy substitution with alternate details. In edd grouped details, select them and press "Ctrl+U".

1. Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2. Modify Estimated Quantities as required. Don’t leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item to be added during construction. See Alternate Details for culvert extensions, or if five items are required.

3. Add any required transverse joints proportionally spaced along the barrel. Label units and add actual lengths of the units along the barrel.

4. Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data to tables where space allows, or use tables.

5. For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

6. No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after "Rdwy" and insert another row for the other lane.

### VARIABLE DESIGN FILL HEIGHTS ###

- Select and delete the details grouped with the fill heights table. Select and move the alternate grouped details to drawing.
- Place "See Member Thickness table" in the Equation column and place "Varies" in the Dim. column. If Dimension F varies, place "Varies" in the Dim. column.
- This portion of table required when design fill height exceeds limits of the standard plans or when culvert cell height or span is not standard. If only a portion of the units are nonstandard, fill out entire table using the values from the standard table where applicable. Unit if not required.

---

**InletsSizedfor Elevation A-A**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**Pipes With Same Diameter**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**Pipes With Different Diameters**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**Pipe Inlet Data**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**XX" Pipe Inlet Data**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**InletsSizedfor Elevation A-A**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**Supplemental Reinforcement Table**

<table>
<thead>
<tr>
<th>Top Rand Reinforcement</th>
<th>Bottom Rand Reinforcement</th>
<th>Wall Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**Supplemental Pipe Inlet Details**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

**Alternate Plan of Transverse Joints**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Dia. x Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover (Roadway Item). Construction joint key not shown for clarity, see standard plans for details. If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except A+ is based on Unit 1. Fill heights are measured from the top of top slab to the top of earth fill or roadway.

Fill Heights

<table>
<thead>
<tr>
<th>Class &amp; Excavation</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Removal of Culvert-Bridge Concrete</td>
<td>lump sum</td>
</tr>
<tr>
<td>Class B-1 Concrete (Culverts-Bridge)</td>
<td>cu. yard</td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridge)</td>
<td>pound</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimated Quantities</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Removal of Culvert-Bridge Concrete</td>
<td>lump sum</td>
</tr>
<tr>
<td>Class B-1 Concrete (Culverts-Bridges)</td>
<td>cu. yard</td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridge)</td>
<td>pound</td>
</tr>
</tbody>
</table>

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover (Roadway Item). Construction joint key not shown for clarity, see standard plans for details. If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 205.

Hydrologic Data

**Design Flood Discharge = _____ cfs**

**Design Flood Frequency = ___ years**

**Drainage Area = ___ mi²**

**Outlet Velocity = __ ft/s**

**Design Flood Discharge = ___ cfs**

**Design Flood Frequency = ___ years**

**Drainage Area = ___ mi²**

**Outlet Velocity = __ ft/s**

**General Notes:**

- **Design Specifications:**
  - 2018 AASHTO LRFD Bridge Design Specifications and 2010 Interim Revisions
  - **Design Loading:**
    - **Equivalent Fluid Pressure:** 30 lbf/ft² (min.), 60 lbf/ft² (max)
  - **Design Unit Stresses:**
    - Class B-1 Concrete (Box Culvert) f'c = 4,000 psi
    - Missouri Standard Plans:
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Unit Stresses:
        - **Equivalent Fluid Pressure:** 30 lb/cf (min.), 60 lb/cf (max)

**Estimated Quantities**

- **Estimated Backfill:** 105,303 cu.yd
- **Structural Fill:** 6,780 cu.yd
- **Blind Sides:** 67,340 cu.yd

**General Notes:**

- **MISTLY Construction personnel will indicate the type of box culvert constructed.**
  - Cast-in-Place Concrete Box used
  - Precast Concrete Box used
- When alternate precast concrete box sections are used, the minimum distance from inside face of sidewalk to precast sections measured along the wall surface shall be in accordance with Missouri Standard Plans.
- **Traffic Handling:**
  - **Traffic to be maintained during construction.**
  - **Traffic plans for traffic control.**

**LOCATION SKETCH**

**PLAN OF LAYOUT DIMENSIONS**

**CULVERT-BRIDGE:**

**ROUTE:** OVER

**ROUTE FROM** TO **OR** **TIE STA.**

**ADJUST** **HILLS** OR **TIE STA.**
Standard Drawing Guidance

Some details have been grouped together to allow easy substitution with alternate details. In edit grouped details, select them and press Ctrl+U.

1. Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2. Modify Estimated Quantities as required. Don't leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item code for grouping
   for culvert extensions, or if five items are required.

3. Add any required transverse joints proportionally spaced along barrel. Label units and add actual lengths of units along the barrel.

4. Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data using notes where space allows, or use tables.

5. For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

6. No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after X/Rdwy and insert another row for the other lane.

---

**Pipes With Same Diameter**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>F.L. Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
</tbody>
</table>

---

**Pipes With Different Diameters**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>F.L. Elev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
</tbody>
</table>

---

**Inlets Sizing for Elevation A-A**

Pipe Diameter/Culvert HT

Top Slab Reinforcement

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>36&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Supplemental Reinforcement Table (Nonstandard Culverts with only one design fill height)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>36&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Supplemental Pipe Inlet Details**

XX" Pipe Inlet Data

Station | Offset | F.L. Elev. |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
<tr>
<td>xxx+xx.xx</td>
<td>xxx.xx</td>
<td>xxx.xx</td>
</tr>
</tbody>
</table>

---

**Alternate Plan of Transverse Joints**

Unit No.

1 2 3 4 5 6 7 8 9 10

---

**VARIABLE DESIGN FILL HEIGHTS**

1. Select and delete the details grouped with the Fill Heights table. Select and move the alternate grouped details to drawing.

2. Place "See Member Thickness table" in the Equation column and place "Varies" in the Dim. column. If Dimension F varies, place "Varies" in the Dim. column.

3. Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

(Do not show on plans. Turn off the Bridge Construction level to hide)

---

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press Ctrl+U.
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity, see standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Plan of Layout Dimensions

Alternate Details for Multiple Design Fill Heights

Fill Heights

<table>
<thead>
<tr>
<th>Item</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 4 Excavation</td>
<td>cu. yd</td>
</tr>
<tr>
<td>Temporary Shoring</td>
<td>lump sum</td>
</tr>
<tr>
<td>Partial Removal of Culvert-Bridge Concrete</td>
<td>lump sum</td>
</tr>
<tr>
<td>Class B-1 Concrete (Culverts-Bridge)</td>
<td>cu. yd</td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridge)</td>
<td>pound</td>
</tr>
</tbody>
</table>

Estimated Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 4 Excavation</td>
<td>cu. yd</td>
</tr>
<tr>
<td>Temporary Shoring</td>
<td>lump sum</td>
</tr>
<tr>
<td>Partial Removal of Culvert-Bridge Concrete</td>
<td>lump sum</td>
</tr>
<tr>
<td>Class B-1 Concrete (Culverts-Bridge)</td>
<td>cu. yd</td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridge)</td>
<td>pound</td>
</tr>
</tbody>
</table>

Alternate Estimated Quantities for Culvert

Extensions or when five items are required
**GENERAL ELEVATION A-A**

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

**Hydrologic Data**
- Design Flood Frequency = ___ years
- Design Flood Discharge = ___ cfs
- Design Flood Elevation = _____
- Design Flood Frequency = ___ years
- Design Flood Discharge = ___ cfs
- Design Flood Elevation = _____

**Mineral Backfill Limits**
- Granular Backfill = 6" (Typ.)
- Granular Backfill Limits = 6" (Typ.)

**Detailed Notes:**
- Reinforcing Steel (Culverts-Bridge) fy = 60,000 psi
- Class B-1 Concrete (Culverts-Bridge) f'c = 4,000 psi
- Design Unit Stresses:
  - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
  - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

**General Notes:**
- Design Specifications:
  - 2010 AASHTO LRFD Bridge Design Specifications and 2010 Intermediate Revisions
  - Design Loading:
  - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
  - Design Unit Stresses:
    - Class B-1 Concrete (Box Culvert) fy = 60,000 psi
    - Reinforcing Steel (Grade 60) fy = 60,000 psi
    - Standard Plans:
      - 703.37, 703.41, 703.46, 703.47

**Estimated Quantities**
- Fill Heights
- Overlapping Flood Discharge
- Overlapping Flood Frequency
- Flood Elevation

**Checkled**
- Reinforcing Steel (Culverts-Bridge) pound x

**Traffic Handling:**
- Plan for Traffic control

**Location Sketch**
- General Notes:
  - MoDOT Construction personnel will indicate the type of box culvert constructed.
  - PCCP or Pre-Insulated Box used

**NOTE:** This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press <Ctrl> U.

1. Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.
2. Modify Estimated Quantities as required. Don’t leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item to be added during construction. See Alternate Details for culvert extensions, or if five items are required.
3. Add any required transverse joints proportionately spaced along the barrel. Label units and add actual lengths of units along the barrel.
4. Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add detail showing notes where space allows, or use tables.
5. For nonstandard culverts with only one design fill height, add supplemental reinforcement table.
6. No need to revise General Elevation A-A for dual roadways. If fill heights table adds a different design fill height, insert another row for the other lane.

*** VARIABLE DESIGN FILL HEIGHTS ***
Select and delete the details grouped with the Fill Heights table. Select and move the alternate grouped details to drawing.

Place “See Member Thickness table” in the Equation column and place “Varies” in the Dim. column. If Dimension F varies, place “Varies” in the Dim. column.

Ex: Use 0.5 detail for 36” pipe into a 6’ tall culvert.

(Do not show on plans. Turn off the Bridge Construction level to hide)

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press <Ctrl> U.

Supplemental Reinforcement Table (Nonstandard Culverts with only one design fill height)

Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add detail showing notes where space allows, or use tables.

For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

No need to revise General Elevation A-A for dual roadways. If fill heights table adds a different design fill height, insert another row for the other lane.
### PLAN OF LAYOUT DIMENSIONS

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Unit Length</th>
<th>Member</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Fill Heights

<table>
<thead>
<tr>
<th></th>
<th>E Rdwy at E Culvert = ft</th>
<th>Design Units 1 &amp; = ft</th>
<th>Design Units = ft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Estimated Quantities

<table>
<thead>
<tr>
<th>Classification</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 6 Excavation</td>
<td>cu. yd</td>
</tr>
<tr>
<td>Temporary Shoring</td>
<td>lump sum</td>
</tr>
<tr>
<td>Partial Removal of Culvert-Bridge Concrete</td>
<td>lump sum</td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridges)</td>
<td>pound</td>
</tr>
</tbody>
</table>

### Alternate Details for Multiple Design Fill Heights

- Remove if not applicable

### PLAN OF TRANSVERSE JOINTS AND STAGE CONSTRUCTION

- Alternate Estimated Quantities for Culvert Extensions or when five items are required

- Corresponds to the border of the standard drawing for ease in moving alternate details (Snap to corner)

---

**Guidance & Alternate Details (2 of 2)**

*If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover (Roadway Items).*

*Construction joint key not shown for clarity. See standard plans for details. If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.*
Standard Drawing Guidance
Do not show on plans. Turn off the Bridge Construction level to hide.

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press Ctrl U.

1 Ahead station is shown for stream flowing left to right. Arrow must be flipped for streams that flow right to left.

*** VARIABLE DESIGN FILL HEIGHTS ***

- Remove blank rows. End units may have different design fill heights but both units need to have the same member thicknesses.

0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1

2 Place “See Member Thickness table” in the Equation column and place “Varies” in the Dim. column. If Dimension F varies, place “Varies” in the Dim. column.

Ex: Use 0.5 detail for 36” pipe into a 6’ tall culvert.

(Do not show on plans. Turn off the Bridge Construction level to hide)

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press Ctrl U.

4 Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data using notes where space allows, or use tables.

5 For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

- Select and delete the details grouped with the Fill Heights table. Select and move the alternate grouped details to drawing.

- Place “See Member Thickness table” in the Equation column and place “Varies” in the Dim. column. If Dimension F varies, place “Varies” in the Dim. column.

- Remove blank rows. End units may have different design fill heights but both units need to have the same member thicknesses.

- This portion of table required when design fill height exceeds limits of the standard plans or when culvert cell height or span is not a standard fill height. Fill out entire table using the values from the standard table where applicable. Omit if not required.

6 No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after E and insert another row for the other lane.

- For some 20° or more, remove Detail C, remove TT from the equation for D and place “NA” in the Dim. column for Dim. TT. Will first need to drop last 2 rows of group by selecting it, then pressing Ctrl U.

7 For skews 20° or more, remove Detail C, remove TT from the equation for D and place “NA” in the Dim. column for Dim. TT. Will first need to drop last 2 rows of group by selecting it, then pressing Ctrl U.
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity, see standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.
Construction joint key not shown for clarity. See standard plans for details.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item) If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Granular Backfill Limits

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance
Do not show on plans. Turn off the Bridge Construction level to hide.

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press Ctrl U.

1. Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2. Add required transverse joints proportionally spaced along the barrel. Label units and add actual lengths of units along the barrel.

3. Insert STD 703-60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A viewable from alignment. Add inlet data using notes where space allows, or use tables.

4. For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

5. No need to revise General Elevation A-A for dual roadways in fill heights table add a lane designation after each item and insert another row for the other lane.

6. For skews 20° or more, remove Detail C. Remove TT from the equation for Dim. TT. Will first need to drop Detail C from group by selecting it and pressing Ctrl U.

7. For skewed culverts with only one design fill height, add supplemental reinforcement table.
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit (Typ.) Fill heights are measured from the top of top slab to the top of earth fill or roadway.
Granular Backfill Limits

Granular Backfill Limits

Note: This drawing is not to scale. Follow dimensions.
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec. 206.

Corresponds to the border of the standard drawing for ease in moving alternate details (Snap to corner)

Dimensions are based on end units; except AA is based on Unit  1. Fill heights are measured from the top of top slab to the top of earth fill or roadway.

### Fill Heights

<table>
<thead>
<tr>
<th>Location</th>
<th>Design (Units 1 &amp; 2)</th>
<th>Design (Units 3 &amp; 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rdwy at Culvert</td>
<td>ft</td>
<td>ft</td>
</tr>
</tbody>
</table>

### Estimated Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Final</th>
<th>Temporary Shoring</th>
<th>Partial Removal of Culvert-Bridge Concrete</th>
<th>Reinf. Steel (Culverts-Bridge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A Excavation</td>
<td>cu. yard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class B-1 Concrete (Culverts-Bridge)</td>
<td>cu. yard</td>
<td>lump sum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial Removal of Culvert-Bridge Concrete</td>
<td>cu. yard</td>
<td>lump sum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridge)</td>
<td>pound</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Plan of Layout Dimensions

**Notes:**

- Substitute table for tables shown on Standard Plan 703.87

**Legend:**

- A = Total length normal to Rdwy or Median
- A + B = Total length normal to Rdwy or Median
- A + C = Total length normal to Rdwy or Median

**Transverse Joints and Stage Construction:**

- Remove if not applicable

**Granular Backfill Limits:**

- Flow
- Tie Station
- Rdwy or Median

**Barrel Length:**

- Granular Backfill Limits

**Granular Backfill Limits:**

- Flow
- Tie Station
- Rdwy or Median

**PLAN OF TRANSVERSE JOINTS AND STAGE CONSTRUCTION:**

- Remove if not applicable

**Estimated Quantities for Culvert Extensions or when five items are Required**
Standard Drawing Guidance
Do not show on plans. Turn off Bridge Construction level to hide.

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press <Ctrl> U.

1 Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2 Modify Estimated Quantities as required. Don’t leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item to be added during construction. See Alternate Details for culvert extensions, or if five items are required.

3 Add any required transverse joints proportionally spaced along the barrel. Label and add actual lengths of units along the barrel.

4 Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data using notes where space allows, or use tab es.

5 For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

6 No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after “Rdwy” and insert another row for the other lane.

*** VARIABLE DESIGN FILL HEIGHTS ***

Select and delete the details grouped with the Fill Heights table. Select and move the alternate grouped details to drawing.

Place “See Member Thickness table” in the Equation column and place “Varies” in the Dim. column. If Dimension F varies, place “Varies” in the Dim. column.

Ex: Use 0.5 detail for 36” pipe into a 6’ tall culvert.

Ex: Use 0.5 detail for 36” pipe into a 6’ tall culvert.

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX” Pipe Inlet Data

Station Offset E. L. Elev.

Pipes With Different Diameters

Pipe Inlet Data

Station Offset Dia. F. L. Elev.

Supplemental Reinforcement Table (Nonstandard Culverts with only one design fill height)

Top Slab Reinforcement

Bottom Slab Reinforcement

Wall Reinforcement

Pipes With Same Diameter

XX” Pipe Inlet Data

Station Offset E. L. Elev.

Pipes With Different Diameters

Pipe Inlet Data

Station Offset Dia. F. L. Elev.

Supplemental Pipe Inlet Details

Alternate Plan of Transverse Joints

XX” Pipe Inlet Data

Station Offset E. L. Elev.

Pipes With Different Diameters

Pipe Inlet Data

Station Offset Dia. F. L. Elev.

Supplemental Pipe Inlet Details

Alternate Plan of Transverse Joints

XX” Pipe Inlet Data

Station Offset E. L. Elev.

Pipes With Different Diameters

Pipe Inlet Data

Station Offset Dia. F. L. Elev.

Supplemental Pipe Inlet Details

Alternate Plan of Transverse Joints

XX” Pipe Inlet Data

Station Offset E. L. Elev.

Pipes With Different Diameters

Pipe Inlet Data

Station Offset Dia. F. L. Elev.
Construction joint may not be shown for clarity, see standard plans for details. If any part of the barrel is exposed, the roadway fill shall be warped to clarity, see standard plans for details.

Top of earth fill or roadway. Fill heights are measured from the top of top slab to the top of earth fill or roadway.
Standard Drawing Guidance
Do not show on plans. Turn off the Bridge Construction level to hide.

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press <Ctrl> U.

1. Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2. Modify Estimated Quantities as required. Don’t leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item to be added during construction. See Alternate Details for culvert extensions, or if five items are required.

3. Add any required transverse joints proportionally spaced along the barrel. Label units and add actual lengths of units along the barrel.

4. Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data using notes where space allows, or use tables.

5. For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

6. No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after & Rdwy and insert another row for the other lane.

7. Substitute table for tables shown on Standard Plan 703.87.

BXC08_tri_la_str
Guidance & Alternate Details (1 of 2)

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Alternate Plan of Transverse Joints

Pipes With Same Diameter

XX" Pipe Inlet Data

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Alternate Plan of Transverse Joints

Pipes With Same Diameter

XX" Pipe Inlet Data

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Alternate Plan of Transverse Joints

Pipes With Same Diameter

XX" Pipe Inlet Data

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Alternate Plan of Transverse Joints

Pipes With Same Diameter

XX" Pipe Inlet Data

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Alternate Plan of Transverse Joints

Pipes With Same Diameter

XX" Pipe Inlet Data

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Alternate Plan of Transverse Joints

Pipes With Same Diameter

XX" Pipe Inlet Data

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Alternate Plan of Transverse Joints

Pipes With Same Diameter

XX" Pipe Inlet Data

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Pipe Inlet Details

Pipes With Same Diameter

XX* Pipe Inlet Data

Inlets Sized for Elevation A-A (Pipe Diameter/Culvert HT)

Supplemental Pipe Inlet Details

Pipes With Different Diameters

Pipe Inlet Data

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.
If any part of the barrel is exposed, the roadway fill shall be warped to provide at least 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity. See standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

#### PLAN OF TRANSVERSE JOINTS AND STAGE CONSTRUCTION

**Detail A**

- **20"**
- **H**
- **H**
- **T**
- **X**
- **H**
- **H**
- **3"**
- **F**
- **S**
- **5"**
- **18"**
- **T**
- **I**
- **T**
- **X**
- **18"**
- **T**
- **O**
- **X**
- **G**
- **G**
- **Granular Backfill Limits**
- **Granular Backfill Limits**

**PLAN OF LAYOUT DIMENSIONS**

- **W = Total length normal to Roadway or Median**
- **E = Total length along Culvert**

**Fill Heights**

- **18" Rdwy at 1 Culvert = ft**
- **Design (Units 1 & 1) = ft**
- **Design (Units 2 & 1) = ft**
- **Design (Units 3 & 1) = ft**

**Estimated Quantities**

- **Class A Excavation**
- **Class B-1 Concrete (Culverts-Bridge)**
- **Reinforcing Steel (Culverts-Bridge)**
- **Partial Removal of Culvert-Bridge Concrete**
- **Temporary Shoring**
- **Temp. Steel (Culverts-Bridge)**
- **Concrete or Barreled Concrete**
- **Steel Placing**

**Alternate Estimated Quantities**

- **Alternate Estimated Quantities for Culvert Extensions when None of the Items are Required**

**Dimensions are based on end units, except AA is based on Unit. Fill heights are measured from the top of top slab to the top of earth fill or roadway.**

**Unit No.**

- **18" Rdwy at 1 Culvert**
- **Design (Units 1 & 1)**
- **Design (Units 2 & 1)**
- **Design (Units 3 & 1)**

| Unit No. | Unit Length | Member Thickness | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|          |             |                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**Substitute table for tables shown on Standard Plan 703-B7**

**Guidance & Alternate Details (2 of 2)**

Corresponds to the border of the standard drawing for ease in moving alternate details (Snap to corner).
Hydrologic Data

Stream Area = [ft²]
Average Annual Discharge = [cfs]
Design Flood (100-year) = [cfs]
Overtopping Flood Frequency = [years]
Overtopping Flood Elevation = [ft]
Base Flood Discharge = [cfs]
Base Flood Elevation = [ft]
Design Flood Discharge = [cfs]
Design Flood Frequency = [years]
Drainage Area = [mi²]

General Notes:

Design Specifications:
2010 AASHTO LRFD Bridge Design Specifications and 2015 Interim Revisions
Design Loading:
2010 AASHTO LRFD Bridge Design Specifications
Design Unit Stresses:
Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

Concrete:
Class B-1 Concrete (Culverts-Bridge) f'c = 4,000 psi
Reinforcing Steel (Grade 60) fy = 60,000 psi

Standard Plans:
2010 AASHTO LRFD Bridge Design Specifications

Removal of Bridges
Bridges shall be removed in the following order:
1. Deck
2. Piers
3. Foundations

Miscellaneous:
MISSOURI HIGHWAYS AND TRANSPORTATION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
Standard Drawing Guidance

Some details are grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press Ctrl+G.

- Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

- Modify Estimated Quantities as required. Don't leave blank rows but leave space between Estimated Quantities and Design. Use of all inlet dimensions must be added as needed for culvert extensions, or if five items are required.

- Add any required transverse joints proportionately spaced along the barrel. Label the station and actual lengths of units along the barrel.

- Pipes with the same diameter should be entered in a single row. Note: Use of all available spaces is recommended.

- Pipes with different diameters should be entered in separate rows. Note: Use of all available spaces is recommended.

- Top Slab Reinforcement

- Bottom Slab Reinforcement

- Wall Reinforcement

- Substitute table for tables shown on Standard Plan 703.87

- For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

- No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after Ki Rdwy and insert another row for the other lane.

- Top Slab Reinforcement

- Bottom Slab Reinforcement

- Wall Reinforcement

- Substitute table for tables shown on Standard Plan 703.87
If any part of the barrel is exposed, the roadway fill shall be warped to clear visibility, see standard plans for details.

Construction joint key not shown for Culvert (Typ.)

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Construction joint key not shown for Culvert (Typ.)

Granular Backfill Limits

Notes:
- This drawing is not to scale. Follow dimensions.
- Dimensions are based on end units.
- Dimensions are measured from the top of top slab to the top of earth fill or roadway.
- Dimensions are based on end units.
- Dimensions are measured along the shortest wall shall be 3 feet.
- Reinforcement and dimensions for wings and headwalls shall be maintained on during construction. See roadway plans for traffic control.
- General Notes:
  - Design Specifications:
    - Design Loading: Roadway Overtopping
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Flood Frequency = ___ years
      - Design Flood Discharge = ___ cfs
      - Design Overtopping Flood Discharge = ___ cfs
    - Design Centerline Elevation = ___ ft
    - Design Backwater = ___ ft

  - Design Unit Stresses:
    - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
    - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

  - Design Specifications:
    - Design Loading: Roadway Overtopping
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Flood Frequency = ___ years
      - Design Flood Discharge = ___ cfs
      - Design Overtopping Flood Discharge = ___ cfs
    - Design Centerline Elevation = ___ ft
    - Design Backwater = ___ ft

  - Design Unit Stresses:
    - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
    - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

  - Design Specifications:
    - Design Loading: Roadway Overtopping
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Flood Frequency = ___ years
      - Design Flood Discharge = ___ cfs
      - Design Overtopping Flood Discharge = ___ cfs
    - Design Centerline Elevation = ___ ft
    - Design Backwater = ___ ft

  - Design Unit Stresses:
    - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
    - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

  - Design Specifications:
    - Design Loading: Roadway Overtopping
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Flood Frequency = ___ years
      - Design Flood Discharge = ___ cfs
      - Design Overtopping Flood Discharge = ___ cfs
    - Design Centerline Elevation = ___ ft
    - Design Backwater = ___ ft

  - Design Unit Stresses:
    - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
    - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

  - Design Specifications:
    - Design Loading: Roadway Overtopping
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Flood Frequency = ___ years
      - Design Flood Discharge = ___ cfs
      - Design Overtopping Flood Discharge = ___ cfs
    - Design Centerline Elevation = ___ ft
    - Design Backwater = ___ ft

  - Design Unit Stresses:
    - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
    - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

  - Design Specifications:
    - Design Loading: Roadway Overtopping
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Flood Frequency = ___ years
      - Design Flood Discharge = ___ cfs
      - Design Overtopping Flood Discharge = ___ cfs
    - Design Centerline Elevation = ___ ft
    - Design Backwater = ___ ft

  - Design Unit Stresses:
    - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
    - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf

  - Design Specifications:
    - Design Loading: Roadway Overtopping
      - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
      - Design Flood Frequency = ___ years
      - Design Flood Discharge = ___ cfs
      - Design Overtopping Flood Discharge = ___ cfs
    - Design Centerline Elevation = ___ ft
    - Design Backwater = ___ ft

  - Design Unit Stresses:
    - Equivalent Fluid Pressure = 30 lb/cf (min.), 60 lb/cf (max.)
    - Vehicular = HL-93 minus lane load, Earth = 120 lb/cf
Standard Drawing Guidance

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press <Ctrl> U.

1. Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2. Modify Estimated Quantities as required. Don't leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item to be added during construction. See Alternate Details for culvert extensions, or if five items are required.

3. Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data using notes where space allows, or use tables.

4. For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

5. No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after ‘Rdwy’ and insert another row for the other lane.

6. Substitute table for tables shown on Standard Plan 703.87.
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Construction joint key not shown for clarity, see standard plans for details.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Dimensions are based on end units, except AA is based on Unit . Fill heights are measured from the top of top slab to the top of earth fill or roadway.

Remove if not applicable.

<table>
<thead>
<tr>
<th>Table for Multiple Items (2 of 2)</th>
<th>Estimated Quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 4 Excavation</td>
<td>1 unit</td>
</tr>
<tr>
<td>Class B-1 Concrete (Culverts-Bridge)</td>
<td>1 unit</td>
</tr>
<tr>
<td>Reinforcing Steel (Culverts-Bridge)</td>
<td>1 unit</td>
</tr>
</tbody>
</table>

Finite

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Construction points are not shown for clarity. See standard plans for details.

If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

**Granular Backfill Limits**
- If unsuitable material is encountered, excavation of unsuitable material shall be in accordance with Sec 206.
- Furnishing and placing of granular backfill shall be in accordance with Sec 206.

**Hydrologic Data**
- **Drainage Area:**...
- **Design Flood Discharge:**...
- **Design Flood (Q.P.) Elevation:**...
- **Eve Flood Elevation:**...
- **Estimated Backwater:**...
- **Outlet Velocity:**...
- **Overlapping Flood Discharge:**...
- **Overlapping Flood Elevation:**...

**Elevations**
- **Fill Heights**
  - Upstream (Elev. 1) =...
  - Downstream (Elev. 2) =...

**Estimated Quantities**

**General Notes:**
- **Design Specifications:**
  - **2010 AASHTO LRFD Bridge Design Specifications**
  - **2010 Design Specifications:**

**Miscellaneous:**
- **Reinforcement and dimensions for wings and headwalls shall:**
- **Conveyance and openings for wings and headwalls shall:**

**Traffic Handling:**
- **When advance notice concrete box sections are used:**
- **When advance notice concrete box sections are used:**

**Design Loading:**
- **Vehicular:** HL-93 minus lane load, Earth = 120 lb/cf
- **Earth:** HL-93 minus lane load, Earth = 120 lb/cf

**Reinforcing Steel (Culverts-Bridge) f'c = 4,000 psi**

**Design (All units) =**...

**DATE PREPARED: 10/13/2023**
**COMMISSIONER:**
**PROJECT NO.:**
**BRIDGE NO.:**
**COUNTY:** MO
**SHEET NO.:**
**DATE:**
**LOCATION SKETCH:**

**CONTRACT ID.:**

**PLAN OF LAYOUT DIMENSIONS**

**LOCATION SKETCH**

**DESIGNED**

**CHECKED**

**Note:** This drawing is not to scale. Follow dimensions.
**Standard Drawing Guidance**

(Do not show on plans. Turn off the Bridge Construction level to hide)

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press Ctrl U.

a) Station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

b) Modify estimated quantities as required. Do not leave blank rows. Leave space between estimated quantities in alternate details. Do not use cross-entries during construction. See Alternate Details for culvert extensions, or if five items are required.

c) Add any required transverse joints proportionally spaced along the barrel. Label units and add actual lengths of units along the barrel.

d) Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data using notes where space allows, or use tables.

e) For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

f) We need to revise General Elevation A-A for dual roadways. In Fill Heights table add a new designation after C and insert another row for the other lane.

g) For skews 20 degrees or more, remove Detail C, remove TT from equation for D and place "NA" in the Dim. column of Dimension TT. Will first need to separate Detail C from Plan by selecting and pressing Ctrl U.

---

**Variables Design Fill Heights**

c) Remove blank rows. End units may have different design fill heights but both units need to have the same member thicknesses.

b) Place "See Member Thickness table" in the Equation column and place "Varies" in the Dim. column. If Dimension F varies, place "Varies" in the Dim. column.

---

**Supplemental Pipe Inlet Details**

XX" Pipe Inlet Data

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>Culvert Ht</th>
</tr>
</thead>
<tbody>
<tr>
<td>xx+xx.xx</td>
<td>xxx.xx</td>
<td>xx.xx' XX</td>
</tr>
</tbody>
</table>

**Supplemental Reinforcement Table (Nonstandard culverts with only one design fill height)**

<table>
<thead>
<tr>
<th>Top Slab Reinforcement</th>
<th>Bottom Slab Reinforcement</th>
<th>Wall Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spa. Sz. J3 Bars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spa. Sz. A1 Bars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spa. Sz. C1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spa. Sz. Q8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spa. Sz. C5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spa. Sz. Q9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spa. Sz. C6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Alternate Plan of Transverse Joints**

<table>
<thead>
<tr>
<th>Station</th>
<th>Offset</th>
<th>F.L. Elev.</th>
<th>Dia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>xx+xx.xx</td>
<td>xxx.xx</td>
<td>xx.xx' XX</td>
<td>xx&quot;</td>
</tr>
<tr>
<td>xx+xx.xx</td>
<td>xxx.xx</td>
<td>xx.xx' XX</td>
<td>xx&quot;</td>
</tr>
</tbody>
</table>
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimal cover. (Roadway Item)

If unstable material is encountered, excavation of unstable material and backfilling and placing of granular backfill shall be in accordance with Sec. 266

### General Elevation A-A

#### Drainage Area

- **Drainage Area =** $m^2$
- **Base Flood Discharge =** $ft^3/s$
- **Design Flood Discharge =** $ft^3/s$
- **Base Flood Discharge =** $ft^3/s$
- **Overall Elevation =** $ft$
- **Design Flood Discharge =** $ft^3/s$
- **Estimated Backwater =** $ft$
- **Waves Velocity =** $ft/s$
- **Estimating Crossing =** $ft$
- **Overlapping Flood Discharge =** $ft^3/s$
- **Minimum Flood Elevation =** $ft$

### Layout Dimensions

<table>
<thead>
<tr>
<th>Section</th>
<th>Equation</th>
<th>Dim.</th>
<th>Equation</th>
<th>Dim.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>$x$</td>
<td>$y$</td>
<td>$z$</td>
<td>$w$</td>
</tr>
<tr>
<td>1</td>
<td>$x$</td>
<td>$y$</td>
<td>$z$</td>
<td>$w$</td>
</tr>
<tr>
<td>2</td>
<td>$x$</td>
<td>$y$</td>
<td>$z$</td>
<td>$w$</td>
</tr>
<tr>
<td>3</td>
<td>$x$</td>
<td>$y$</td>
<td>$z$</td>
<td>$w$</td>
</tr>
</tbody>
</table>

### Hydrologic Data

- **Drainage Area:** $m^2$
- **Base Flood Discharge:** $ft^3/s$
- **Design Flood Discharge:** $ft^3/s$
- **Base Flood Discharge:** $ft^3/s$
- **Overall Elevation:** $ft$
- **Estimated Backwater:** $ft$
- **Waves Velocity:** $ft/s$
- **Estimating Crossing:** $ft$
- **Overlapping Flood Discharge:** $ft^3/s$
- **Minimum Flood Elevation:** $ft$

### Elevation

- **Upstream Elevation:** $ft$
- **Fill Height at Culvert:** $ft$
- **Design (As-Installs):** $ft$
- **Note:** This drawing is not to scale. Follow dimensions.

### Estimated Quantities

- **Fill:** $cu. yard$
- **Bases of Culvert:** $cu. yard$
- **Concrete (Culverts):** $cu. yard$
- **Reinforcing Steel (Culverts):** pounds

### General Notes:

- **Design Specifications:**
  - **Roadway & Median: Class 4 Excavation**
  - **Culverts:** Class B-1 Concrete (Box Culvert) $f'_c = 4,000$ psi
  - **Flow:** $V(tan Z)/2$
  - **Background:** $3'' + TX[tan Z]$
  - **Warped Fill:** $2A + B + C + D + E + SS$
  - **Granular Backfill Limits:** $HT + TS - 12''$
  - **Precast Concrete Box:** $AA + BB + CC + DD + EE$
  - **Outlet Velocity:** $20''$
  - **Estimated Backwater:** $20''$
  - **Streamline:** $F(tan Z)/2$
  - **Flow (in) =** $3''[cos Z]$
  - **Design Flood (D.F.) Elevation:** $_____$
  - **Design Flood Frequency:** $___$ years
  - **Drainage Area:** $___$ mi

- **FINAL**
  - **Roadway Overtopping:** $_____$
  - **Base Flood Discharge:** $_____$
  - **Estimated Backwater:** $_____$
  - **Outlet Velocity:** $_____$

- **Interim Revisions**
  - **State:** TX
  - **Project:** 105 WEST CAPITOL
  - **Commission:** 1-888-ASK-MODOT (1-888-275-6636)
Standard Drawing Guidance

(Do not show on plant. Turn off the Bridge Construction level to hide)

Some details have been grouped together to allow easy substitution with alternate details. To edit grouped details, select them and press Ctrl-U.

1 Ahead station is shown for streams flowing left to right. Arrow must be flipped for streams that flow right to left.

2 Modify Estimated Quantities as required. Don't leave blank rows but leave space between Estimated Quantities and General Notes for at least one pay item to be added during construction. See Alternate Details for culvert extensions, or if five items are required.

3 Add any required transverse joints proportionally spaced along the barrel. Label units and add actual lengths at units along the barrel.

4 Insert STD 703.60 when pipe inlets are required. Add pipe inlets to Plan of Layout Dimensions at appropriate locations and to Elevation A-A if visible from elevation. Add inlet data using notes where space allows, or use tables.

5 For nonstandard culverts with only one design fill height, add supplemental reinforcement table.

6 No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after Rdwy and insert another row for the other lane.

7 For skews 20 degrees or more, remove Detail C and insert detail for 0.1 Rdwy. Will first need to separate Detail C from Plan by selecting and pressing Ctrl-U.

8 No need to revise General Elevation A-A for dual roadways. In Fill Heights table add a lane designation after Rdwy and insert another row for the other lane.

** VARIABLE DESIGN FILL HEIGHTS **

Select and delete the details grouped with the Fill Heights table. Select and move the alternate grouped details to drawing.

Place "See Member Thickness Table" in the Equation column and place "Varies" in the Dim. column. If Dimension F varies, place "Varies" in the Dim. column.

Ex: Use 0.5 detail for 36" pipe into a 6' tall culvert.

Substitute table for tables shown on Standard Plan 703.87

---

Sheet 1 of 2
If any part of the barrel is exposed, the roadway fill shall be warped to provide 12 inches minimum cover. (Roadway Item)

Dimensions are based on end units, except AA is based on unit fill heights are measured from the top of top slab to the top of earth fill or roadway.

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

Estimate Quantities: Final

- Class 4 Excavation
- Partial Removal of Culvert-Bridge Concrete
- Reinforcing Steel (Culverts-Bridge)

Partial Removal of Culvert-Bridge Concrete

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Class 4 Excavation</th>
<th>Partial Removal of Culvert-Bridge Concrete</th>
<th>Reinforcing Steel (Culverts-Bridge)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cu yard</td>
<td>lump sum</td>
<td>pound</td>
</tr>
</tbody>
</table>

Replace table for tables shown on Standard Plan 703 #7

Substitute table for tables shown on Standard Plan 703 #7

Remove if not applicable

Alternate Estimated Quantities for Culvert Extensions or Required

Alternate Details for Multiple Design Fill Heights

Corresponds to the border of the standard drawing for ease in moving alternate details (Snap to corner)
**General Notes:**

Furnishing and installing posts and guardrail on culvert as shown on this sheet will be considered completely covered by the contract unit price for Bridge Guardrail (W-Beam) Bridge Guardrail (Thrie Beam) other items.

Furnishing and installing posts and guardrail on culvert shall be in accordance with Sec 606 except as shown.

Rail posts shall be seated on elastomeric pads having the same dimensions as the post base plate and 0.125" thickness. Such pads may be any elastomeric material, plain or fibered, having a hardness (Durometer) of 50 or above, as certified by the manufacturer. Additional pads or half pads may be used in shimming for alignment. Post heights shown will increase by the thickness of the pad.

Posts and base plates shall be fabricated from ASTM A709 Grade 36 steel and galvanized.

Fabrication of structural steel shall be in accordance with Sec 1080.

The contractor shall use one of the qualified resin anchor systems in accordance with Sec 1039.

Cost of furnishing and installing the resin anchor systems, complete in place, will be considered completely covered by the contract unit price for these systems.

The minimum embedment depth in concrete with $f'c = 4,000$ psi for the resin anchor systems shall be that required to meet the minimum ultimate pullout strength in accordance with Sec 1039 but shall not be less than 5".

See Missouri Standard Plans drawing 606.00 for details not shown.
General Notes:

- Furnishing and installing posts and guardrail on culvert as shown on this sheet will be considered completely covered by the contract unit price for Bridge Guardrail (W-Beam) Bridge Guardrail (Thrie Beam) other items.
- Furnishing and installing posts and guardrail on culvert shall be in accordance with Sec 606 except as shown.
- Rail posts shall be seated on elastomeric pads having the same dimensions as the post base plate and 1/16" thickness. Such pads may be any diatomite-based material, plain or fibered. Nailing or gluing the pad to the post is not required. The pad shall be capable of supporting the post and shall be in accordance with the manufacturer. Additional pads or half pads may be used in shimming for alignment. Post heights shown will increase by the thickness of the pad.
- Posts and base plates shall be fabricated from ASTM A36 Grade 36 steel and galvanized.
- Fabrication of structural steel shall be in accordance with Sec 606.
- Holes for ASTM A307 bolts may be drilled into the culvert. See slab sheet for rail post spacing.

See Missouri Standard Plans drawing 606.00 for details not shown.

Use this detail when required to connect rail post to culvert slab.

Additional pads or half pads may be used in shimming for alignment. Post heights shown will increase by the thickness of the pad.

Parts and base plates shall be fabricated from ASTM A36 Grade 36 steel and galvanized.

Fabrication of structural steel shall be in accordance with Sec 606.

Holes for ASTM A307 bolts may be drilled into the culvert.

See slab sheet for rail post spacing.

General Notes:

- Designed for AASHTO LTD.
- Not designed for AASHTO LRFD.
- Not crash tested.
- Comparable to TL-2 (MARP 556) deck-mounted (top) post and rail system: Texas TSB, Texas Type B

Uncertified AHD analysis shows:

- 1/3" Post

Guardrail (W-Beam) Design Requirements for TL-2

1/3" Post Spacing max
Single Rail
2" Post and Plate

Thrie Beam Design Requirements for TL-2

1/3" Post Spacing max
Single Rail
2" Post and Plate

Detail B

Top of Box Culvert

PART SECTION AT RAIL POST

SECTION A-A

Detail B

Not: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):
Remove all details shown that are not applicable to project.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):

Check wall thickness to see if existing and new matches. If different, see SPM.

SPM to have design checked before using details.

SPM could use wing beam design to possibly eliminate all removals.

General Notes:

For details of Transverse Joint, see Missouri Standard Plans.

When the Headwall is removed, the top slab A-Bars and F-Bars shall lap the existing bars a minimum of 2'-0".
GENERAL NOTES:

Anchor bolts for Type C bearings shall be 1" Ø ASTM F1554 Grade 55 swaged bolts, with no heads or nuts and shall extend 15" into the concrete. Swaging shall be 1" less than the extension into the concrete. Anchor bolts shall be grouted in the drilling holes or anchor bolt wells and grouted prior to the erection of steel. The top of anchor bolts shall be set approximately 1/4" below the top of bearing.

Anchor bolts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry thickness of 4 mils minimum, 6 mils maximum, galvanized in accordance with Sec 101.

Weight of the anchor bolts for bearings are included in the weight of the Fabricated StructuralSteel.

Note: This drawing is not to scale. Follow dimensions.

ANCHOR BOLTS

Anchor bolts shall be 1" Ø ASTM F1554 Grade 55 swaged bolts, with no heads or nuts, and shall extend 15" into the concrete. Swaging shall be 1" less than the extension into the concrete.anchor bolts shall be grouted in the drilling holes or anchor bolt wells and grouted prior to the erection of steel. The top of anchor bolts shall be set approximately 1/4" below the top of bearing.

Anchor bolts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry thickness of 4 mils minimum, 6 mils maximum, galvanized in accordance with Sec 101.

Weight of the anchor bolts for bearings are included in the weight of the Fabricated Structural Steel.

Note: This drawing is not to scale. Follow dimensions.
GENERAL NOTES:

Anchor bolts for Type D Bearings shall be Ø ASTM F1554 Grade 55 swaged bolts and shall extend into the concrete with ASTM A578 Grade A Heavy Hex nuts. Actual manufacturer’s certified mill test reports (chemical and mechanical) shall be provided. Use ASTM F1612 hardened washers for the expansion bearings. Wedging shall be 1 in. less than extension into the concrete.

Anchor bolts, hardened washers and heavy hex nuts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Sec 1081.

Weight of the anchor bolts, hardened washers and heavy hex nuts for bearings are included in the weight of the Fabricated Structural Steel.

Shop drawings are not required for the lead plates and the preformed fabric pads.

Anchor bolts for Type D bearings shall be Ø ASTM F1554 Grade 55 swaged bolts and shall extend into the concrete with ASTM A578 Grade A Heavy Hex nuts. Actual manufacturer’s certified mill test reports (chemical and mechanical) shall be provided. Use ASTM F1612 hardened washers for the expansion bearings. Wedging shall be 1 in. less than extension into the concrete.

Anchor bolts, hardened washers and heavy hex nuts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Sec 1081.

Weight of the anchor bolts, hardened washers and heavy hex nuts for bearings are included in the weight of the Fabricated Structural Steel.

Shop drawings are not required for the lead plates and the preformed fabric pads.

Details for 3/8"Ø thru 2 1/2"Ø anchor bolts

Optional details for 1 3/8"Ø thru 2 1/2"Ø anchor bolts

Swedge anchor bolts details

Note: This drawing is not to scale. Follow dimensions.
GENERAL NOTES:

Anchor bolts for Type E bearings shall be Ø ASTM F1554 Grade 55 swedged bolts and shall extend into the concrete with ASTM A325 Grade A heavy hex nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Use ASTM A563 Grade A Heavy hex nuts or hardened washers for the expansion bearings. Swedging shall be 1" less than extensions into the concrete.

Anchor bolts, hardened washers and heavy hex nuts shall be coated with a minimum of two coats of inorganic zinc 30-micron thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Sec. 1081. Weight of the anchor bolts, hardened washers and heavy hex nuts for bearings are included in the weight of the Fabricated Structural Steel.

Indicates machine finish surface.

A lubricant coating shall be applied in the shop to both mating surfaces of the bearing assembly. The lubricant, method of cleaning, and application shall meet the requirements of MIL-L-23398 and MIL-L-46147. The coated areas shall be protected for shipping and erection.

Shop drawings are not required for the lead plates and the preformed fabric pads.

anchor bolts for Type E bearings shall be Ø ASTM F1554 Grade 55 swedged bolts and shall extend into the concrete with ASTM A325 Grade A heavy hex nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Use ASTM A563 Grade A Heavy hex nuts or hardened washers for the expansion bearings. Swedging shall be 1" less than extensions into the concrete.

Anchor bolts, hardened washers and heavy hex nuts shall be coated with a minimum of two coats of inorganic zinc 30-micron thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Sec. 1081. Weight of the anchor bolts, hardened washers and heavy hex nuts for bearings are included in the weight of the Fabricated Structural Steel.

Indicates machine finish surface.

A lubricant coating shall be applied in the shop to both mating surfaces of the bearing assembly. The lubricant, method of cleaning, and application shall meet the requirements of MIL-L-23398 and MIL-L-46147. The coated areas shall be protected for shipping and erection.

Shop drawings are not required for the lead plates and the preformed fabric pads.

Number Required:

Type E Bearings

(1) for 3/4" Ø anchor bolts
(1) for 1 3/8" Ø anchor bolts

Note: This drawing is not to scale, follow dimensions.
ELEVATION OF GALVANIZED STEEL STOPPER PLATE

PLAN OF GALVANIZED STEEL STOPPER PLATE

PART PLAN SHOWING STOPPER PLATE

STOPPER PLATE

Steel stopper plate (all galvanized) shall be provided to prevent upward movement of beam (striped) when beam is fully supported. Stopper plate and straps shall be provided to prevent movement of beam (striped) due to slipping of PTFE bearing. Stopper plates and straps will be considered completely covered by the contract unit price for Type N PTFE Bearing.

GENERAL NOTES:

- Design coefficient of friction equals 0.06.
- Anchor bolts shall be # ASTM A574 Grade 55 swedged bolts and shall extend into the concrete with ASTM A595 Grade A heavy hex nut. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Sweding shall be 1" less than extension into the concrete.
- Anchor bolts shall be Ø ASTM F1554 Grade 55 swedged bolts and shall extend into the concrete with ASTM A563 Grade A Heavy Hex nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Sweding shall be 1" less than extension into the concrete.
- Anchor bolt shall be at the centerline of slotted hole at 60°F. Bearing position shall be adjusted for each 10°F fall or rise in temperature at installation.
- Anchor bolts and heavy hex nuts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 6 mils minimum. 8 mils maximum, or galvanized in accordance with Sec 1081.

Neoprene Elastomeric Pads shall be 10 Diameter.

Structural splice: for splice plate(s) be ASTM A490 Grade and shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 6 mils minimum. 8 mils maximum. The stainless steel plate shall be protected from any coating.

Type N PTFE Bearings shall be in accordance with Sec 716.

PTFE surface shall be fabricated as a single piece. Splicing will not be permitted.

Note: This drawing is not to scale, follow dimensions.
**Neoprene Elastomeric Pad**

- Bond Polytetrafluoroethylene (PTFE) to neoprene elastomeric pad, then to neoprene elastomeric pad.

**General Notes:**

- Design coefficient of friction equals 0.06.
- Anchor bolts shall be ASTM F1554 Grade 55 swedged bolts and shall extend into the concrete with ASTM A563 Grade A Heavy Hex Nuts. Actual minimum embedment shall be adjusted for each 10°F fall or rise in temperature at installation.
- Anchor bolts shall be at the centerline of slotted hole at 60°F. Bearing position shall be adjusted for each 10°F fall or rise in temperature at installation.
- Anchor bolts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Sec 1081.
- Neoprene Elastomeric Pads shall be 50 Durameter.
- Structural steel for sole plate shall be ASTM A709 Grade 36 and shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum. The stainless steel plate shall be protected from any coating.
- Type N PTFE Bearings shall be in accordance with Sec 716.
- PTFE surface shall be fabricated as a single piece. Splicing will not be permitted.

---

**PTFE Sliding Bearings**

<table>
<thead>
<tr>
<th>NO.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>Number of Shim Plates</th>
<th>Number Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The required shim plate shall be placed between layers of elastomer and molded together to form an integral unit.

---

**Type N PTFE Bearings**

---

**General Notes:**

1. Use note MO 29.1 with Grade 50 Steel.
2. Use note MO 29.2 when steel superstructure is galvanized.
3. Remove underlined portion when steel superstructure is galvanized.

---

**Elevation of Galvanized Steel Stopper Plate**

Stopper plates and straps shall be provided to prevent loss of support due to creeping of PTFE bearings. Stopper plates and straps shall be welded to the sole plate and neoprene bearing pad.

---

**Standard Drawing Guidance:**

1. Use note MO 29.1 with Grade 50 Steel.
2. Use note MO 29.2 when steel superstructure is galvanized.
3. Remove underlined portion when steel superstructure is galvanized.
**GENERAL NOTES:***

Anchor bolts shall be Ø ASTM F1554 Grade 55 swedged bolts and shall extend into the concrete in ASTM A563 Grade A Heavy Hex nuts. Actual manufacturer’s certified mill test reports (chemical and mechanical) shall be provided. Swedging shall be 1" less than extension into the concrete.

Anchor bolts and heavy hex nuts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, as galvanized in accordance with Sec 1081.

Neoprene Elastomeric Pads shall be Durometer.

Structural steel for sole plate shall be ASTM A709 Grade and shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 6 mils minimum, 8 mils maximum.

Laminated Neoprene Bearing Pad Assembly shall be in accordance with Sec 716.

---

**FIXED BEARINGS**

<table>
<thead>
<tr>
<th>REF.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>NUMBER OF SHIM PLATES</th>
<th>NUMBER REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The required shim plate shall be placed between layers of elastomer and molded together to form an integral unit.

---

**LAMINATED NEOPRENE BEARING PAD ASSEMBLY**

Note: This drawing is not to scale. Follow dimensions.
**GENERAL NOTES:**

Anchor bolts shall be Ø ASTM F1554 Grade 55 swedged bolts and shall extend into the concrete with ASTM A535 Grade A Heavy Hex nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Swedging shall be 1" less than extension into concrete. Anchor bolt shall be at the centerline of slotted hole at 60°F. Bearing position shall be adjusted after each 1½ fall or rise in temperature at installation.

Anchor bolts and heavy hex nuts shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mil minimum, 6 mil maximum, or galvanized in accordance with Sec 1081.

Neoprene Elastomeric Pads shall be Durometer.

Structural steel for sole plate shall be ASTM A709 Grade and shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mil minimum, 6 mil maximum.

Laminated Neoprene Bearing Pad Assembly shall be in accordance with Sec 716.

---

**EXPANSION BEARINGS**

| A | B | C | D | E | F | G | J | K | L | M | N | P | Q | R | SHIM PLATES | REQUIRED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

* The required shim plate shall be placed between layers of elastomeric and molded together to form an integral unit.

---

**LAMINATED NEOPRENE BEARING PAD ASSEMBLY**

Note: This drawing is not to scale. Follow dimensions.
DESCRIPTION OF MATERIALS:

**NEOPRENE ELASTOMERIC PAD**
- The bent cap is Top of pad elastomeric Neoprene x" (Min.)
- Layers of elastomer and molded together to form an integral unit.
- Neoprene Elastomeric Pad (bond to bearing seat with epoxy adhesive)
- Layers of 1/2" elastomer alternating with 11 gage or 1/8" shim plate (see table for number required)
- The required shim plate shall be placed between layers of elastomer and molded together to form an integral unit.

**FIXED BEARINGS**
- Anchor bolts shall be Ø ASTM F1554 Grade 55 swedged bolts and shall extend into the concrete with ASTM A563 Grade A heavy hex nuts. Actual manufacturer’s certified mill tests report for stainless steel and mechanical testing shall be provided. Swedging shall be 1" less than extension into the concrete.
- Anchor bolt shall be at the centerline of slotted hole at 60°F. Bearing bushings shall be adjusted for 1" for each 10°F fall or rise in temperature at installation.
- Anchor bolts and heavy hex nuts shall be coated with a minimum of two coats of zinc-rich prime to provide a total dry film thickness of 4 mils minimum & 6 mils maximum.
- Neoprene Elastomeric Pads shall be in accordance with Sec 1080.
- Structural steel for sole plate shall be ASTM A572 Grade 60 and shall be coated with a minimum of two coats of zinc-rich primary to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.
- The laminated neoprene bearing pad assembly shall be in accordance with Sec 1080.

**GENERAL NOTES:***
- Top of bent cap is Top of pad elastomeric Neoprene x" (Min.)
- The required shim plate shall be placed between layers of elastomer and molded together to form an integral unit.
- Neoprene Elastomeric Pad (bond to bearing seat with epoxy adhesive)
- Layers of 1/2" elastomer alternating with 11 gage or 1/8" shim plate (see table for number required)
- The required shim plate shall be placed between layers of elastomer and molded together to form an integral unit.

**CONTRIBUTIONS:**
- 105 West Capitol
- Jefferson City, MO 65102
- 1-888-ASK-MODOT (1-888-275-6636)
The bearing design shall conform to the provisions of the latest edition of AASHTO LRFD Bridge Design Specifications. The contractor, in coordination with the bearing manufacturer, shall be responsible for sizing the sole plate and masonry plate and determining the size, number, and location of anchor bolts based on the load and movement capacities, indicated in the Bearing Data Table.

The contractor shall submit calculations sealed by a Professional Engineer, licensed in the state of Missouri, indicating compliance with design requirements and criteria in the contract documents.

1. Maximum vertical dimension of the complete bearing. If the actual bearing dimensions differ, adjustments shall be made to the thickness of the sole plate, masonry plate and concrete pad as needed by the contractor at no additional cost to the owner. Contractor shall submit proposed method of adjustment to Engineer for approval.

2. Estimated horizontal dimension of the pot bearing device. If the actual dimension differs, adjust the size of the sole plate and masonry plate as needed by the contractor at no additional cost to the owner.

3. Maximum vertical dimension of the complete bearing. If the actual bearing dimensions differ, adjustments shall be made to the thickness of the sole plate, masonry plate and concrete pad as needed by the contractor at no additional cost to the owner. Contractor shall submit proposed method of adjustment to Engineer for approval.

4. The temperature of the steel adjacent to the elastomeric should be kept below 200°F.

The Dimension H in the Bearing Data Table represents the assumed total height of bearing mechanism between the sole plate and masonry plate used by the designer to establish the pedestal elevations.

The bearings shall be manufactured pot bearings, designed for the load and movement capacities indicated in the Bearing Data Table.

All expansion bearings shall have maximum friction coefficient of 4%. Steel for pot bearings shall be AASHTO M270 Grade 50 and shall be galvanized. Steel for sole plate and masonry plate shall be AASHTO M270 Grade 50.

Anchor bolts shall conform to ASTM F1554 Grade 55. The anchor bolts shall be the swedge-type and shall have a minimum diameter of 1.5 inches and a minimum length of two times the diameter plus 8 inches. The anchor bolts shall be 1 inch less than the extension into the concrete. Anchor bolts shall be installed using a hardened steel washer at each exposed location.

Washers shall conform to ASTM F463.

Anchor bolts and hardened washers shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Section 1081.

Certified mill test reports, conforming to the requirements of the specifications, for the metals of the pot bearing device, sole plate, masonry plate and anchor bolts shall be submitted.

The masonry plate shall be prepared per the specifications and shop-coated with two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The sole plate shall be prepared per the specifications and shop-coated with two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The bearing device, sole plate and masonry plate shall be assembled in the shop and the bearing assembly shall be field-welded to the bottom flange of the steel cap beam. The welds shall be designed for the load capacities indicated in the Bearing Data Table.

After installation of the bearings, any uncoated or damaged surfaces of the masonry and sole plates shall be field-coated with inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The surface of the masonry and sole plates shall be field-coated with System G intermediate and finish coat.

All bearings shall be marked prior to shipping. The marks shall include the bearing location on the bridge and a direction arrow that points up stream. All marks shall be permanent and be visible after the bearing is installed.

The pot bearing device, sole plate, masonry plate, anchor bolts, washers, anchor bolts washers and any other appurtenances included in the fabrication and installation of the pot bearing device shall be incidental to the project.

When jacking of the superstructure is needed to reset the bearings, the contractor shall submit a jacking sequence for approval.

GENERAL NOTES:

Steel for pot bearings shall be AASHTO M270 Grade 50 and shall be galvanized. Steel for sole plate and masonry plate shall be AASHTO M270 Grade 50.

Anchor bolts shall conform to ASTM F1554 Grade 55. The anchor bolts shall be the swedge-type and shall have a minimum diameter of 1.5 inches and a minimum length of two times the diameter plus 8 inches. The anchor bolts shall be 1 inch less than the extension into the concrete. Anchor bolts shall be installed using a hardened steel washer at each exposed location.

Washers shall conform to ASTM F463.

Anchor bolts and hardened washers shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Section 1081.

Certified mill test reports, conforming to the requirements of the specifications, for the metals of the pot bearing device, sole plate, masonry plate and anchor bolts shall be submitted.

The masonry plate shall be prepared per the specifications and shop-coated with two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The sole plate shall be prepared per the specifications and shop-coated with two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The bearing device, sole plate and masonry plate shall be assembled in the shop and the bearing assembly shall be field-welded to the bottom flange of the steel cap beam. The welds shall be designed for the load capacities indicated in the Bearing Data Table.

After installation of the bearings, any uncoated or damaged surfaces of the masonry and sole plates shall be field-coated with inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The surface of the masonry and sole plates shall be field-coated with System G intermediate and finish coat.

All bearings shall be marked prior to shipping. The marks shall include the bearing location on the bridge and a direction arrow that points up stream. All marks shall be permanent and be visible after the bearing is installed.

The pot bearing device, sole plate, masonry plate, anchor bolts, washers, anchor bolts washers and any other appurtenances included in the fabrication and installation of the pot bearing device shall be incidental to the project.

When jacking of the superstructure is needed to reset the bearings, the contractor shall submit a jacking sequence for approval.

GENERAL NOTES:

Steel for pot bearings shall be AASHTO M270 Grade 50 and shall be galvanized. Steel for sole plate and masonry plate shall be AASHTO M270 Grade 50.

Anchor bolts shall conform to ASTM F1554 Grade 55. The anchor bolts shall be the swedge-type and shall have a minimum diameter of 1.5 inches and a minimum length of two times the diameter plus 8 inches. The anchor bolts shall be 1 inch less than the extension into the concrete. Anchor bolts shall be installed using a hardened steel washer at each exposed location.

Washers shall conform to ASTM F463.

Anchor bolts and hardened washers shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with Section 1081.

Certified mill test reports, conforming to the requirements of the specifications, for the metals of the pot bearing device, sole plate, masonry plate and anchor bolts shall be submitted.

The masonry plate shall be prepared per the specifications and shop-coated with two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The sole plate shall be prepared per the specifications and shop-coated with two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The bearing device, sole plate and masonry plate shall be assembled in the shop and the bearing assembly shall be field-welded to the bottom flange of the steel cap beam. The welds shall be designed for the load capacities indicated in the Bearing Data Table.

After installation of the bearings, any uncoated or damaged surfaces of the masonry and sole plates shall be field-coated with inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum.

The surface of the masonry and sole plates shall be field-coated with System G intermediate and finish coat.

All bearings shall be marked prior to shipping. The marks shall include the bearing location on the bridge and a direction arrow that points up stream. All marks shall be permanent and be visible after the bearing is installed.

The pot bearing device, sole plate, masonry plate, anchor bolts, washers, anchor bolts washers and any other appurtenances included in the fabrication and installation of the pot bearing device shall be incidental to the project.

When jacking of the superstructure is needed to reset the bearings, the contractor shall submit a jacking sequence for approval.
CURB BLOCKOUT

SECTION THRU SAW CUT JOINT

(1) Use manufacturer's embedding length (minimum 12")

DETAILS OF RESIN ANCHORS

(1) The minimum embedment depth in concrete with f'c = 4,000 psi for the resin anchor system shall be that required to meet the minimum ultimate pullout strength in accordance with Sec 1056.

The minimum embedment depth in concrete with f'c = 4,000 psi for the resin anchor system shall be that required to meet the minimum ultimate pullout strength in accordance with Sec 1056.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Notes:
- Slip-formed option only.
- Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Curb Blockout.
- See End Post Detail
- Payment for concrete, reinforcement, resin anchor systems and any other work incidental to the curb blockout, complete in place, will be considered completely covered by the contract unit price for Curb Blockout per linear foot.
- Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.

Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans 617.10 for two-way traffic shall have retroreflective sheeting on both sides. Use a minimum lap of 3'-1" for #5 horizontal curb blockout bars.
2’-8” BLOCKOUT

SECTION THRU SAW CUT JOINT

PART ELEVATION OF CURB BLOCKOUT

SECTION A-A

SECTION B-B
These details are meant to be used as a starting point only. Modify as needed.

1. Taper front face as gradually as possible, while maintaining 6" minimum thickness of blockout at the end of the existing parapet. 2'-9" maximum taper length.

2. Holes may be shifted 12" closer to the end (8" instead of 20") to avoid attaching a rail post to the top of backwall. All other dimensions and reinforcement remain the same.

Longitudinal R bars shall extend 2'-7" minimum into new end post.

Notes:

- Work this sheet with Sheet No. .
- For details of fresh anchors, see Sheet No.
- Fresh anchors shall be shifted as needed in field to clear one-inch diameter holes by at least 1/2 inch.

Curb Blockout at End Bents

Cost of removing existing end posts will be considered completely covered by the contract unit price for Curb Blockout.

Existing Curb
Front Face of Existing Curb

Top of Wearing Surface (Typ.)

6-#5-R Bars
(Bend in Field)

Existing Reinf. (U.I.P.)
4-#5-R Bars
(Bend in Field)

Remove concrete. (Detailed area only)
Reinforcing steel.

PART ELEVATION SHOWING END POST CONCRETE REMOVAL

Note: This drawing is not to scale. Follow dimensions. Sheet No. 6 of 6.
2'-8" Curb Blockout

These details are meant to be used as a starting point only. Modify as needed.

1. Taper front face as gradually as possible, while maintaining 6" minimum thickness of blockout at the end of the existing parapet. 2'-8" maximum taper length.
2. Notes may be shifted 12" closer to the end (8" instead of 20") to avoid attaching a rail post to the top of backwall. All other dimensions and reinforcement remain the same.
3. Longitudinal R bars shall extend 2'-7" minimum into new end post.

Note: This drawing is not to scale. Follow dimensions.

Curb Blockout at End Bents

Cost of removing existing ends posts will be considered completely covered by the contract unit price for Curb Blockout.
PLAN OF LEFT CURB BLOCKOUT

(Right curb blockout similar)

Cost of any concrete curb repair will be considered completely covered by the contract unit price for Curb Blockout.

The 1/4-inch joints may be either formed joints with joint filler or saw-cut joints. Joint sealant and backer rods shall be in accordance with Sec 717 for Silicone Joint Sealant for Saw Cut and Formed Joints.

For details of optional saw-cut joint, see Sheet No. __.

For additional details of end of blockout, see Sheet No. __.

Work this sheet with Sheets No. __ & __.

Notes:

Longitudinal dimensions are along grade and are taken at top inside edge of curb.

Top of curb blockout shall be built parallel to grade with curb blockout joints except at end bents normal to grade.

Concrete in the curb blockout shall be Class B-1.

All exposed edges of curb blockout shall have either a 1/2-inch radius or a 3/8-inch bevel, unless otherwise noted.

Payment for concrete, reinforcement, resin anchor systems and any other work incidental to the curb blockout, complete in place, will be considered completely covered by the contract unit price for Curb Blockout.

Measurement of curb blockout is to the nearest linear foot for each structure measured along the inside edge of curb from end of slab to end of slab.

Concrete traffic barrier delineators shall be placed on top of the top of curb blockout, as shown on Missouri Standard Plans 617.30 and in accordance with Sec 617. Delineators on bridges shall be in accordance with Sec 617. Delineators on bridges shall be in accordance with Sec 617.

Concrete traffic barrier delineators will be considered completely covered by the contract unit price for Curb Blockout.

Note: This drawing is not to scale. Follow dimensions.
These details are meant to be used as a starting point only. Modify as needed.

If slip-form option is not allowed, include saw-cut joint details, or allow joint filler only (with SPM approval).

Longitudinal R bars in front face shall lap 3'-1" minimum with horizontal R bars in end post.

SECTION A-A

* 3-#5 R bars (Each face) (Equally spaced)

Change to 3-#5 bars in Plan (top bar not bent in field) and remove line that indicates the sloped top. Use resin anchor System A for all 6 R bars in end post at front face (top bar not bent in field).

ALTERNATE DETAILS FOR 2'-8" BLOCKOUT
Notes:

1. Plan is not to scale. Follow dimensions.

2. Specific sections refer to Missouri Standard Plans.

3. Specifications for Curb Blockout are as follows:
   - All exposed edges of curb blockout shall have either a 1/2-inch radius or a 3/8-inch bevel, unless otherwise noted.
   - Payment for concrete, reinforcement, resin anchor systems and any other work included in the curb blockout, complete in place, will be considered completely covered by the contract unit price for Curb Blockout per linear foot.
   - Measurement of curb blockout is to the nearest linear foot for each structure, measured along the inside edge of curb from end of slab to end of slab.
   - Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans.
   - Joint sealant and backer rods shall be in accordance with Sec 717 for Silicone Joint Sealant for Saw Cut and Formed Joints.
   - For details of optional saw-cut joint, see Sheet No.
   - For additional details of end of blockout, see Sheet No.
   - Work this sheet with Sheets No.

4. Cost of any concrete curb repair will be considered completely covered by the contract unit price for Curb Blockout.

5. The 1/4-inch joints may be either formed joints with joint filler or saw-cut joints.

6. All exposed edges of curb blockout shall have either a 1/2-inch radius or a 3/8-inch bevel, unless otherwise noted.

7. Payment for concrete, reinforcement, resin anchor systems and any other work included in the curb blockout, complete in place, will be considered completely covered by the contract unit price for Curb Blockout per linear foot.

8. Measurement of curb blockout is to the nearest linear foot for each structure, measured along the inside edge of curb from end of slab to end of slab.

9. Concrete traffic barrier delineators shall be placed on top of the curb blockout similarly as shown on Missouri Standard Plans.

10. Joint sealant and backer rods shall be in accordance with Sec 717 for Silicone Joint Sealant for Saw Cut and Formed Joints.

11. For details of optional saw-cut joint, see Sheet No.

12. For additional details of end of blockout, see Sheet No.

13. Work this sheet with Sheets No.

14. Cost of any concrete curb repair will be considered completely covered by the contract unit price for Curb Blockout.

15. The 1/4-inch joints may be either formed joints with joint filler or saw-cut joints.

16. Joint sealant and backer rods shall be in accordance with Sec 717 for Silicone Joint Sealant for Saw Cut and Formed Joints.

17. For details of optional saw-cut joint, see Sheet No.

18. For additional details of end of blockout, see Sheet No.

19. Work this sheet with Sheets No.

20. Cost of any concrete curb repair will be considered completely covered by the contract unit price for Curb Blockout.

21. The 1/4-inch joints may be either formed joints with joint filler or saw-cut joints.

22. Joint sealant and backer rods shall be in accordance with Sec 717 for Silicone Joint Sealant for Saw Cut and Formed Joints.

23. For details of optional saw-cut joint, see Sheet No.

24. For additional details of end of blockout, see Sheet No.

25. Work this sheet with Sheets No.
These details are meant to be used as a starting point only. Modify as needed.
If slip-form option is not allowed, include saw-cut joint details, or allow joint filler only (with SPM approval).
Longitudinal R bars in front face shall lap 3'-1" minimum with horizontal R bars in end post.

SECTION A-A

- 3-#5 R bars (Each face) (Equally spaced)

ALTERNATE DETAILS FOR 2'-8" BLOCKOUT
Note: This drawing is not to scale. Follow dimensions.

Details of Resin Anchors

- Manufacturer's recommended embedment length (5" min.)
- System A (required)
- System B (24 required)
- System C (required)

Cost of channel removal will be considered completely covered by the contract unit price for Curb Blockout.

Notes:
- Work this sheet with Sheets No. 6.
- All curb blockout reinforcement shall be epoxy coated.
- The contractor shall use one of the qualified resin anchor systems in accordance with Sec. 1039.
- The minimum embedment depth in concrete with f'c = 4,000 psi for the resin anchor system shall be that required to meet the minimum ultimate pullout strength in accordance with Sec. 1039 but shall not be less than 5 inches.
- An epoxy coated #6 Grade 60 reinforcing bar shall be substituted for the 3/4-inch diameter threaded rod.
- Resin anchors shall be shifted or bent in field to clear one-inch diameter holes by at least 1/2 inch.

CURB BLOCKOUT

FREE FROM EXISTING END POST (3'-0")

OMIT FOR FREE-STANDING END POST

USE ONLY IF THERE IS AN EXPANSION GAP (ANY SIZE) BETWEEN THE END POST AND THE FIRST RAIL POST OFF THE BRIDGE
Standard Drawing Guidance (Do not show on plans):
1. May use 2'-8" if curb blockout is on a non-NHS route and sight distance or weight is an issue.
2. Holes may be shifted 12" closer to the end (8" instead of 20") to avoid attaching a rail post to the top of backwall. All other dimensions and reinforcement remain the same.

Use this sheet with CBO_03 or 04 & CBO_05.

Longitudinal R bars in front face shall lap 3" minimum with horizontal R bars in end post.

These details may not cover all situations, and are intended as a starting point only. Modify as necessary.

FREE FROM EXISTING END POST (2'-8"

ATTACH TO EXISTING END POST (3'-0"

PART SECTION THRU END OF BLOCKOUT
PART ELEVATION SHOWING END OF BLOCKOUT

PART ELEVATION OF END OF BLOCKOUT SHOWING REINFORCEMENT

ELEVATION B-B

<table>
<thead>
<tr>
<th>Existing End Post (U.I.P.)</th>
<th>2'-9&quot;</th>
<th>2'-6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-Ø Resin Anchors System C</td>
<td>@ 9&quot; cts. (Outside face)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roadway Face of curb blockout</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot; Resin Anchor System B (Rdwy. face)</td>
</tr>
<tr>
<td>3/4&quot; Resin Anchor System A (Rdwy. face)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bend top bars in field</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-#5-R bars</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System B or A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforcement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roadway Face of curb blockout</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot; Resin Anchor System C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top of Existing A Curb</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Ø Holes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top of Wearing Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Ø Holes</td>
</tr>
</tbody>
</table>

| PART SECTION THRU END OF BLOCKOUT |
| PART ELEVATION SHOWING END OF BLOCKOUT |

CBO_05-CurbRail-details     Guidance & Alternate Details 1 of 2
PART SECTION THRU END OF BLOCKOUT

PART ELEVATION SHOWING END OF BLOCKOUT

PART ELEVATION OF END OF BLOCKOUT SHOWING REINFORCEMENT

ATTACH TO EXISTING END POST (2'-8")
Option 06 - Curb Rail-slip
Effective: May 2020
Supersedes: Apr. 2020

TYPICAL ELEVATION OF CURB BLOCKOUT AT SUPPORT LOCATIONS

Horizontal #4 bars and rail attachment holes not shown for clarity. C bars and textured fiberglass bars shall be used in addition to reinforcement shown for conventional forming.

- #5-C1 bars may be shifted or omitted.
- Work this sheet with Sheets No. _ & _.
- Joint sealant and backer rods shall be in accordance with Sec 717 for silicone joint sealant for saw-cut and formed joints.
- For slip-formed option, both sides of the curb blockout shall have a vertically broomed finish and the top shall have a transversely broomed finish.
- Cost of silicone joint sealant and backer rod, complete in place, will be considered completely covered by the contract unit price for Curb Blockout.
- General notes shown for conventionally formed curb blockouts also apply to slip-formed curb blockouts.
- Channel, posts and concrete end posts shall be removed if necessary for slip forming. Removal cost will be considered completely covered by the contract unit price for Curb Blockout.

Note:
- Each side of joint location
- #2 bars spaced with resin anchor systems in roadway face of 12" wide curb blockout.

Standard Drawing Guidance
(Do not show on plans):"
- Optional construction joint 1 1/2" past end of the 7-#5-R bars.

Notes:
- **When optional construction joint is used,** #5-C1 bars may be shifted or omitted.

Optional Slip-Formed Curb Blockout

Note: This drawing is not to scale. Follow dimensions.
Guidance: Remove top slopes from ends in Elevation for 2'-8" blockout.

Alternate details for 2'-8" blockout
Standard Drawing Guidance (do not show on plans):
Check that the 1 1/2"Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1 1/2" to any prestressing strands. Diaphragm spacing may need to be adjusted.

For MoDOT Type 2 girder only, use shorter angle and plate 15 x 1/2" instead of 16" to account for depth tolerance of web. Revise bolt end clearances to 1 3/4".

Delete panels for CIP slab.
Steel Intermediate Diaphragms

Steel Diaphragm Notes:

- Four 1 1/16" x 2 1/4" horizontal slotted holes in beam & 7/8" hole (ASTM A307) bolt, hex nut and 2 hardened washers.
- Thirteen 1 1/16"Ø holes cast in beam with 7/8" hole (ASTM A307) bolt, hex nut and 2 hardened washers. Tighten and burr threads.
- Steel diaphragm materials including bolts, nuts, and washers shall be galvanized.
- Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.
- Payment for furnishing and installing steel intermediate diaphragms will be considered completely covered by the contract unit price for Steel Intermediate Diaphragm for P/S Concrete Girders.
- Shop drawings will not be required for steel intermediate diaphragms and angle connections.

For location of intermediate diaphragms, see Sheet No. __________.

Standard Drawing Guidance (do not show on plans):

Check that the 1 1/2"Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1 1/2" to any prestressing strands. Diaphragm spacing may need to be adjusted.

For MoDOT Type 2 girder only, use shorter angle and plate 15 1/2" instead of 16" to account for depth tolerance of web. Revise bolt end clearances to 1 3/4".

Delete panels for CIP slab.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (Do not show on plans):
Check that the 3 1/2"Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1 1/2" to any prestressing strands. Diaphragm spacing may need to be adjusted.

Delete panels for CIP slab.

STEEL DIAPHRAGM NOTES:
* In lieu of 3 1/2" outside diameter washers, contractor may substitute a 3/8" (Min. thickness) plate with four 15/16" Ø holes and one hardened washer per bolt.

* Bolts shall be tightened to provide a tension of 1/2" that specified in Sec 712 for high strength bolt installation. ASTM A325 Grade A325 type 3 bolts may be substituted for and installed in accordance with the requirements for the specified ASTM A307 bolts.

All diaphragm materials including bolts, nuts, and washers shall be galvanized.

Fabricated structural steel shall be ASTM A992 Grade 36 except as noted.

Punishing and installing steel intermediate diaphragms will be considered separately ordered by the contract unit price for Steel Intermediate Diaphragm for P/S Concrete Girders.

Shop drawings will not be required for steel intermediate diaphragms and angle connections.

For location of intermediate diaphragms, see Sheet No. ...
Standard Drawing Guidance (Do not show on plans):

Check that the {1\frac{1}{2}} holes for the diaphragms shown on the design plans will provide a minimum clearance of at least {1\frac{1}{2}} to any prestressing strands. Diaphragm spacing may need to be adjusted.

Delete panels for CIP slab.

STEEL DIAPHRAGM NOTES:

- In lieu of 2 {1\frac{1}{2}} outside diameter washers, contractor may substitute a {3\frac{1}{8}} (Min. thickness) plate with four {1\frac{5}{16}} holes and one hardened washer per bolt.

- Bolts shall be tightened to provide a tension of one-half that specified in Sec 712 for high-strength bolt installation. ASTM F3125 Grade A325 Type 1 bolts may be substituted for and installed in accordance with the requirements for the specified ASTM A307 bolts.

All diaphragm materials including bolts, nuts, and washers shall be galvanized.

Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):
Check that the 1 1/2"Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1 1/2" to any prestressing strands. Diaphragm spacing may need to be adjusted.
Delete panels for CIP slab.

**Steel Intermediate Diaphragms**

- **Steel Intermediate Diaphragms:**
  - **Diaphragms:**
    - **Holes:** 1 1/2"Ø holes cast in beam with TJP (ASTM A505) bolts.
    - **Tighten bolts:**
      - **Threads:** Tighten and burr threads.

**Steel Intermediate Diaphragms Notes:**

- **In lieu of 2 1/2" O.D. washers:**
  - **Contractor may substitute a 3/16" (Min. thickness) plate with four 15/16" Ø holes and one hardened washer per bolt.**

- **Bolts:**
  - **Tension:**
    - **Half the tension:**
      - **Specified in Sec 712:**
        - **A325 Grade 1 bolts:**
          - **Substitute bolts:**
            - **Per requirements:**
              - **ASTM A307 bolts.**

- **All diaphragm materials including bolts, nuts, and washers shall be galvanized.**

- **Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.**

- **Fabrication and installation of steel intermediate diaphragms:**
  - **Contractor:**
    - **Unit price:**
      - **For Steel Intermediate Diaphragms for P/S Concrete Girder.**

- **Shop drawings will not be required for steel intermediate diaphragms and angle connections.**

*Note: This drawing is not to scale. Follow dimensions.*
### Standard Drawing Guidance (do not show on plans):

Check that the 1 1/2"Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1 1/2" to any prestressing strands. Diaphragm spacing may need to be adjusted.

Delete panels for CIP slab.

---

**Steel Intermediate Diaphragms**

**Steel Diaphragm Notes:**

- In lieu of 2 1/2” outside diameter washers, contractor may substitute with 3/16” thickness plate with four 1 1/16” Ø holes and one hardened washer per bolt.

- Bolts shall be tightened to provide a tension of one-half that specified in Sec 712 for high strength bolt installation. ASTM F3125 Grade A325 Type 1 bolts may be substituted for and installed in accordance with the requirements for the specified A307 bolts.

All diaphragm materials including bolts, nuts, and washers shall be galvanized.

Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.

Payment for furnishing and installing steel intermediate diaphragms will be considered completely covered by the contract unit price for Steel Intermediate Diaphragm for P/S Concrete Girders.

Shop drawings will not be required for steel intermediate diaphragms and angle connections.

For location of intermediate diaphragm, see Sheet No. 1.

---

**Note:** This drawing is not to scale. Follow dimensions.
**Standard Drawing Guidance (Do not show on plans):**

Check that the 1 1/2" Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1½" to any prestressing strands. Diaphragm spacing may need to be adjusted.

Delete panels for CIP slab.

**Steel Intermediate Diaphragms**

#### STEEL DIAPHRAGM NOTES:

- **Four 1 1/16" x 2 1/4" horizontal slotted holes in 6" leg of each 6 x 4 x 1/2 x 16" angle;**
- **Eight 15/16" Ø holes in bent plate, eight 7/8" Ø bolts (ASTM A307), hex nuts, 8 2 1/2" O.D. washers and 16 hardened washers.**
- **1 1/2" Ø Holes cast in web, 7/8" Ø bolt (ASTM A307), hex nut, and 2 hardened washers. Tighten and burr threads.**

**Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.**

Payment for furnishing and installing steel intermediate diaphragms will be considered completely covered by the contract unit price for Steel Intermediate Diaphragm for P/S Concrete Girders.

Shop drawings will not be required for steel intermediate diaphragms and angle connections.

For location of intermediate diaphragms, see Sheet No._._.
PART SECTION SHOWING INTERMEDIATE DIAPHRAGMS

STEEL DIAPHRAGM NOTES:
- In lieu of 2 1/2" outside diameter washers, contractor may substitute a 3/16" (Min. thickness) plate with four 15/16" holes and one hardened washer per bolt.
- Bolts shall be tightened to provide a tension of one-half that specified in Sec 712 for high strength bolt installation. ASTM F3125 Grade A325 Type 1 bolts may be substituted for and installed in accordance with the requirements for the specified ASTM A307 bolts.
- All diaphragm materials including bolts, nuts, and washers shall be galvanized.
- Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.
- Payment for furnishing and installing steel intermediate diaphragms will be considered completely covered by the contract unit price for Steel Intermediate Diaphragm for P/S Concrete Girders.
- Shop drawings will not be required for steel intermediate diaphragms and angle connections.
- For location of intermediate diaphragms, see Sheet No. .

Note: This drawing is not to scale. Follow dimensions.

STEEL INTERMEDIATE DIAPHRAGMS
STEEL INTERMEDIATE DIAPHRAGMS

PART SECTION SHOWING INTERMEDIATE DIAPHRAGMS

SECTION A-A

1. Four 3 1/16" x 2 1/4" horizontal slotted holes in 6" leg of each 6 x 4 x 1/2 x 16" angle; 6 1/1/8"Ø holes in bent plate 4 x 3/8" x 16".

2. Eight 15/16"Ø holes in bent plate, eight 2 1/2" O.D. washers and 16 hardened washers.

3. 1 1/16"Ø Hole in 4" leg of 6 x 4 x 1/2 x 16" angle and in plate 4" x 3/8" x 16".

SECTION B-B

1. Four 3 1/16" x 2 1/4" horizontal slotted holes in 6" leg of each 6 x 4 x 1/2 x 16" angle; 6 1/1/8"Ø holes in bent plate 4 x 3/8" x 16".

2. Eight 15/16"Ø holes in bent plate, eight 2 1/2" O.D. washers and 16 hardened washers.

SECTION C-C

1. Four 3 1/16" x 2 1/4" horizontal slotted holes in 6" leg of each 6 x 4 x 1/2 x 16" angle; 6 1/1/8"Ø holes in bent plate 4 x 3/8" x 16".

2. Eight 15/16"Ø holes in bent plate, eight 2 1/2" O.D. washers and 16 hardened washers.

3. 1 1/16"Ø Hole in 4" leg of 6 x 4 x 1/2 x 16" angle and in plate 4" x 3/8" x 16".

Standard Drawing Guidance (Do not show on plans):

Check that the 1 1/2"Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1 1/2" to any prestressing strands. Diaphragm spacing may need to be adjusted.

1. Use 2'-4" for NU 78 girders

Delete panels for CIP slab.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (Do not show on plans):
Check that the 1 1/2"Ø holes for the diaphragms shown on the design plans will provide a minimum clearance of at least 1 1/2" to any prestressing strands. Diaphragm spacing may need to be adjusted.

Use 2'-4" for NU 7B girders
Delete panels for CIP slab.

STEEL DIAPHRAGM NOTES:
* In lieu of 2 1/2" outside diameter washers, contractor may substitute a 3/8" (Min. thickness) plate with four 5/16" holes and one hardened washer per bolt.
* Bolts shall be tightened to provide a tension that is one-half that specified in Sec 712 for high strength bolt installation. ASTM F3125 Grade A325 Type 1 bolts may be substituted for and installed in accordance with the requirements for the specified ASTM A307 bolts.
* All diaphragm materials including bolts, nuts, and washers shall be galvanized.
* Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.
* Payment for furnishing and installing steel intermediate diaphragms will be considered completely covered by the contract unit price for Steel Intermediate Diaphragm for P/S Concrete Girders.

Shop drawings will not be required for steel intermediate diaphragms and angle connections. For location of intermediate diaphragms, see Sheet No.
TYPICAL PART SECTION SHOWING END DIAPHRAGMS

Note: This drawing is not to scale. Follow dimensions.

Standard Drawing Guidance (do not show on plans):
- Angle size should be shown without inch (") marks on the plans.
- Do not show fillet weld size unless by design and size of weld exceeds Sec 1080.
- Show specialty welds information as given unless by design.
- Delete panels for CIP slab.
- Modify if necessary in accordance with EPG 751.14.5.3.

Replace this detail with alternate details if flange connection angle is required by design.
Use these alternate details if Flange Connection Angle is required by design.

2. Use Type 3 for weathering steel bolted connections and Type 1 for painted or galvanized steel connections.

3. Verify clearance for cross slope.

Note: Bolts shall be 3/4-inch diameter ASTM F1320 Grade A325 Type 1 and Type 3 that connect the beam to the top flange, placed so the nut is on the inside of flange (toward the web).
TYPICAL PART SECTION SHOWING END DIAPHRAGMS

Standard Drawing Guidance (do not show on plans):
- Angle size should be shown without inch (") marks on the plans.
- Do not show fillet weld size unless by design and size of weld exceeds Sec 1080.
- Show specialty welds information as given unless by design.
- Delete panels for CIP slab.
- Modify if necessary in accordance with EPG 751.14.5.4.

Note: This drawing is not to scale. Follow dimensions.

STEEL DIAPHRAGMS
Use these alternate details if Flange Connection Angle is required by design.

1. Use Type 3 for weathering steel bolted connections and Type 1 for painted or galvanized steel connections.

2. Verify clearance for cross-slope.

3. Use Type 3 for weathering steel bolted connections and Type 1 for painted or galvanized steel connections.

Note: Bolts shall be 3/4-inch diameter ASTM F3125 Grade A325 Type 1 Type 3 that connect the 6 x 6 x 3/8 angle to the top flange and placed so the nut is on the inside of flange (toward the web).

Use these alternate details if Flange Connection Angle is required by design.
**STEEL DIAPHRAGMS**

Standard Drawing Guidance (do not show on plans):
- Angle size should be shown without inch (") marks on the plans.
- Do not show fillet weld size unless by design and size of weld exceeds Sec 1080.
- Show specialty welds information as given unless by design.
- Delete panels for CIP slab.
- Modify if necessary in accordance with EPG 751.14.5.4.

Note: This drawing is not to scale. Follow dimensions.

---

**TYPICAL PART SECTION SHOWING END DIAPHRAGMS**

Unit these details if End Diaphragms (slab haunched to bear) are not used.

**TYPICAL PART SECTION SHOWING CROSS FRAMES AND INTERMEDIATE DIAPHRAGMS**

Replace these details with alternate details if flange connection angle is required by design.

---

### DETAIL A
- Diamond shaped fill plate
- At the contractor's option, rectangular fill plates
- Omit these details if End Diaphragms (slab haunched to bear) are not used.
- Replace these details with alternate details if flange connection angle is required by design.

### DETAIL B
- Rectangular fill plate
- (Bottom flange shown, top flange similar.)

### DETAIL C
- (Min.)
- (Max.)
- (Min.)
- (Max.)
- (Min.)
- (Max.)

---

**STEEL DIAPHRAGMS**

Effective: Sep. 2021
Supersedes: July 2020
Use these alternate details if Flange Connection Angle is required by design:

1. Use Type 3 for weathering steel bolted connections and Type 1 for painted or galvanized steel connections.

2. Use Type 3 for weathering steel bolted connections and Type 1 for painted or galvanized steel connections.

Note: Bolts shall be 3/4-inch diameter ASTM F3125 Grade A325 Type 1 that connect the 6 x 6 x 3/8 angle to the top flange and placed so the nut is on the inside of flange toward the web.
CONSTRUCTION SEQUENCE:

Construct end bent with anchor tees in place.
Construct deadman with anchor tees in place.
Machine compact fill up to elevation of __" Ø rod and turnbuckle
Install __" Ø rod, clevis and turnbuckle assembly.
Tighten turnbuckle until snug.
Hand compact fill for __" (Min.) over __" Ø rod and turnbuckle.
Machine compact remaining fill.

BILL OF REINFORCING STEEL EACH DEADMAN

Reinforcing steel lengths are based on nominal lengths, out to out.

All anchor tees, rods, clevises, turnbuckles etc. shall be fabricated from ASTM A36 (Grade B), ASTM A668 Class F or equivalent steel and galvanized in accordance with Sec 1081. Shop drawings will not be required. All concrete shall be Class B. All reinforcing steel shall be Grade 60. All metal members of the anchorage system not embedded in concrete shall be cleaned and receive a heavy coating of an approved bituminous paint. Fine aggregate shall be in accordance with Sec 1005 and shall be placed below and above the rod and turnbuckles.

Payment for all materials, excavation, backfill and any other incidental work necessary to complete the Deadman Anchorage System shall be considered completely covered by the contract unit price per each.

Note: This drawing is not to scale. Follow dimensions.
**Standard Drawing Guidance (do not show on plans):**

Use this detail near expansion device to deflect water away from girder.

Use this detail near bent, on outside of exterior girder only, to deflect water away from bent.

Note: Steel for drip bars shall be same grade as bottom flange.
Standard Drawing Guidance (do not show on plans):

Modify as required.

Bolted drip angles should only be used when welded drip bolts cannot be used.

Drip angles should be located between 5 feet from center of expansion device and 2 feet less than the end of the partial coating limit.

Note:
- Drip angles shall be caulked with dark brown caulk against flange, web and fillet welds.
- Drip angles shall be same grade as bottom flange.
- Use 1/2-inch diameter ASTM F3125 Grade A325 Type 3 for bolted connection.

Section A-A

Section B-B

Section C-C

Section D-D
As-Built Drilled Shaft Data

<table>
<thead>
<tr>
<th>Shaft No.</th>
<th>Top of Sound Rock (Elev.)</th>
<th>Tip of casing (ELEV.)</th>
<th>Bottom Half Socket (ELEV.)</th>
<th>Remarks</th>
</tr>
</thead>
</table>

Note: This sheet to be completed by MoDOT construction personnel.

Standard Drawing Guidance (do not show on plans):
- Draw layout and provide numbering of shafts.
- Combine with As-Built Pile Data if both piles and drilled shafts are shown on same sheet.
Standard Drawing Guidance (Do not show on plans.):

1. 6" embedment typical, may be adjusted to accommodate a thinner slab thickness, but not less than 4" embedment.

2. May conflict with any proposed expansion device in sidewalk, consult the structural project manager.

GENERAL NOTES:
Pedestrian guard fence (Chain link type) shall be in accordance with Sec. 1043 except all fabric shall have the top and bottom edges knuckled.

All posts shall be vertical. Grout of 1/2" minimum thickness shall be placed under floor plates to provide for vertical alignment of posts.

Payment for furnishing, galvanizing and erecting the fence and frame complete with anchor bolts and washers will be considered completely covered by the contract unit price for (112 in.) Curved Top Pedestrian Fence (Structures) per linear foot.

Dimensions of pedestrian guard fence are measured horizontally.

The maximum spacing allowed between pull posts and end posts is 100 ft. Post brace and 1/2"Ø truss rod are required for panels adjacent to pull posts and end posts to which the stretcher bar is attached.

(112 in.) Curved Top Pedestrian Fence (Structures) will be measured to the nearest linear foot for each structure measured along the bottom outside edge of the sidewalk barrier from one ___ to _____.

Core wire size for wire fabric shall be 6 gage minimum.

Note: This drawing is not to scale. Follow dimensions.

Sheet No. of
PLAN SHOWING PEDESTRIAN CURB

Left side shown, right side similar
Longitudinal dimensions are horizontal.

PART ELEVATION OF PEDESTRIAN CURB AT END BENT

SECTION A-A

SECTION B-B

PART ELEVATION AT CURB JOINT

PEDESTRIAN CURB

In the available space, draw the plan of the left barrier showing:
- Drainage
- Provide joints similar to those used in barriers
- First & last #4-R stirrup bars @ about 12" centers, dimensioned with total number in curb.
- Fence post spacing "per manufacturer" (4" min. from joints and ends)
- All joints and centerlines with one centerline labeled as:
  4" Joint (Curb only) (Typ.)

For skewed structures only. Remove for squared bridges.
Optional. Show this dimension on Plan and remove this detail.

Notes:
- Top of curb shall be built parallel to grade and curb joints (except at end bents) shall be to grade.
- All exposed edges of curb shall have either a 1/2-inch radius or a 3/8-inch bevel, unless otherwise noted.
- Measurement of pedestrian curb is to the nearest linear foot for each structure, measured along the outside top of curb from end to end of curb.
- Concrete in curb shall be Class B-1.
- Curb to end of curb.
- Center of posts shall clear curb joints or ends by at least 6 inches.
- Minimum lap for longitudinal R-bars is 2'-7".
- Slab reinforcement not shown for clarity.
- For details of decorative pedestrian fence, see Sheet No. 5220/160/170.
Notes:

These details are a general representation of a Decorative Pedestrian Fence. The actual fence components and component positions may be different than what is shown.

Fence shall have a galvanized finish (Federal Standard 21028). See special provisions.

Base plate shall be ASTM A709, Grade 50.

All base plates, U bolts, hex nuts and washers shall be galvanized in accordance with ASTM A123 and Sec 1083.

Measurement of pedestrian fence will be made horizontally and to the nearest linear foot along centerline fence.

Payment for furnishing and erecting the fence complete in place will be considered completely covered by the contract unit price for 1 in. Decorative Pedestrian Fence (Structural).

All fence posts shall be vertical.

Material shall be placed under the post base plates in accordance with Sec 1089.

Decorative pedestrian fencing shall be in accordance with 2020-AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS Bridge Design Specifications, 9th Ed.

Shop drawings and structural calculations will not be required for the decorative pedestrian fences on the Bridge Pre-qualified Products List.

All materials used in fabrication and construction of the decorative pedestrian fencing shall be in accordance with the manufacturer's specifications, except as modified in the contract documents.

Decorative pedestrian fencing system shall be supplied by only one manufacturer. Decorative pedestrian fencing system shall include all components except the anchor bolts and hardware. All parts welded to the anchor bolts. The material sizes and component positions may be different than what is shown.

Base plate shall be ASTM A709, Grade 50.

See Bridge Pre-qualified Products List (BPPL) for a list of approved manufacturers.

Substitution for the U-bolt cages will not be permitted.

For details of pedestrian curb, see Sheet No. .

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 01

FEN04_Decorative  Effective: Nov. 2023  Supersedes: Sep. 2023

Standard Drawing Guidance:

(Do not show on plans.)

Note on plans that longitudinal dimensions of fence are horizontal.

TYPICAL PART ELEVATION

Optional rail. Need is based on design computations performed by the manufacturer and approved by MoDOT, or may be added for aesthetics.
**FEN04 Alternate Details**

On Type H Barrier

**TYPICAL PART ELEVATION**
- Optional rail: need is based on design computations performed by the manufacturer and approved by MoDOT, or may be added for aesthetics.
- Connection shall allow 4" movement.

**PART ELEVATION AT EXPANSION JOINT**
- Optional rail: need is based on design computations performed by the manufacturer and approved by MoDOT, or may be added for aesthetics.
- Connection shall allow 4" movement.

**TYPICAL DETAIL OF FENCE AT LIGHT STANDARDS**
- Use where the top of barrier is less than 9 inches wide, or when the barrier is to be slip-formed.

**LIGHT STANDARDS**
- Use this detail when an expansion joint is used (on curb).
Finger plate shall be cut with a machine guided gas torch from one plate. The plate from which fingers are cut may be sawed before fingers are cut. The surface of the undercut shall not deviate more than ±1" from the position of the centerline of cut shown. No splicing of finger plates or finger plate assembly shall be allowed after fingers are cut. The expansion device shall be fabricated and installed in the crown and grade of the roadway face.

Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased or decreased for each 10°F fall or rise in temperature at installation.

Material for the expansion device shall be ASTM A572 Grade 50 structural steel. Anchors for the expansion device shall be in accordance with Sec 1037.

Structural steel for the expansion device and barrier plate shall be coated with a minimum of two coats of organic zinc primer, plus one topical coat of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

Payment for furnish, painting or galvanizing and installing the structural steel for the expansion device will be lumped completely covered by the contract unit price for Expansion Device (Finger Plate) per linear foot.

Longitudinal reinforcing steel shall be placed so that ends shall not be more than 2' from the 3/4" vertical mounting plate at the expansion device.

Complete joint penetration welds utilized in the fabrication of the expansion device shall be nondestructively tested by an approved method.

Concrete shall be forced under and around finger plate supporting hardware, anchors, and recess, so as to provide a pressure of 30# (Min.) 2-layers of 30# (Min.) 2-layers of Roofing Felt (Min.) on the top of the concrete.
FING01_psi_end  Guidance & Alternate Details (1 of 2)

STANDARD DRAWING GUIDANCE: (do not show on plans). 
(For all finger plate drawings. Some notes may not apply to this sheet.)
1. Not a guidance note. Do not replace.
2. Gap between fingers, barrier recess gap, and, for intermediate bents, gap in barrier.
4. Transverse gap between fingers.
5. Maximum gap between fingers normal to joint at 60°F.
6. Finger length.
7. Transverse gap between fingers: not the same as 3 for skewed joints.
8. Plate length = (18 + 6)/cos (skew).
9. Gap between girder or between girder and end bent.
10. Include details of slab projection beyond W-beam under barrier on plan of slab detail sheet. Consider similarly projection beyond front face of angle under barrier at end bent.
11. Delete panel for CIP slab.

LA TYPE B BARRIER (SBC)

LA TYPE D BARRIER

PART PLAN OF DEVICE

PART PLAN OF DEVICE

PART PLAN OF DEVICE

PART PLAN OF FINGER PLATE

PART PLAN OF DEVICE
PART PLAN OF FINGER PLATE
RA

PART ELEVATION
AT END OF BENT BARRIER PLATE

SECTION B-B

SECTION C-C

PART PLAN OF DEVICE
RA TYPE D BARRIER

PART PLAN OF DEVICE
RA TYPE B BARRIER (SBC)

PART ELEVATION
OF BARRIER

ELEVATION OF BARRIER

TYPE B BARRIER (SBC) (ALL SKEWS)
FINGER PLATE EXPANSION DEVICE AT INT. BENT NO. _

Finger plate shall be cut with a machine guided gas torch from one plate. The plate from which fingers are cut may be spoiled before fingers are cut. The surface of cut shall be free of surface cracks. The width of cut shall not exceed 1/8" in width. The centerline of cut shall not deviate more than 1/16" from the position of center line of cut shown. No spoiling of finger plate or finger plate assembly will be allowed after fingers are cut. The expansion device shall be fabricated and installed to the crown and grade of the roadway.

Plan dimensions are based on installation at 60°F. The expansion joint and other dimensions shall be increased or decreased for each 10°F fall or rise in temperature at installation.

Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Anchors for the expansion device shall be in accordance with Sec 1037.

Structural steel for the expansion device and barrier plate shall be coated with a minimum of two coats of organic zinc primer to provide a total dry film thickness of 4 mil minimum, 6 mil maximum, or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion device will be considered completely covered by the contract unit price for Expansion Device (Finger Plate) per linear foot.

Longitudinal reinforcing steel shall be placed so that they shall not be more than 1/2" from the 3/4" vertical mounting plate at the expansion device.

Concrete joint penetration grouts utilized in the fabrication of the expansion device shall be nondestructively tested by an approved method.

GENERAL NOTES:
FING02_psi_int Guidance & Alternate Details (1 of 2)

STANDARD DRAWING GUIDANCE: (do not show on plans).

For all finger plate drawings: Some notes may not apply to this sheet:

1. Not a guidance note. Do not replace.
2. Gap between fingers, barrier recess gap and for intermediate bents, gap in barrier.
3. For end bents: 2 + 1/2"/cos(θ).[1,2]
5. Transverse gap between fingers.
6. Maximum gap between fingers normal to joint @ 60°F.
7. Finger length.
8. Transverse gap between fingers: not the same as 6) for skewed joints.
9. Plate length = (18" + 1)/cos(θ).[3,4]
10. Gap between girder or between girder and end bent.
11. Include details of slab projection beyond W-beam under barrier on plan of slab detail sheet. Consider similarly projection beyond front face of angle under barrier at end bents.
12. Delete panel for CIP slab.

FINGER PLATE

PART PLAN OF FINGER PLATE

LA TYPE B BARRIER (SBC)

PART PLAN OF DEVICE

LA TYPE D BARRIER

PART PLAN OF DEVICE

SQ TYPE B BARRIER (SBC)
PART PLAN OF DEVICE

RA TYPE D BARRIER

3/4" Mounting Plate with 13/16" x 2" vertical slotted holes (Typ.)
L8x6x3/4 (Continuous) (Typ.)
3/4"Ø x 8" Long Welded Shear Connector Studs
(Spaced alternately at about 9" cts.) (Typ.)
1/4"Ø Vent Hole at abt. 12" cts. (Typ.)
1 1/4" x 2" x 4 1/2" Slotted Well (Cast in top of P/S girder) and 3/4"Ø x 7" Anchor Bolt with Nut and Washer (Typ.)

PART PLAN OF DEVICE

RA TYPE B BARRIER (SBC)

3/4" Mounting Plate with 13/16" x 2" vertical slotted holes (Typ.)
L8x6x3/4 (Continuous) (Typ.)
3/4"Ø x 8" Long Welded Shear Connector Studs
(Spaced alternately at about 9" cts.) (Typ.)
1/4"Ø Vent Hole at abt. 12" cts. (Typ.)
1 1/4" x 2" x 4 1/2" Slotted Well (Cast in top of P/S girder) and 3/4"Ø x 7" Anchor Bolt with Nut and Washer (Typ.)
Finger plate shall be cut with a machine guided gas torch from one plate. The plate from which fingers are cut may be spliced before fingers are cut. The surface of cut shall not exceed 1/16" in width. The concave cut shall not deviate more than 1/16" from the position of center line of cut shown. No splicing of finger plate or finger plate assembly will be allowed after fingers are cut. The expansion device shall be fabricated and installed to the crown and grade of the roadway.

Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased or decreased for each 10°F fall or rise in temperature at time of installation.

Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Anchors for the expansion device shall be in accordance with Sec 1037.

Structural steel for the expansion device and barrier plate shall be coated with a minimum of two coats of high build primer. Bevel barrier (free end) of barrier shall be provided with a full film thickness of 4 mil minimum, 6 mil maximum, or galvanized in accordance with ASTM A653. Anchors need not be protected from overspray.

Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion device will be considered completely covered by the contract unit price for Expansion Device (Finger Plate) per linear foot.

All holes shown for connections shall be subpunched 3/16-inch diameter (shop or field drill) and reamed to 1/4-inch diameter in field, except holes in members that will be drilled to 5/16-inch diameter in shop. Holes in plates shall be spliced before fingers are cut. The surface of cut shall not exceed 1/8" in width.

Longitudinal reinforcing steel shall be placed so that ends shall not be more than 5" from the web of W14 x 43 at the expansion device.

Complete joint penetration welds utilized in the fabrication of the expansion device shall be nondestructively tested by an approved method.
FING03_st1_end  Guidance & Alternate Details (1 of 2)

STANDARD DRAWING GUIDANCE (do not show on plans):
1. Not a guidance note. Do not replace.
2. Gap between fingers, barrier recess gap and, for intermediate bents, gap in barrier.
3. For end bents, $2 = 1/2\"/\cos (skew)$
4. Gap adjustment for temperature: along bridge longitudinal axis
5. Transverse gap between fingers
6. Maximum gap between fingers normal to joint at 60°F.
7. Finger length
8. Transverse gap between fingers: not the same as 6 for skewed joints.
9. Plate length = $(18" + x)/\cos (skew)$
10. Gap between girder or between girder and end bent.
11. Include details of slab projection beyond W beam under barrier on plan of slab detail sheet. Consider similarly projection beyond front face of angle under barrier at end bent.
12. Delete panel for CIP slab.

PART PLAN OF DEVICE
LA TYPE B BARRIER (SBC)

PART PLAN OF FINGER PLATE
LA

PART PLAN OF DEVICE
SQ TYPE B BARRIER (SBC)
FINGER PLATE EXPANSION DEVICE AT INT. BENT NO. _

**GENERAL NOTES:**

Finger plate shall be cut with a machine guided gas torch from one plate. The plate from which fingers are cut may be spliced before fingers are cut. The surface of cut shall be smooth and free from rough edges. The cut shall not exceed 1/8-inch in width. The centerline of cut shall not deviate more than 1/8-inch from the position of centerline of cut shown. No splicing of finger plate or finger plate assembly will be allowed after fingers are cut.

The expansion device shall be fabricated and installed to the crown and grade of the roadway.

Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions that are increased or decreased for each 10°F fall or rise in temperature at installation are shown.

Material for the expansion device shall be ASTM A369 Grade 20 structural steel. Anchors for the expansion device shall be in accordance with Sec 1037.

Complete joint penetration welds utilized in the fabrication of the expansion device shall be nondestructively tested by an approved method.

Concrete shall be forced under and around finger plate supporting hardware, anchors, and recess barrier to permit free movement of plate. The expansion device shall be protected from overspray.

Structural steel for the expansion device shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 6 mils minimum. A mils maximum, or galvanized in accordance with ASTM A623. Anchors need not be protected from overspray.

Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion device will be considered completely covered by the contract unit price for Expansion Device (Finger Plate) per linear foot.

All holes shown for connections shall be subpunched ½-inch diameter (shop or field drill) and reamed to 13/16-inch diameter in fields except holes in members that will be used as shear connectors. The shop-drilled holes shall be reamed to 13/16-inch to accommodate the 3/4-inch diameter (Typ.) bolts. The shop-drilled holes shall be reamed to 13/16-inch to provide a total dry film thickness of 6 mils minimum. A mils maximum, or galvanized in accordance with ASTM A623. Anchors need not be protected from overspray.

Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion device will be considered completely covered by the contract unit price for Expansion Device (Finger Plate) per linear foot.

**Note:** This drawing is not to scale. Follow dimensions.
STANDARD DRAWING GUIDANCE: (do not show on plans)
1. Not a guidance note. Do not replace.
2. Gap between fingers. Barrier recess gap and, for intermediate bents, gap in barrier.
3. For end bents: 2 + 1/2"/cos(θxθ)
5. Transverse gap between fingers.
6. Maximum gap between fingers normal to joint @ 60°F.
7. Finger length.
8. Transverse gap between fingers: not the same as #5 for skewed joints.
9. Plate length = (18" + #10)/2 + #10
10. Gap between girder or between girder and end bent.
11. Include details of slab projection beyond W-beam under barrier on plan of slab detail sheet. Consider similarly projection beyond front face of angle under barrier at end bents.
12. Delete panel for CIP slab.

PART PLAN OF DEVICE
LA TYPE D BARRIER

PART PLAN OF DEVICE
LA TYPE B BARRIER (SBC)

PART PLAN OF FINGER PLATE

PART PLAN OF DEVICE
SQ TYPE B BARRIER (SBC)
RA TYPE D BARRIER

PART PLAN OF DEVICE

RA TYPE B BARRIER (SBC)

PART PLAN OF DEVICE

RA TYPE B BARRIER (SBC)

PART PLAN OF FINGER PLATE

PART ELEVATION

AT END OF BENT BARRIER PLATE

SECTION B-B

SECTION C-C

SECTION A-A

ELEVATION OF BARRIER

Type B Barrier (SBC) (All Skews)
GENERAL NOTES:
Finger plate shall be fabricated with a machine guided gas torch from one plate. The plate from which fingers are cut may be spliced before fingers are cut. The surface of cut shall not exceed 1/8" in width. The contours of cut shall not deviate more than 3/16" from the position of centerline of cut shown. No splicing of finger plate or finger plate assembly will be allowed after fingers are cut. The expansion device shall be fabricated and installed in the concrete and placed in the roadway.

Plan dimensions are based on installation at 60°F. The expansion shall be increased to decrease for each 10° fall or rise in temperature at site.

Material for the expansion device shall be ASTM A709 Grade 50 structural steel. The material for the expansion device shall be in accordance with Sec 1037.

Stiffeners for the expansion device and barrier plate shall be coated with a minimum of two coats of primer which are to be provided to seal the thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

Payment for furnishing, orienting, and installing the, the structural steel for the expansion device will be considered completely covered by the contract unit price for Expansion Device (Finger Plate) per linear foot.

All holes shown for connections shall be subpunched 11/16-inch diameter (shop, or field drill) and rounded to 1/2-inch diameter in field, except holes in members that will be used as templates. Holes shall be punched in members of multi-piece connections, with the holes in the template member to be drilled to 3/16-inch diameter in the shop.

Longitudinal reinforcing steel shall be placed so that ends shall not be more than 1/8" from the 3/4" vertical mounting plate and the web of W14x43 at the expansion device.

Complete joint penetration welds shall be utilized in the fabrication of the expansion device. Each shall be nondestructively tested by an approved method.

FINGER DETAIL
Note: This drawing is not to scale. Follow dimensions. Sheet No. A/1
STANDARD DRAWING GUIDANCE (do not show on plans):
(For all finger plate drawings. Some notes may not apply to this sheet.)

1. Not a guidance note. Do not replace.
2. Gap between fingers, barrier recess gap and, for intermediate bents, gap in barrier.
3. For end bents: 2 + 1/2"/cos(skew)
5. Transverse gap between fingers.
6. Maximum gap between fingers normal to joint @ 60°F.
7. Finger length.
8. Transverse gap between fingers: not the same as 5 for skewed joints.
9. Plate length = (18" + 6")/cos(skew)
10. Gap between girder or between girder and end bent.
11. Include details of slab projection beyond W-beam under barrier on plan of slab detail sheet. Consider similarly projection beyond front face of angle under barrier at end bends.
12. Delete panel for CIP slab.

LA TYPE B BARRIER (SBC)

SQ TYPE B BARRIER (SBC)

LA TYPE D BARRIER
PART PLAN OF DEVICE
RA TYPE D BARRIER

PART PLAN OF DEVICE
RA TYPE B BARRIER (SBC)

PART ELEVATION AT END OF BENT BARRIER PLATE

Ra Type B Barrier (SBC) (All Skews)
ALTERNATE DETAILS FOR TYPE B BARRIER (SBC)

STANDARD DRAWING GUIDANCE (do not show on plans):
2. Barrier plate length.
3. Include details of slab projection beyond W-beam under barrier on plan or slab detail sheet. Consider similar projection beyond front face of angle under barrier at end bents.

FINGER PLATE EXPANSION DEVICE AT MEDIAN

Note: This drawing is not to scale, follow dimensions. Sheet No. of
Recess barrier to permit free movement of plate

7/16"Ø Hole countersunk in roadway plate. Slotted hole 1/2" x 1" in angle; Bar 7/8" x 3/8" x 2" tapped for 3/8"Ø Flat Head stove bolt at about 9" cts. Remove bolt after concrete has set.

3/4"Ø x 8" Long Welded Shear Connector Studs spaced alternately at about 9" cts.

3/4" Plate with two 1 3/16" x 1 1/2" vertical slotted holes for 3/4"Ø machine bolts and nuts in roadway plate. Slotted holes placed along centerline of girder parallel to roadway.

1/2" Beveled Stiffener Plate (Form flush with barrier)

3/4"Ø x 6" Long Welded Shear Connector Studs spaced alternately at about 9" cts.

PART PLAN

Note: Concrete vent holes not shown for clarity.

RA TYPE D BARRIER

RA TYPE B BARRIER (SBC)

Bevel barrier plate on roadway face

ELEVATION OF BARRIER

PERMISSIBLE FIELD SPLICE AT END BENT

No weld required on vertical leg of angle

RA
Recess barrier to permit free movement at plate.

3/4"Ø Hole countersunk in roadway plate. Slotted hole 1/2" dia. 1/4" in angle. Bar 1 1/4" x 3/8" x 2

3/4"Ø x 8" Long Welded Shear Connector Studs (Sloped alternately at abt. 8" cts.) (Typ.)

4'-0" cts. Remove bolt head stove bolt at abt. Bar 1 1/4" x 3/8" x 2" Hole 1/2" x 1" in angle; 7/16"Ø Hole countersunk abt. 9" cts. (Typ.) (Spaced alternately at holes for 3/4"Ø machine bolts)

3/4"Ø x 2 1/4" Wide Plate with two 13/16" x 3" Slotted holes parallel along centerline of girder parallel to roadway (Typ.)

1 1/4" x 2" x 4 1/2" Slotted Well (Cast in top of the prestressed girder) and 3/4"Ø x 5 1/4" Anchor Bolt with nut and washer. See Std. Specs. for grout for the anchor bolts. (Typ.)

Bevel barrier plate on roadway face.

3/4"Ø x 6" Long Welded Shear Connector Studs (Spaced alternately at abt. 8" cts.) (Typ.)

Plate 6" x 5/8" x 1 1/4" x 2" x 4 1/2" Slotted Well (Cast in top of the prestressed girder) and 3/4"Ø x 5 1/4" Anchor Bolt with nut and washer. See Std. Specs. for grout for the anchor bolts. (Typ.)

1/2" Barrier Plate

2/2" Barrier Plate

3/4"Ø x 6" Long Welded Shear Connector Stud (Typ.)

3/4"Ø x 8" Wide Plate with two 13/16" x 3" Slotted holes for 3/4"Ø machine bolts

3/4"Ø Machine

5/8" Plate

Bevel barrier plate on roadway face.

Plate 12" x 7/8"

PART PLAN SHOWING ROADWAY PLATE AND VERTICAL PLATE

SECTION AT INTERMEDIATE BENT

Plate 12" x 7/8"

PART PLAN OF ANGLE AND BAR

SECTION B-B

PART ELEVATION AT END OF BARRIER PLATE

SECTION C-C

PERMISSIBLE FIELD SPlice AT INT. BENT

FLAT PLATE EXPANSION DEVICE AT INT. BENT NO.
1. Bar height.

2. Plate length = 12"/cos(ske) (12" for 0° skew)

3. Barrier gap = 3"/cos(ske) [3" for 0° skew]. Assume recess ends at front edge of bar.

4. Barrier recess gap = 2"/cos(ske) [2" for 0° skew].

5. Installation gap adjustment for temperature.

6. Check and revise locations of slotted wells to clear girder end section reinforcement.

7. Delete panel for CIP slab.

---

**PART PLAN**

- 7/16" Hole countersunk in roadway plate; Slotted Holes 1/2" x 1" in angle; Bar 1/4" x 3/8" x 2" tapped for 3/8"Ø flat head stove bolt at abt. 4'-0" cts. Remove bolt after concrete has set.
- No weld required on vertical leg of angle.
- 1/2" Barrier Plate
- 3/4" x 2 1/4" Wide Plate (Typ.)
- 1/2" x 2 1/4" Wide Plate (Typ.)
- Plate 12" x 7/8" x 5/8"
- 3/4" Plate with two 13/16" x 1 1/2" vertical slotted holes for 3/4"Ø machine bolts and nuts (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 1/2" x 1/4" Wide Plate with two 13/16" x 1 1/2" vertical slotted holes (placed along centerline of girder parallel to roadway) (Typ.)
- 3/4" x 2 1/4" Wide Plate (Typ.)
- 3/4" x 2 1/4" Wide Plate with two 13/16" x 1 1/2" vertical slotted holes for 3/4"Ø machine bolts and nuts (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 3/4" x 2" x 4 1/2" Slotted Well (Cast in top of prestressed girder and 3/4"Ø x 3" anchor bolt with nut and washer. See Std. Specs. for grout for the anchor bolts. (Typ.)

---

**LA TYPE D BARRIER**

**PART PLAN**

- 7/16" Hole countersunk in roadway plate; Slotted Holes 1/2" x 1" in angle; Bar 1/4" x 3/8" x 2" tapped for 3/8"Ø flat head stove bolt at abt. 4'-0" cts. Remove bolt after concrete has set.
- No weld required on vertical leg of angle.
- 1/2" Barrier Plate
- 3/4" x 2 1/4" Wide Plate (Typ.)
- 1/2" x 2 1/4" Wide Plate (Typ.)
- Plate 12" x 7/8" x 5/8"
- 3/4" Plate with two 13/16" x 1 1/2" vertical slotted holes for 3/4"Ø machine bolts and nuts (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 1/2" x 1/4" Wide Plate with two 13/16" x 1 1/2" vertical slotted holes (placed along centerline of girder parallel to roadway) (Typ.)
- 3/4" x 2 1/4" Wide Plate (Typ.)
- 3/4" x 2 1/4" Wide Plate with two 13/16" x 1 1/2" vertical slotted holes for 3/4"Ø machine bolts and nuts (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 3/4" x 2" x 4 1/2" Slotted Well (Cast in top of prestressed girder and 3/4"Ø x 3" anchor bolt with nut and washer. See Std. Specs. for grout for the anchor bolts. (Typ.)

---

**SQ TYPE B BARRIER (SBC)**

**PART PLAN**

- 7/16" Hole countersunk in roadway plate; Slotted Holes 1/2" x 1" in angle; Bar 1/4" x 3/8" x 2" tapped for 3/8"Ø flat head stove bolt at abt. 4'-0" cts. Remove bolt after concrete has set.
- No weld required on vertical leg of angle.
- 1/2" Barrier Plate
- 3/4" x 2 1/4" Wide Plate (Typ.)
- 1/2" x 2 1/4" Wide Plate (Typ.)
- Plate 12" x 7/8" x 5/8"
- 3/4" Plate with two 13/16" x 1 1/2" vertical slotted holes for 3/4"Ø machine bolts and nuts (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 1/2" x 1/4" Wide Plate with two 13/16" x 1 1/2" vertical slotted holes (placed along centerline of girder parallel to roadway) (Typ.)
- 3/4" x 2 1/4" Wide Plate (Typ.)
- 3/4" x 2 1/4" Wide Plate with two 13/16" x 1 1/2" vertical slotted holes for 3/4"Ø machine bolts and nuts (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 1/2" Beveled Stiffener Plate (Typ.)
- 3/4" x 2" x 4 1/2" Slotted Well (Cast in top of prestressed girder and 3/4"Ø x 3" anchor bolt with nut and washer. See Std. Specs. for grout for the anchor bolts. (Typ.)
RA TYPE D BARRIER

Part Plan

Note: Concrete vent holes not shown for clarity.

RA TYPE B BARRIER (SBC)

Part Plan

Note: Concrete vent holes not shown for clarity.

TYPE B BARRIER (SBC)(ALL)
GENERAL NOTES:
Expansion device shall be fabricated in one section, except for stage construction and when the length is over 50 feet. A complete joint penetration groove weld, including the root pass, shall provide a smooth surface. The expansion device shall be fabricated and installed to the crown and grade of the roadway.

Plan dimensions are based on installation at 60°F. Increases or decreases in design shall be made in accordance with Sec 1037.

Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Welds shall be made by a qualified welding operator in accordance with AWS D1.1. Welding shall be done on the inside of the expansion device and barrier plate shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of at least 8 mils. The expansion device shall be nondestructively tested by an approved method.

Concrete shall be poured around the expansion device and barrier plate. The vertical leg of the angle at the expansion device ends shall not be more than ±1" from vertical plate and the vertical leg of the angle at the expansion device shall be in accordance with Sec 1037.

Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Anchors for the expansion device shall be Grade 3% or more. Concrete shall be forced under and around the expansion device. The vertical and horizontal concrete vent holes shall be offset from each other. Do not alternate holes at the 12" spacing.

Concrete shall be poured in 1-foot or less lifts. The concrete shall be achieved by hand finishing within one foot of the expansion device. The vertical and horizontal concrete vent holes shall be offset from each other. Do not alternate holes at the 12" spacing.

Concrete shall be poured around the expansion device and barrier plate. The vertical leg of the angle at the expansion device ends shall not be more than ±1" from vertical plate and the vertical leg of the angle at the expansion device shall be in accordance with Sec 1037.

Permissible field splice at end bent

General Notes:

Note: This drawing is not to scale. Follow dimensions.

Bevel barrier plate on roadway face

Recess barrier to permit free movement of plate.

1/2" Barrier Plate

Bevel barrier plate on roadway face

General Notes:

Note: This drawing is not to scale. Follow dimensions.

Bevel barrier plate on roadway face

Recess barrier to permit free movement of plate.

1/2" Barrier Plate

Bevel barrier plate on roadway face

General Notes:

Note: This drawing is not to scale. Follow dimensions.

Bevel barrier plate on roadway face
STANDARD DRAWING GUIDANCE (do not show on plans):

1. Bar height.
2. Plate length = 12”/cos(skuw) (12” for 0° skew)
3. Barrier gap = 2/3”/cos(skuw) (2/3” for 0° skew)
4. Barrier recess gap = 2/3”/cos(skuw) (2/3” for 0° skew)
   Assume recess ends at front edge of bar.
5. Installation gap adjustment for temperature: normal to joint.
6. Check and revise locations of slotted wells to clear girder end section reinforcement.
7. Delete panel for CIP slab.

Note: Concrete vent holes not shown for clarity.
RA TYPE D BARRIER

PART PLAN
Note: Concrete vent holes not shown for clarity.

RA TYPE B BARRIER (SBC)

PART PLAN
Note: Concrete vent holes not shown for clarity.

PERMISSIBLE FIELD SPLICE AT END BENT

RA

PART ELEVATION AT END OF BENT BARRIER PLATE

SECTION A-A

SECTION B-B

SECTION C-C

ELEVATION OF BARRIER

TYPE B BARRIER (SBC)(ALL)
Expansion device shall be fabricated in one section, except for stage construction and when the length is over 50 feet. A complete joint penetration groove weld shall be provided. Pure copper (99.99%), having a melting point of 1084°F, is provided a smooth surface. The expansion device shall be fabricated and installed in the crown and grade of the roadway.

Plan dimensions are based on installation at 60°F. When the expansion device is to be installed above or below this temperature, the expansion gap and other dimensions shall be increased or decreased " for each 10°F fall or rise in temperature at installation.

Material for the expansion device shall be ASTM A505 Grade 36 structural steel. Anchor bolts in the expansion device shall be Grade 50 and be galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

Panels shall be cut and the vertical leg of the angle at the expansion device.

Bolts and the vertical leg of the angle at the expansion device.

Concrete shall be forced under and around flat plate, roadway plate and barrier plate anchors and angles. Proper consolidation shall be achieved by hand finishing of the concrete around the anchors and angles. The vertical and horizontal concrete vent holes shall be offset from each other. Do not alternate holes at the 12" cts. spacing.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.

Concrete shall be applied to the roadway face.
STANDARD DRAWING GUIDANCE (do not show on plans):

1. Bar height.
2. Plate length = 12"/cos(skew) [12" for 0° skew]
3. Barrier gap = 3"/cos(skew) [3" for 0° skew]
4. Barrier recess gap = 2"/cos(skew) [2" for 0° skew]. Assume recess ends at front edge of bar.
5. Installation gap adjustment for temperature: normal to joint.
6. Check and revise locations of slotted wells to clear girder end section reinforcement.
7. Delete panel for CIP slab.

Note: Concrete vent holes not shown for clarity.
Recess barrier to permit free movement of plate.

7/16"Ø Hole countersunk in roadway plate; Slotted Hole 1/2" x 1/2" in angle; Bar 1 1/4" x 3/8" x 8" long welded stud; Head stove bolt at set 4'-0" cts. Remove bolt after concrete has set.

Note: Concrete vent holes not shown for clarity.

RA TYPE D BARRIER

PART PLAN

RA TYPE B BARRIER (SBC)

PART PLAN

Note: Concrete vent holes not shown for clarity.

RA TYPE B BARRIER (SBC) (ALL)
**Standard Drawing Guidance (do not show on plans):**

- Revise notes and details per project as necessary.
- Use standard detailing notes H5.33, H5.33 thru H5.36 (FG 15.30) when new armor is to be used. Modify note H5.35 for open cell foam joint seal.
- Use standard detailing note H5.55 when polymer concrete wearing surface is used with an open cell foam joint seal.
- When new steel armor is to be installed, use armor information from P.COM standard drawing and modify as needed.
- Omit "±" when not applicable.

**General Notes:**

Open cell foam joint seal size shall be determined by the manufacturer. Manufacturer recommended seal size shall meet the movement and installation gap requirements and skew effect.

The open cell foam joint seal shall be installed according to the manufacturer's recommendations.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

**SECTION THRU JOINT**

**AT ABUTMENT NO.**

**Manufacturer's recommended size**

Extend seal 3" past edges of slab.

---

<table>
<thead>
<tr>
<th>Movement of Joint</th>
<th>Movement Normal to Joint</th>
<th>Min. Joint Width (Normal to Joint)</th>
<th>Max. Joint Width (Normal to Joint)</th>
<th>Min. Jt. Width (Normal to Joint) @ 40°F</th>
<th>Max. Jt. Width (Normal to Joint) @ 40°F</th>
<th>Min. Jt. Width (Normal to Joint) @ 50°F</th>
<th>Max. Jt. Width (Normal to Joint) @ 50°F</th>
<th>Min. Jt. Width (Normal to Joint) @ 60°F</th>
<th>Max. Jt. Width (Normal to Joint) @ 60°F</th>
<th>Min. Jt. Width (Normal to Joint) @ 70°F</th>
<th>Max. Jt. Width (Normal to Joint) @ 70°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
</tbody>
</table>

*MoDOT construction personnel will record the manufacturer and seal name that was used.*

---

**OPEN CELL FOAM JOINT SEAL**

**Note:** This drawing is not to scale. Follow dimensions.
**SEAL01_OCF  Alternate Details**

**SECTION THRU JOINT AT END OF BRIDGE APPROACH SLAB**

- Manufacturer's recommended size
- Extend seal full width of approach slab.

*Between bridge approach slab and concrete approach pavement (Use only with approval of SPM or SLE)*

**SECTION THRU JOINT AT _____ NO. _____**

- Manufacturer's recommended size
- Extend seal 3" past edges of slab.

*With existing steel armor*

**SECTION THRU JOINT AT ABUTMENT NO. _____**

- Manufacturer's recommended size
- Extend seal 3" past edges of slab.

*Between slab and approach slab*

**SECTION THRU JOINT AT BENT NO. _____**

- Manufacturer's recommended size
- Extend seal 3" past edges of slab.

*Use for locations other than approach slab*
**Allowed Transverse Preformed Silicone or EPDM Joint Seals**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Seal Name</th>
<th>Movement Parallel to Roadway</th>
<th>@ 40°F</th>
<th>@ 50°F</th>
<th>@ 60°F</th>
<th>@ 70°F</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>R J Watson</td>
<td>Silicoflex SPS10</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td></td>
</tr>
<tr>
<td>R J Watson</td>
<td>Silicoflex SPS75</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td></td>
</tr>
<tr>
<td>Watson Bowman Acme Wabo</td>
<td>Preformed Silicone Joint Seal</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td></td>
</tr>
<tr>
<td>Watson Bowman Acme Wabo</td>
<td>Preformed Silicone Joint Seal</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td></td>
</tr>
<tr>
<td>D S Brown EPDM Joint Seal</td>
<td>V Seal V-500</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td></td>
</tr>
<tr>
<td>D S Brown EPDM Joint Seal</td>
<td>V Seal V-800</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td></td>
</tr>
</tbody>
</table>

**General Notes:**

- The seal shall be installed in joints in one continuous piece without field splices. Factory splices are permitted for joints in excess of 5 feet.
- The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.
- (1) Allowed installation gap (±) normal to joint at roadway surface (see table).
- (2) Installation depth (±) per manufacturer's recommendation.

**MoDOT Construction personnel will indicate the type of seal used.**

---

**Standard Drawing Guidance:**

- Do not show on plans:
- Remove non-applicable rows in table.
- Revise notes and details per project as necessary.
- Use standard detailing notes H5.31, H5.33 thru H5.36 (EPG 751.50) when new armor is to be used.
- Modify note H5.33 for preformed silicone or EPDM joint seal.
- When new armor is to be installed, use armor information from P.COM standard drawing and modify as needed.
- Omit "±" when not applicable.
Preformed silicone or EPDM seal.

SECTION THRU JOINT AT ____ NO. _

Polymer concrete shall be in accordance with Sec 623.

Joint gap (opening) wider than 3" during installation may require use of backer rod to keep seal in place while adhesive is curing.
X. MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALL SYSTEM

Indicates location of borings. Notice and Disclaimer Regarding Boring Log Data

The locations of all subsurface borings for this structure are shown on the plan sheet(s) for this structure. The boring data for all locations, indicated as required by the Commission in Sec 220.24 and as may be required by the Commission in Sec 220.50 and other factual records of subsurface data and investigations performed by the department for the foundation design project in accordance with Sec 220.50, and may be obtained in the form of a report from the Commission or other source.

The data is also available from the Project Engineer upon written request. No greater significance or weight shall be given to the boring data obtained from the shop drawings. The boring log data is given to the subsurface data available from the district engineer(s). The Commission does not represent or warrant that any such boring data accurately depicts the conditions to be encountered in constructing this project. Also, neither the Commission nor the contractor may rely upon any other factual record not expressly warranted by the contractor.

Plan

Ground Improvement

Concrete Leveling pad not shown for clarity. (1)

Details of Ground Improvements

Concrete leveling pad: 4 square feet.

Locates of Wall System

Proprietary Wall Systems Data Table:

The MSE Wall System shall be a small large block wall system.

Standard specifications:

The MSE Wall System shall be built in accordance with Sec 720.

The design stress for the select granular backfill (reinforced backfill) only 34° for the select granular backfill is 34° for the select granular backfill (reinforced backfill) only for structural systems.

The minimum compressive strength of concrete for precast panels shall be 4,000 psi in accordance with Sec 1052.

The MSE Retaining Wall System shall be a small large block wall system. The MSE Wall System shall be built in accordance with Sec 720.

If a seal is present on this sheet, it has been electronically sealed and dated.


table

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>System</th>
<th>Facing Unit Manufacturer</th>
<th>Facing Unit</th>
<th>Geogrid Manufacturer</th>
<th>Geogrid</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>System</td>
<td>Facing Unit Manufacturer</td>
<td>Facing Unit</td>
<td>Geogrid Manufacturer</td>
<td>Geogrid</td>
<td>Type</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>System</td>
<td>Facing Unit Manufacturer</td>
<td>Facing Unit</td>
<td>Geogrid Manufacturer</td>
<td>Geogrid</td>
<td>Type</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>System</td>
<td>Facing Unit Manufacturer</td>
<td>Facing Unit</td>
<td>Geogrid Manufacturer</td>
<td>Geogrid</td>
<td>Type</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>System</td>
<td>Facing Unit Manufacturer</td>
<td>Facing Unit</td>
<td>Geogrid Manufacturer</td>
<td>Geogrid</td>
<td>Type</td>
</tr>
</tbody>
</table>

General Notes:

Design Specifications:

2002 AASHTO (13th Ed.) Standard Specifications (Section 5 ASD Design) Seismic Performance Category = G1

Acceleration Coefficient = 

Design loading:

Dp = - and unit weight, w = 60 ksf for retained backfill material to be retained by the mechanically stabilized earth wall system.

For improved foundation ground where wall is to bear:

Allowable bearing pressure and limits of improved foundation ground shall not be adjusted from that as shown on the plans.

Contractor shall include design # = (actual # x w) and the total unit weight, y, for the select granular backfill (reinforced backfill) and wedge area backfill for structural systems or shop drawings. Contractor shall identify source of select granular backfill material, submit proration in accordance with AASHTO table 5.8.5.2A, and submission with the shop drawings.

From AASHTO table 5.8.5.2A, in accordance with ASTM D4253 and ASTM D3055, and for unimproved foundation ground shall be in accordance with Sec 1052.

A filter cloth meeting the requirements for a Separation Geotextile material coated.

For seismic design the factor of safety shall be 1.5 for overturning and 1.5 for sliding.

The default values for the pullout friction factor, Fp, in accordance with AASHTO table 5.8.5.2A, and design value for scale effect correction factor, α, in accordance with AASHTO table 5.8.5.2A, and for approved steel system shall be 0.3. (See Table 5.8.5.2A).

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

Design # = 34° for the select granular backfill (reinforced backfill) only for structural systems

The minimum compressive strength of concrete for precast panels shall be 4,000 psi in accordance with Sec 1052.

For seismic design the factor of safety shall be 1.5 for overturning and 1.5 for sliding.

The default values for the pullout friction factor, Fp, in accordance with AASHTO table 5.8.5.2A, and design value for scale effect correction factor, α, in accordance with AASHTO table 5.8.5.2A, and for approved steel system shall be 0.3. (See Table 5.8.5.2A).

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

Design # = 34° for the select granular backfill (reinforced backfill) only for structural systems

The minimum compressive strength of concrete for precast panels shall be 4,000 psi in accordance with Sec 1052.

For seismic design the factor of safety shall be 1.5 for overturning and 1.5 for sliding.

The default values for the pullout friction factor, Fp, in accordance with AASHTO table 5.8.5.2A, and design value for scale effect correction factor, α, in accordance with AASHTO table 5.8.5.2A, and for approved steel system shall be 0.3. (See Table 5.8.5.2A).

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

Design # = 34° for the select granular backfill (reinforced backfill) only for structural systems

The minimum compressive strength of concrete for precast panels shall be 4,000 psi in accordance with Sec 1052.

For seismic design the factor of safety shall be 1.5 for overturning and 1.5 for sliding.

The default values for the pullout friction factor, Fp, in accordance with AASHTO table 5.8.5.2A, and design value for scale effect correction factor, α, in accordance with AASHTO table 5.8.5.2A, and for approved steel system shall be 0.3. (See Table 5.8.5.2A).

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.

Design # = 34° for the select granular backfill (reinforced backfill) only for structural systems

The minimum compressive strength of concrete for precast panels shall be 4,000 psi in accordance with Sec 1052.

For seismic design the factor of safety shall be 1.5 for overturning and 1.5 for sliding.

The default values for the pullout friction factor, Fp, in accordance with AASHTO table 5.8.5.2A, and design value for scale effect correction factor, α, in accordance with AASHTO table 5.8.5.2A, and for approved steel system shall be 0.3. (See Table 5.8.5.2A).

The maximum applied bearing pressure for the controlling design case at the foundation level shall be shown on the shop drawings and shall be less than the allowable bearing pressure for foundation ground provided herein. For unimproved foundation ground where wall is to be built, the maximum applied bearing pressure shall be less than two times the allowable bearing pressure for foundation ground shown on the shop drawings.
Revise notes and details per project as necessary.

1. Show the minimum embedment = maximum (2 feet; embedment based on Geotechnical Report and global stability requirements, and FHWA-NHI-10-024, Table 2-2).

2. Show theoretical top of leveling pad elevation on the plan based on minimum embedment requirements. Minimum embedment shall be provided in accordance with FHWA-NHI-10-024, Table 2-2, and Geotechnical Report.

3. The allowable bearing pressure and an angle of internal friction, Φ, for unimproved and improved ground where wall is to be placed above note on plans and if rock is to be excavated for MSE wall construction.

4. Use the underlined portion from note FIGR 10-10-1035a when limits of improved foundation ground is required by Geotechnical Section.

5. Use for all large block MSE walls.

6. Use for all large block walls. Use for small block walls if applicable.

7. Use for small block walls unless the small block wall is to be built vertically.

NOTES TO ROADWAY AND BRIDGE DESIGNERS:

Extraction classes, quantities and pay items are the responsibility of District Design Division for including on the roadway 2B quantity sheets which is noted on the MSEW plans and required in accordance with Sec 720. All other quantities required in accordance with Sec 720 will be developed for including on the roadway 2B quantity sheets which is noted on the MSEW plans and required in accordance with Sec 720. All other quantities are the responsibility of the division responsible for the MSEW wall plans.

If rock is not known to exist from a geotechnical report or study, place the following note on the plans:

“If rock is encountered in the proposed reinforced backfill area or wedge area of the MSE wall before or during excavation, the contractor shall immediately cease excavating and notify the engineer.”

Otherwise, if rock is known to exist and it is to be excavated, then do not place above note on plans and determine the excavation class and estimate a rock quantity. For all Bridge Division MSE walls, Bridge Division and Design Division shall coordinate in estimating excavation quantities when rock is known to exist from the geotechnical report and shall be used as part of the wall backfill or excavated for MSE wall construction.
General Notes Cont.:

- Minimum 18" wide Geotextile strips shall be centered at vertical and horizontal joints of panel. Geotextile material shall be bonded to backfill. Minimum 18" wide Geotextile strips shall be used at all vertical and horizontal joints of each fabric strip. Geotextile strips shall provide a positive seal. A minimum 18" wide Geotextile strip shall be provided between spliced Geotextile strips.

- Aligned soil reinforcement shall have edges coated with coating material per manufacturer.

- Soil reinforcement shall be spaced to avoid roadway drop inlets behind wall.

- Two layers of soil reinforcement shall be extended 3 feet beyond the lower layer when wall height is greater than or equal to 60 feet.

- All steel soil reinforcements shall be separated from other metallic elements by at least 3 inches.

- The spay angle should be less than 15° and tensile capacity of sprayed reinforcement shall be reduced by the cosine of the spray angle. Soil reinforcement shall clear the obstruction by at least 3 inches.

- No reinforcement shall be left unconnected to the wall face or arbitrarily cut in the field to avoid the obstruction.

- Where interference between the vertical obstruction and the soil reinforcement is unavoidable, the length of the wall from the obstruction shall be modified using one of the alternative sections in MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION Standard Plans, Section 5.4.2. Formal layout of the drawing is for wall designs with horizontal obstructions in reinforced soil mass, see MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION Standard Plans, Section 5.4.3.

- Reinforced Coping for structural systems shall be attached to wall by panel dowels.

- Slope excavation shall be bench ed and separation Geotextile shall be placed between the retained backfill and the select granular backfill for structural systems meeting the requirements of Section 1010.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010.

- For MSE Walls, the angle of internal friction for the selected backfill shall not be greater than 40° for computations.

- Final configuration of this option shall be sent to Geotechnical Section for new overall global stability analysis. Design Wagner shall be assumed on the shop drawings if used.

- The slope excavation line shall be bench ed and separation Geotextile shall be placed between the retained backfill and the select granular backfill for structural systems meeting the requirements of Section 1010.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.

- For MSE Walls, the retained backfill excavation fill line and the horizontal line is less than 90°, the wedge area backfill may be reduced with select granular backfill for structural systems meeting the requirements of Section 1010. If Φ ≥ 40°, the properties for select granular backfill shall be used for active force computations.
Standard Drawing Guidance (do not show on plans):

Revise notes and details per project as necessary.

For Modified Type A and Type B Gutter and Fence Post Connection details, see Missouri Standard Plans No. 607.11.

For Type A & Type B Gutter information, see Missouri Standard Plans No. 605.00.

See EPG 751.24.2.1 for drainage guidance.

1. Show the minimum embedment = maximum (2 feet; embedment based on Geotechnical Report and global stability requirements; and FMVA-NHI-10-024, Table 2-2).

2. Minimum soil reinforcement length shall be based on the following cases in accordance with EPG 751.6.2.2:

   Maximum (0.7H, 8 ft, or FIGR) for a non-seismic design.
   Maximum (0.7H, 8 ft, or FIGR, seismic loading requirement) for a seismic design.
   Maximum (0.8H, 8 ft, or FIGR) for a sloping backfill surcharge case.

   Soil reinforcement length shall be greater than or equal to be required for a stable feature wall for strongest rock case.

   Where:

   \[ H = \text{Height of the wall as measured from the top of the leveling pad to the top of the wall.} \]
   \[ \text{FIGR = Foundation Investigation Geotechnical Report} \]

3. Use for MSE walls in Seismic Categories B, C & D.

4. District Design Division to verify 6" diameter pipe or increase diameter. Minimum pipe diameter shall be 6".

5. Use for MSE Walls when there may be contact between dissimilar metals.

6. Use for MSE Walls when there may be vertical and/or horizontal obstructions in reinforced soil mass.

7. Use for all large block MSE walls.

8. Do not show values in the plan details. MSE wall designer shall include this table on shop drawings and provide values used in the design computations.
Reinforced Coping shall be attached to wall by panel dowels. (1)

Sec 1010
Structural Systems
Backfill for Structural Systems

Sec 720 and Sec 1013
Drainage System (3)

TYPICAL SECTION THRU LARGE BLOCK WALL SHOWING FILTER CLOTH.

Note: This drawing is not to scale. Follow dimensions.

Note: For additional information, see "TYPICAL SECTION THRU LARGE BLOCK WALL SHOWING FILTER CLOTH."

(1) Inverted U-shape reinforced capstone may be used in lieu of coping. Panel dowels for level-up concrete shall be required and provided by manufacturer. The dowels shall be field trimmed to clear the capstone by a minimum of 1 1/2 inches and a maximum of 2 1/2 inches.

(2) Topmost layer of reinforcement shall be fully covered with select granular backfill for structural systems as approved by the wall manufacturer. Before placement of the separation geotextile.

(3) Minimum 0.75" diameter perforated PVC or PE pipe. Manufacturer shall show drain details on design plans to be submitted as shown on MODOT MSE wall plans and/or roadway plans.

(4) See bridge plans.

For bridge lengths greater than 200 feet, use 5" - 6" minimum backfill which is based on the use of 24" inside diameter pipe pile spacers and FHWA-NHI-10-0024, Figure 5-17C. For larger length pipes, add pipe diameter. For bridge lengths longer than 200 feet, add pipe diameter. See EPG 751.24.2.1 for drainage guidance.

For walls parallel to abutment, provide actual slope H:V. Otherwise, replace leadered note with "Varies (4)".

Cover type should be selected at core team meeting.

For Modified Type A and Type B Gutters and Fence Post Connection Details, see Missouri Standard Plans No. 607.11.

For Type A and Type B Gutter information, see Missouri Standard Plans No. 609.09.

See MO DOT Standard Guidance (do not show on plans):

Standard Drawing Guidance (do not show on plans):

Revise notes and details per project as necessary.

Otherwise, replace leadered note with "Varies (4)".

See Missouri Standard Plans No. 609.09.

Note: For additional information, see "TYPICAL SECTION THRU LARGE BLOCK WALL SHOWING FILTER CLOTH."

(1) Inverted U-shape reinforced capstone may be used in lieu of coping. Panel dowels for level-up concrete shall be required and provided by manufacturer. The dowels shall be field trimmed to clear the capstone by a minimum of 1 1/2 inches and a maximum of 2 1/2 inches.

(2) Topmost layer of reinforcement shall be fully covered with select granular backfill for structural systems as approved by the wall manufacturer. Before placement of the separation geotextile.

(3) Minimum 0.75" diameter perforated PVC or PE pipe. Manufacturer shall show drain details on design plans to be submitted as shown on MODOT MSE wall plans and/or roadway plans.

(4) See bridge plans.

For bridge lengths greater than 200 feet, use 5" - 6" minimum backfill which is based on the use of 24" inside diameter pipe pile spacers and FHWA-NHI-10-0024, Figure 5-17C. For larger length pipes, add pipe diameter. For bridge lengths longer than 200 feet, add pipe diameter. See EPG 751.24.2.1 for drainage guidance.

For walls parallel to abutment, provide actual slope H:V. Otherwise, replace leadered note with "Varies (4)".

Cover type should be selected at core team meeting.

For Modified Type A and Type B Gutters and Fence Post Connection Details, see Missouri Standard Plans No. 607.11.

For Type A and Type B Gutter information, see Missouri Standard Plans No. 609.09.

See MO DOT Standard Guidance (do not show on plans):

Standard Drawing Guidance (do not show on plans):

Revise notes and details per project as necessary.

Otherwise, replace leadered note with "Varies (4)".
Reinforced Coping shall be attached to wall by panel dowels (coping only at large block wall). (1) Inverted U-shape reinforced capstone may be used in lieu of copings.

Panel dowels (coping only) shall be embedded 4'-0" deep and all dowels shall be 1/2" in diameter. Dowels shall be spaced at a maximum of 12" centers.

Joint Seal (Rdwy item)
Joint Filler (Rdwy item)

Reinforced Coping shall be attached to wall by panel dowels (coping only at large block wall). (1) Inverted U-shape reinforced capstone may be used in lieu of copings.

Panel dowels (coping only) shall be embedded 4'-0" deep and all dowels shall be 1/2" in diameter. Dowels shall be spaced at a maximum of 12" centers.

Joint Seal (Rdwy item)
Joint Filler (Rdwy item)

Reinforced Coping shall be attached to wall by panel dowels (coping only at large block wall). (1) Inverted U-shape reinforced capstone may be used in lieu of copings.

Panel dowels (coping only) shall be embedded 4'-0" deep and all dowels shall be 1/2" in diameter. Dowels shall be spaced at a maximum of 12" centers.

Joint Seal (Rdwy item)
Joint Filler (Rdwy item)
GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A complete joint penetration groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fastened and installed to the crown and grade of the roadway.

Structural steel for the expansion joint system shall be ASTM A709 Grade 36. Anchors for the expansion joint system shall be in accordance with Sec 1037. Preformed compression seal expansion joint system shall be in accordance with Sec 712.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

Concrete shall be formed on the expansion joint system according to Sec 1037. Concrete shall be protected by localized internal vibration. Vertical leg of angle shall be a minimum of Manufacturer's Recommended Height + 3/4". Horizontal leg of angle shall alternately spaced at about 9" cts.

Note: This drawing is not to scale. Follow dimensions.

<table>
<thead>
<tr>
<th>Seal Width</th>
<th>Movement Capacity (Normal to Joint)</th>
<th>Width (Normal)</th>
<th>Height</th>
<th>Minimum Installation Gap (Normal to Joint)</th>
<th>Manufacturer</th>
<th>Seal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.27&quot;</td>
<td>0.85&quot;</td>
<td>1.06&quot;</td>
<td>1.93&quot;</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>2.50&quot;</td>
<td>1.00&quot;</td>
<td>1.13&quot;</td>
<td>2.13&quot;</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>3.00&quot;</td>
<td>1.30&quot;</td>
<td>1.25&quot;</td>
<td>2.55&quot;</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>3.50&quot;</td>
<td>1.60&quot;</td>
<td>1.38&quot;</td>
<td>2.98&quot;</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>4.00&quot;</td>
<td>1.83&quot;</td>
<td>1.57&quot;</td>
<td>3.45&quot;</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>4.50&quot;</td>
<td>2.20&quot;</td>
<td>1.60&quot;</td>
<td>3.83&quot;</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
</tbody>
</table>

Note: Depth of seal shall not be less than width of seal. Size of anchor angle shall be a minimum of Manufacturer's Recommended Height + 2/3". Horizontal leg of angle shall be 32". Vertical leg of angle shall be a minimum of 1/2". Minimum thickness of angle shall be 1/2".

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT Construction personnel will record the manufacturer and seal name that was used.

Note: This drawing is not to scale. Follow dimensions.

PART PLAN

PART ELEVATION

SECTION THRU DEVICE

Table of Transverse Preformed Compression Seal Expansion Joint System Dimensions

PART A-A

PART B-B

DETAIL A

DETAIL B
STANDARD DRAWING GUIDANCE (do not show on plans):

For slab thickness < 8 1/2", check shear connector stud length for clearance to flange or diaphragm and adjust length as necessary. See Structural Project Manager.

Use standard detailing note H5.55 when polymer concrete wearing surface is used with a preformed compression seal.

Remove non-applicable rows in table.

1. Piece angle length to center of first slotted hole.
2. Use squared, left advanced or right advanced Part Plan as needed.
3. = 3/4" (Min.) @ 60°. Verify only.
4. = @ 60° + 3/4" (Min.). Verify only.
5. Delete panels for CIP slab.

Left Advanced

1/2"Ø Machine bolt at about 18" cts. with hardwood spacer block. Cut machine bolt flush with angles after concrete in last pour has taken initial set. (Typ.)

Right Advanced

1/2"Ø Machine bolt at about 18" cts. with hardwood spacer block. Cut machine bolt flush with angles after concrete in last pour has taken initial set. (Typ.)
**GENERAL NOTES:**

Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A joint system fabricated in two sections may be used. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed in the crown and grade of the roadway.

Structural steel for the expansion joint system shall be ASTM A572 Grade 50. Anchors for the expansion joint system shall be in accordance with Sec. 217. Prefabricated compression seal expansion joint system shall be in accordance with Sec. 217.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A265. Anchors need not be protected from overspray.

Concrete shall be forced under armor angle and around anchors. Proper consolidation of the concrete shall be achieved by localized internal vibration.

Longitudinal reinforcing steel shall be placed so that ends shall be 2" from the vertical leg of the angle at the expansion joint system.

---

**Table of Transverse Preformed Compression Seal Expansion Joint System Dimensions**

<table>
<thead>
<tr>
<th>Seal Width (in.)</th>
<th>Movement Capacity (in.)</th>
<th>Min. Joint Width (in.)</th>
<th>Max. Joint Width (in.)</th>
<th>Allowed Installation Gap (in.)</th>
<th>Air/Surface Temperature (°F)</th>
<th>Manufacturer</th>
<th>Seal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5&quot;</td>
<td>1.67&quot;</td>
<td>1.90&quot;</td>
<td>2.10&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>1.67&quot;</td>
<td>1.90&quot;</td>
<td>2.10&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>1.67&quot;</td>
<td>1.90&quot;</td>
<td>2.10&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
</tbody>
</table>

Note: Depth of seal shall not be less than width of seal.

Size of armor angle: Vertical leg of angle shall be a minimum of Manufacturer’s Recommended Height 3. Horizontal leg of angle shall be a minimum of 1. Minimum thickness of angle shall be 1/8".

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT Construction personnel will record the manufacturer and seal name that was used.

---

**Table of Transverse Preformed Compression Seal Expansion Joint System Dimensions**

<table>
<thead>
<tr>
<th>Seal Width (in.)</th>
<th>Movement Capacity (in.)</th>
<th>Min. Joint Width (in.)</th>
<th>Max. Joint Width (in.)</th>
<th>Allowed Installation Gap (in.)</th>
<th>Air/Surface Temperature (°F)</th>
<th>Manufacturer</th>
<th>Seal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5&quot;</td>
<td>1.67&quot;</td>
<td>1.90&quot;</td>
<td>2.10&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>1.67&quot;</td>
<td>1.90&quot;</td>
<td>2.10&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>1.67&quot;</td>
<td>1.90&quot;</td>
<td>2.10&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>70&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>50&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>1.38&quot;</td>
<td>1.60&quot;</td>
<td>1.80&quot;</td>
<td>0.00&quot;</td>
<td>40&quot;</td>
<td>XXX</td>
<td>XXX XXX</td>
</tr>
</tbody>
</table>

Note: Depth of seal shall not be less than width of seal.

Size of armor angle: Vertical leg of angle shall be a minimum of Manufacturer’s Recommended Height 3. Horizontal leg of angle shall be a minimum of 1. Minimum thickness of angle shall be 1/8".

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT Construction personnel will record the manufacturer and seal name that was used.
STANDARD DRAWING GUIDANCE (do not show on plans):

For slab thickness < 8 1/2", check shear connector stud length for clearance to flange or diaphragm and adjust length as necessary. See Structural Project Manager.

Use standard detailing note H5.55 when polymer concrete wearing surface is used with a preformed compression seal.

Remove non-applicable rows in table.

A Use squared, left advanced or right advanced Part Plan as needed.

B = 3/4" (Min.) @ 60°. Verify only.
C = 1 @ 60° + 3/4" (Min.). Verify only.

Delete panels for CIP slab.

A Use squared, left advanced or right advanced Part Plan as needed.

B = 3/4" (Min.) @ 60°. Verify only.
C = 1 @ 60° + 3/4" (Min.). Verify only.

Delete panels for CIP slab.
GENERAL NOTES:

Expansion Joint System shall be fabricated in one section, except for staged construction where the length in over 50 ft. A complete joint penetration groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed to the crown and grade of the roadway.

Structural steel for the expansion joint system shall be ASTM A572 Grade 50. Anchors for the expansion joint system shall be in accordance with Sec 115. PREFORMED COMPRESSION SEAL EXPANSION JOINT SYSTEM shall be in accordance with Sec 718.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of high quality paint, providing a total dry film thickness of 2 mils. anchors shall be protected from overspray as required by MoDOT.

Concrete shall be forced under armor angle and around anchors. Proper consolidation of the concrete shall be achieved by localized internal vibration.

Longitudinal reinforcing steel shall be placed so that ends shall be 2" from the vertical leg of the angle at the expansion joint system.

Table of Transverse Preforemed Compression Seal Expansion Joint System Dimensions

<table>
<thead>
<tr>
<th>Seal Width (in.)</th>
<th>Height Requirement</th>
<th>Movement Capacity (in.)</th>
<th>Min. Joint Width (in.)</th>
<th>Max. Joint Width (in.)</th>
<th>Allowable Installation Temperature (°F)</th>
<th>Manufacturer</th>
<th>Seal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5&quot;</td>
<td>Manufacturer's recommended height</td>
<td>0.85</td>
<td>1.04</td>
<td>1.91</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>Manufacturer's recommended height</td>
<td>1.00</td>
<td>1.33</td>
<td>2.13</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>3.0&quot;</td>
<td>Manufacturer's recommended height</td>
<td>1.30</td>
<td>1.59</td>
<td>2.55</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>Manufacturer's recommended height</td>
<td>1.60</td>
<td>1.88</td>
<td>2.98</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>Manufacturer's recommended height</td>
<td>1.83</td>
<td>2.15</td>
<td>3.40</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>4.5&quot;</td>
<td>Manufacturer's recommended height</td>
<td>2.27</td>
<td>2.56</td>
<td>3.83</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
</tbody>
</table>

Note: Depth of seal shall not be less than width of seal.

Size of armor angle shall be a minimum of Manufacturer's Recommended Height + 3/4" Horiz. leg of angle shall be a minimum of 3" Minimum thickness of armor shall be 1/2".

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT Construction personnel will record the manufacturer and seal name that was used.

PREFORMED COMPRESSION SEAL EXPANSION JOINT SYSTEM AT INTERMEDIATE BENT NO.

Note: This drawing is not to scale. Follow dimensions.
STANDARD DRAWING GUIDANCE (do not show on plans):

For slab thickness < 8 1/2", check shear connector stud length for clearance to
flange or diaphragm and adjust length as necessary.  See Structural Project
Manager.

Use standard detailing note H5.53 when polymer concrete wearing surface is used
with a preformed compression seal.

Remove non-applicable rows in table.

A Use squared, left advanced or right advanced Part Plan
as needed.

B = 3/4" (Min.) @ 60° Verify only.

C = 1 @ 60°+ 3/4" (Min.) Verify only.

Delete panels for CIP slab.

PART PLAN

Left Advanced

Roadway Face
of Barrier
(Gutter Line)

Working Point
(At front face
of backwall at
gutter line)

3/4"Ø x 8" Long Welded
Shear Connector Studs
Alternately Spaced
(See Detail B)

Angle 3 1/2 x 5 x
5/16 x 6" long (Typ.)
(See Detail B)

1/4" x 1/2" Bar

3/4"Ø x 8" Long Welded
Shear Connector Studs
Alternately Spaced
at about 9" cts. (Typ.)

1/4" x 1/2" Bar

PART PLAN

Right Advanced

Roadway Face
of Barrier
(Gutter Line)

Working Point
(At front face
of backwall at
gutter line)

3/4"Ø x 8" Long Welded
Shear Connector Studs
Alternately Spaced
at about 9" cts. (Typ.)

1/4" x 1/2" Bar

3/4"Ø x 8" Long Welded
Shear Connector Studs
Alternately Spaced
at about 9" cts. (Typ.)

5/16" Plate (Typ.)
(See Detail B)

5/16" Plate (Typ.)
(See Detail B)

5/16" Plate (Typ.)
(See Detail B)

5/16" Plate (Typ.)
(See Detail B)
Standard Drawing Guidance (do not show on plans):

1. Use Type 3 for weathering steel bolted connections and Type 1 for painted or galvanized steel bolted connections.
Standard Drawing Guidance (do not show on plans):

Choose the appropriate Plan of Flange.

Detail of Bolted Field Splice shown is for flange splices with a uniform hole pattern only. Detail will need to be modified to accommodate flange splices with a staggered hole pattern (14” & 15” flanges).

1. Use Type 3 for weathering steel bolted connections and Type 1 for painted or galvanized steel bolted connections.

Bolts shall be 7/8-inch diameter ASTM F3125 Grade A325 Type 1 and Type 3 in 15/16-inch diameter holes.

Contact surfaces shall be in accordance with Sec 1081 for surface preparation.

Not: This drawing is not to scale. Follow dimensions.
### GALVANIZED CLOSED ENDED CAST-IN-PLACE (CECIP) CONCRETE PILE

**WITHOUT PILE POINT REINFORCEMENT**

- **Vertical Bars** (Equally spaced)
- **Closure Plate**
- **In-Place Pile**

#### CRUCIFORM PILE POINT

**Notes:**
- Cast of closure plate is included with cast-in-place concrete pile.
- Cruciform pile point shall be ASTM A709 Grade 50.

#### MANUFACTURED CONICAL PILE POINT

**Notes:**
- Welded or seamless steel pipe shall be ASTM A252 Grade 3 (fy = 45,000 psi).
- Steel for cruciform pile point reinforcement shall be ASTM A709 Grade 50.

#### Steel Pipe Pile Splice

**Notes:**
- Welded or seamless steel pipe shall be ASTM A252 Grade 3 (fy = 45,000 psi).
- The contractor shall determine the pile wall thickness required to avoid damage from all driving activities, but wall thickness shall not be less than the minimum specified. No additional payment will be made for furnishing a thicker pile wall than specified on the plans.

**Details:**
- Vertical Bar
- Stirrup Bar
- Plate
- Field Fabricated or Commercial Backing Ring with Pins

**Details:**
- Conical Point
- Conical Point Reinforcement Data
- Closing Plate Thickness
- Steel Pipe Pile Splice
- Bond Plate Thickness
- Upper Stirrup Bars
- Lower Stirrup Bars

---

**Notes:**
- Welded or seamless steel pipe shall be ASTM A252 Grade 3 (fy = 45,000 psi).
- Steel for closure plate shall be ASTM A709 Grade 50.
- Steel for cruciform pile point reinforcement shall be ASTM A709 Grade 50.

**Details:**
- Vertical Bar
- Stirrup Bar
- Plate
- Field Fabricated or Commercial Backing Ring with Pins

**Details:**
- Conical Point
- Conical Point Reinforcement Data
- Closing Plate Thickness
- Steel Pipe Pile Splice
- Bond Plate Thickness
- Upper Stirrup Bars
- Lower Stirrup Bars

---

**Notes:**
- Welded or seamless steel pipe shall be ASTM A252 Grade 3 (fy = 45,000 psi).
- Steel for closure plate shall be ASTM A709 Grade 50.
- Steel for cruciform pile point reinforcement shall be ASTM A709 Grade 50.

**Details:**
- Vertical Bar
- Stirrup Bar
- Plate
- Field Fabricated or Commercial Backing Ring with Pins

**Details:**
- Conical Point
- Conical Point Reinforcement Data
- Closing Plate Thickness
- Steel Pipe Pile Splice
- Bond Plate Thickness
- Upper Stirrup Bars
- Lower Stirrup Bars

---

**Notes:**
- Welded or seamless steel pipe shall be ASTM A252 Grade 3 (fy = 45,000 psi).
- Steel for closure plate shall be ASTM A709 Grade 50.
- Steel for cruciform pile point reinforcement shall be ASTM A709 Grade 50.

**Details:**
- Vertical Bar
- Stirrup Bar
- Plate
- Field Fabricated or Commercial Backing Ring with Pins

**Details:**
- Conical Point
- Conical Point Reinforcement Data
- Closing Plate Thickness
- Steel Pipe Pile Splice
- Bond Plate Thickness
- Upper Stirrup Bars
- Lower Stirrup Bars
Standard Drawing Guidance (do not show on plans):

Do not use 20" and 24" diameter closed ended cast-in-place (CECIP) concrete pile without approval of Structural Project Manager or Liaison.

**Typical Data for CECIP Piles**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>14&quot;</th>
<th>16&quot;</th>
<th>20&quot;</th>
<th>24&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure Plate Thickness (by design)</td>
<td>3/4&quot;</td>
<td>1&quot;</td>
<td>1 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>Pile Point Reinforcement</td>
<td>&quot;Cruciform&quot;, &quot;Conical&quot; or &quot;None&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Bars</td>
<td>6-#5 Vxxx</td>
<td>6-#6 Vxxx</td>
<td>8-#6 Vxxx</td>
<td>12-#6 Vxxx</td>
</tr>
<tr>
<td>Upper Stirrup Bars</td>
<td>5-#3</td>
<td>7-#3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Stirrup Bars</td>
<td>5-#4 Pxxx</td>
<td>7-#4 Pxxx</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Minimum L1 = 5'-3" for 14"Ø and 16"Ø CECIP & 7'-3" for 20"Ø and 24"Ø CECIP

Min. Lower Stirrup Bars = 5-#4 for 14"Ø and 16"Ø CECIP & 7-#4 for 20"Ø and 24"Ø CECIP

Min. Vertical Bars = 6-#5 for 14"Ø CECIP, 6-#6 for 16"Ø CECIP, 8-#6 for 20"Ø CECIP & 12-#6 for 24"Ø CECIP

For SPC B, C and D, modify reinforcement as needed to meet AASHTO 17th edition (LFD) and for SDC B, C and D, modify reinforcement as needed to meet AASHTO Guide Specification for LRFD Seismic Bridge Design (SGS).

For hard driving conditions consider ASTM A148 Grade 90-60. If conical pile points are not used, this note may be removed.
**STEEL PIPE PILE SPLICE**

GALVANIZED OPEN ENDED CAST-IN-PLACE (OECIP) CONCRETE PILE

**NOTES:**
- Welded or seamless steel shell (pipe) shall be ASTM A252 Grade 3 (fy = 43,000 psi).
- Open ended pile shall be augered out to the minimum pile cleanout penetration elevation and filled with Class B-1 concrete.
- Concrete for cast-in-place pile shall be Class B-1.
- Steel cast-iron for open ended cutting shoe pile point reinforcement shall be EN10219 Grade E315 Welded and Seamless material.
- The minimum wall thickness of any spot or local area of any type shall not be more than 12.5% under the specified nominal wall thickness.
- The contractor shall determine the pile wall thickness required to avoid damage from all driving activities, but wall thickness shall not be less than the minimum specified. An additional 0.25" may be allowed for furnishing a thicker wall as approved by the Engineer.
- Splices of pipe for cast-in-place pipe pile shall be made watertight and to the full strength of the pipe above and below the splice to permit hard driving without damage. Pipe sections used for splicing shall be at least 5 feet in length.
- At the contractor's option, the hooks of vertical bars embedded in the beam cap may be oriented inward or outward. The hooks of vertical bars embedded in the pile cap footing should be oriented outward for all seismic categories.
- Reinforcing steel for cast-in-place pile is included in the Bill of Reinforcing Steel.
- No additional payment will be made for furnishing a thicker pile wall than specified on the plans.
- Splices of pipe for cast-in-place pipe pile shall be made watertight and to the full strength of the pipe above and below the splice to permit hard driving without damage. Pipe sections used for splicing shall be at least 5 feet in length.

**MINIMUM PILE CLEANOUT PENETRATION (ELEV.):**

- B1: x
- Min. Nominal Wall Thickness: x
- Pile Point Reinforcement: x
- Min. Pile Cleanout Penetration (Elev.): x
- Vertical Bars: x
- B2: x
- Length of Vertical Bars: x
- Upper Stirrup Bars: x
- Lower Stirrup Bars: x

For Foundation Data table, see Sheet No. 12.

---

**GALVANIZED OPEN ENDED CAST-IN-PLACE (OECIP) CONCRETE PILE**

**Note:** This drawing is not to scale. Follow dimensions.

**Sheet No. 12**
Standard Drawing Guidance (do not show on plans):

Do not use 20" and 24" diameter open ended cast-in-place (OECIP) concrete pile without approval of Structural Project Manager or Liaison.

1. **Typical Data for OECIP Piles**
   - **Min. OECIP Pile (O.D.) (by design)**: 14", 16", 20", 24"
   - **Min. Nominal Wall Thickness (by design)**: 1/16" (See EPG 751.36.2.2 for commonly available nominal wall thicknesses.)
   - **Pile Point Reinforcement**: **** (add note below) or "None"
   - **Min. Pile Cleanout Penetration (Elev.)**: 300, 302, 282, 295
   - **Upper Stirrup Bars**: 6-#5-Vxxx, 6-#6-Vxxx, 8-#6-Vxxx, 12-#6-Vxxx
   - **L1, Length of Vertical Bars**: 5'-3", 7'-3" (Add note below) or "None"
   - **Upper Stirrup Bars**: 5-#4-Pxxx, 5-#4-Pxx
   - **Lower Stirrup Bars**: 7-#6-Pxx

**** Open ended cutting shoe

2. For LFD seismic performance category (SPC) A and LRFD seismic design category (SDC) A, minimum number of vertical bars, size and length and seismic stirrup bar information is provided in Galvanized Open Ended Cast-In-Place (OECIP) Concrete Pile Data. Modify reinforcement size, length of vertical bars (L1), number of vertical bars, number of stirrup bars, and bar mark information as needed for specific project.

   - **Min. L1 = 5'-3" for 14"Ø and 16"Ø OECIP & 7'-3" for 20"Ø and 24"Ø OECIP**
   - **Min. Lower Stirrup Bars = 5-#4 for 14"Ø and 16"Ø OECIP & 7-#4 for 20"Ø and 24"Ø OECIP**
   - **Min. Vertical Bars = 6-#5 for 14"Ø OECIP, 6-#6 for 16"Ø OECIP, 8-#6 for 20"Ø OECIP & 12-#6 for 24"Ø OECIP**

For SPC B, C and D, modify reinforcement as needed to meet AASHTO 17th edition (LFD) and for SDC B, C and D, modify reinforcement as needed to meet AASHTO Guide Specification for LRFD Seismic Bridge Design (SGS).

3. For hard driving conditions consider ASTM A148 Grade 90-60. If cutting shoe is not used, this note may be removed.

4. Use appropriate note based on seismic category (See EPG 751.50, Notes G5b7a & G5b7b)

5. These details of bar array 6, 8 and 12 count, can be used as needed in sheet details "Section A-A" & "DETAIL OF SEISMIC STIRRUP BAR" by using centroid as the handle.
Standard Drawing Guidance (Do not show on plans):

Sheet for piles WITHOUT dynamic pile testing.

Draw layout with bents labeled and provide numbering of piles. List in the tables the piles grouped by bents with the name of the bent included in the remarks column as a header for the piles located at that bent. Provide two blank rows after the last pile of each bent grouping to allow for additions in the field.

Combine with As-Built Drilled Shaft Data if both piles and drilled shafts are shown on same sheet.

**PART PLAN SHOWING PILE NUMBERING FOR RECORDING AS-BUILT PILE DATA**

<table>
<thead>
<tr>
<th>Pile No.</th>
<th>Length in Place (ft)</th>
<th>Computed Nominal Axial Compressive Resistance (kips)</th>
<th>Remarks</th>
</tr>
</thead>
</table>

**As-Built Pile Data**

**As-Built Pile Data**

**As-Built Pile Data**

*Note: This drawing is not to scale. Follow dimensions. Sheet No. of*
### Standard Drawing Guidance (Do not show on plans):

Sheet for piles WITH dynamic pile testing.

Draw layout with bents labeled and provide numbering of piles. List in the tables the piles grouped by bents with the name of the bent included in the remarks column as a header for the piles located at that bent. Provide two blank rows after the last pile of each bent grouping to allow for additions in the field.

Combine with As-Built Drilled Shaft Data if both piles and drilled shafts are shown on same sheet.

---

### As-Built Pile Data

<table>
<thead>
<tr>
<th>Pile No.</th>
<th>Length in Place (ft)</th>
<th>PDA Nom. Axial Compressive Resistance (kips)</th>
<th>PDA End of Drive Blow Count (blows/in.)</th>
<th>Actual End of Drive Blow Count (blows/in.)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Note: Indicate in remarks column:
A. Pile type and grade
B. Batter
C. Driven to practical refusal
D. PDA test pile
E. Minimum tip elevation controlled

(Use when actual blow count is less than PDA blow count due to minimum tip elevation requirement. A plus sign (+) shall be placed after the PDA nominal axial compressive resistance value indicating actual value is higher than PDA value.)

This sheet to be completed by MoDOT construction personnel.
STANDARD DRAWING GUIDANCE (do not show on plans):

1. Actual strand arrangement, bent up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4” space), but dimension to drain hole in Part Plan shall be revised to 10”.

2. Revise if #5 is required. Use 6’-7” for #5-33 actual length and 6’-1” for #5-33 actual length.

3. Splices shown only when necessary (girder length > 60’-2”). Use 2’-1” lap for #4 & 2’-7” lap for #5.
   - When necessary: Delete grouped elements.
   - When not necessary: Extend A bars to # Beam.
   - Revise 10 to 3 A1 bars & 6 to 4 A2 bars.

4. Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged).
   - When necessary: Delete the two grouped elements.
   - Extend hidden lines to # Beam.
   - In Part Plan revise remaining dimension to full length of void.

5. Revise minimum dimension if required by design.

6. By design. Typically 30.98 kips per 0.5” strand & 43.94 kips per 0.6” strand, rounded to nearest whole kip.

7. Strand location not available when vent pipe is required.
STANDARD DRAWING GUIDANCE (do not show on plans):
1. Actual strand arrangement, bent up strands, and debonding (if any) is by
design (top two strands are required). Add or remove symbols and instructions
as required. Strands may be placed continuously across beam (eliminating 4"
space), but dimension to drain hole in Part Plan shall be revised to 10".
2. Revise if #3 is required. Use 6'-7" for #5-33 actual length and 6'-1" for #5-
S2 actual length.
3. Splices shown only when necessary (girder length > 60'-2'). Use 2'-1" lap for
#4 & 2'-7" lap for #5.
   When lap is
   unnecessary:
   - Delete grouped elements.
4. Interior diaphragm & vent pipe shall be shown only when necessary (when
structure may be submerged).
   When not necessary:
   - Delete the two grouped elements.
5. Revise minimum dimension if required by design.
6. By design. Typically 30.98 kips per 0.5" strand & 43.94 kips per 0.6" strand,
   rounded to nearest whole kip.
7. Strand location not available when vent pipe is required.
Actual strand arrangement, bent-up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

Revise if #3 is required. Use 7'-3" for #3-S1 actual length and 6'-5" for #3-S2 actual length.

Splices shown only when necessary (girder length > 60'-2""). Use 2'-1" lap for #4 & 2'-7" lap for #5.

Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged).

Revise minimum dimension if required by design.

Strand location not available when vent pipe is required.
STANDARD DRAWING GUIDANCE (do not show on plans):  

1. Actual strand arrangement, bent up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

2. Revise if #5 is required. Use 7'-3" for #5-S1 actual length and 6'-9" for #5-S2 actual length.

3. Splices shown only when necessary (girder length > 60'-2''). Use 2'-1" lap for #4 & 2'-7" lap for #5.

4. Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged).

5. Revise minimum dimension if required by design.

6. Strand location not available when vent pipe is required.
STANDARD DRAWING GUIDANCE (do not show on plans):

(1) Actual strand arrangement, bent up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

(2) Revise if #5 is required. Use 7'-4" for #5-S1 actual length and 7'-5" for #5-S2 actual length.

(3) Splices shown only when necessary (girder length > 60'-2"), Use 2'-1" lap for #4 & 2'-7" lap for #5.

- When lap is unnecessary: Delete grouped elements.
- When necessary: Extend A bars to 6 beam, Revise 10 to 5 A1 bars & 8 to 4 A2 bars.

(4) Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged).

- When not necessary: Delete grouped elements.
- When necessary: Extend A bars to 6 beam, In Part Plan revise remaining dimension to full length of void.

(5) Revise minimum dimension if required by design.

(6) By design. Typically 30.98 kips per 0.5" strand & 43.94 kips per 0.6" strand, rounded to nearest whole kip.

(7) Strand location not available when vent pipe is required.
DIMENSIONS
(1) Fabricator shall apply a bond where specified or required.

(2) 1/8" (Typ. Optional)

SIDE VIEW

SHAPE 20

7'-5" 3'-7"

SHAPE 51

(1) Fabricator shall apply a bond where specified or required.

(2) 1/8" (Typ. Optional)

HALF ELEVATION

SHAPE 21

(1) Fabricator shall apply a bond where specified or required.

(2) 1/8" (Typ. Optional)

PART PLAN

Mirror about Beam for left advanced.

ELEVATION A-A

Strands not shown for clarity.

SECTION B-B

Mirror for left advanced.

SECTION C-C

Concrete for prestressed beams shall be Class A-1 with f'c = 5000 psi and f'ci = 5000 psi.

Use strands of Grade 270.

Precast members shall be in accordance with ACI 318-02.

Fabricator shall be responsible for location and design of lifting devices.

Exterior and interior beams are the same except for the location of any member, hoist, or similar equipment.

For Beam Centerline Diagram, see Sheet No. 12.

For Application of coil ties at concrete bent diaphragms, see Sheets Nos. __ and __.

SPREAD BOX BEAMS - SPAN (X-X) AND (X-X)

Note: This drawing is not to scale. Follow dimensions.

Detailed Checked

Sheets No. __ and __.

Concrete for slab drains, see Sheet No. __.

No. __.

No. __.
STANDARD DRAWING GUIDANCE (do not show on plans):
(Turn off level Bridge-Guidance to hide guidance)

1. Actual strand arrangement, bent up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

2. Revise if #5 is required. Use 7'-4" for #5-S1 actual length and 7'-9" for #5-S2 actual length.

3. Splices shown only when necessary (girder length > 60'-2"). Use 2'-1" lap for #4 & 2'-7" lap for #5.

4. Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged).

5. Revise minimum dimension if required by design.

6. By design. Typically 30.98 kips per 0.5" strand & 43.94 kips per 0.6" strand, rounded to nearest whole kip.

7. Strand location not available when vent pipe is required.
STANDARD DRAWING GUIDANCE (do not show on plans):
(Turn off level Bridge-Guidance to hide guidance)

1. Actual strand arrangement, bent up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

2. Revise if #5 is required. Use 8'-4" for #3-33 actual length and 7'-9" for #3-53 actual length.

3. Splices shown only when necessary (girder length > 60'-2"). Use 2'-1" lap for #4 & 2'-7" lap for #5.
   When lap is unnecessary:
   - Select & Bnl to Beam.
   - Revise 10 to 3 A1 bars & 8 to 4 A2 bars.

4. Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged): When not necessary:
   - Delete the two grouped elements.
   - Extend hidden lines to Beam.
   - In Part Plan revise remaining dimension to full length of void.

5. Revise minimum dimension if required by design.

6. By design. Typically 30.98 kips per 0.5" strand & 43.94 kips per 0.6" strand, rounded to nearest whole kip.
Actual strand arrangement, bent up strands, and debonding (if any) is by design. Top two strands are required. Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

Revise if #3 is required. Use 8'-4" for #3-33 actual length and 7'-9" for #3-52 actual length.

Splices shown only when necessary (girder length > 60'-2"). Use 2'-1" lap for #4 & 2'-7" lap for #5.

When lap is unnecessary:
- Delete grouped elements.
- Extend A bars to Beam.
- Revise 10 to 5 A1 bars & 8 to 4 A2 bars.

Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged).

When not necessary:
- Delete the two grouped elements.
- Delete the two hidden lines to Beam.
- In Part Plan revise remaining dimension to full length of void.

Revise minimum dimension if required by design.

By design. Typically 30.98 kips per 0.5" strand & 43.94 kips per 0.6" strand. Rounded to nearest whole kip.
STANDARD DRAWING GUIDANCE (do not show on plans):
(Turn off level Bridge-Guidance to hide guidance)

1. Actual strand arrangement, bent up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

2. Revise if #5 is required. Use 9'-4" for #5-S1 actual length and 7'-9" for #5-S2 actual length.

3. Splices shown only when necessary (girder length > 60'-2"). Use 2'-1" lap for #4 & 2'-7" lap for #5.
   - When lap is unnecessary:
     - Delete grouped elements.
     - Extend A bars to & Beam.
     - Revise 10 to 3 A1 bars & 8 to 4 A2 bars.

4. Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged):
   - When not necessary:
     - Delete the two grouped elements.
     - Extend hidden lines to & Beam.
     - In Part Plan revise remaining dimension to full length of void.

5. Revise minimum dimension if required by design.

6. By design. Typically 30.98 kips per 0.5" strand & 43.94 kips per 0.6" strand. Rounded to nearest whole kip.
General Notes:

Concrete for prestressed beams shall be Class A-1 with T = 50°F and F = 30°F.

Use strands - O Grade 270.

Precast members shall be in accordance with Sec. 1029.

Fabricator shall be responsible for the specification and design of lifting devices.

Exterior and interior beams are the same except for the location and design of lifting devices.

For beam center line, see Sheet No.

For location of pipe rebar, see Sheet No.

For location of all rebar, see Sheet No.

Note: This drawing is not to scale. Follow dimensions.
Actual strand arrangement, bent up strands, and debonding (if any) is by design (top two strands are required). Add or remove symbols and instructions as required. Strands may be placed continuously across beam (eliminating 4" space), but dimension to drain hole in Part Plan shall be revised to 10".

Revise if #5 is required. Use 9'-4" for #5-33 actual length and 7'-9" for #5-29 actual length.

Splices shown only when necessary (girder length > 60'-2"). Use 2'-11" lap for #4 & 2'-7" lap for #5.

When lap is unnecessary:
- Delete grouped elements.
- Extend A bars to G beam.
- Revise 10 to 3 A1 bars & 8 to 4 A2 bars.

Interior diaphragm & vent pipe shall be shown only when necessary (when structure may be submerged):

When not necessary:
- Delete the two grouped elements.
- Extend hidden lines to G beam.
- In Part Plan revise remaining dimension to full length of void.

Revise minimum dimension if required by design.

By design, typically 30.98 kips per 0.3" strand & 43.94 kips per 0.6" strand, rounded to nearest whole kip.
STANDARD DRAWING GUIDANCE (do not show on plans)
(Turn off level Bridge-Guidance to hide guidance)

1. Actual strand arrangement, bent up strands, and debonding (if any) is by
design (top two strands are required). Add or remove symbols and instructions
as required. Strands may be placed continuously across beam (eliminating 4"
space), but dimension to drain hole in Part Plan shall be revised to 10".

2. Revise if #3 is required. Use 9’-10" for #3-33 actual length and 7’-3" for #0.
   52 actual length.

3. Splices shown only when necessary (girder length > 60’-2’). Use 2’-1” lap for
   #4 & 2’-7” lap for #5.
   When lap is unnecessary:
   - Delete grouped elements.
   - Extend A bars to # Beam.
   - Revise 10’ to 3 A1 bars & 8 to 4 A2 bars.

4. Interior diaphragm & vent pipe shall be shown only when necessary (when
   structure may be submerged).
   When not necessary:
   - Delete the two grouped elements.
   - Extend hidden lines to # Beam.
   - In Part Plan revise remaining dimension to full length of void.

5. Revise minimum dimension if required by design.

6. By design. Typically 30.98 kips per 0.5’ strand & 43.94 kips per 0.6’ strand,
   rounded to nearest whole kip.
All strands are fully bonded unless otherwise noted. 
- Indicates prestressing strand.
- Indicates cut and shop bend with 2'-6" projection.
- Indicates debonded for X'-X" from end of beam.

Indicates debonded for X'-X" from end of beam.

END VIEW

3'-9" Beam

6" Bearing

End of Beam

COIL TIES

INTERMEDIATE BENTS

EXTERIOR BEAMS AT END BENTS

INTERMEDIATE BENTS

EXTERIOR BEAMS AT END BENTS

EXTERIOR BEAMS AT END BENTS

COIL TIES

SECTION C-C

SECTION B-B

Strands not shown for clarity.

General Notes:
Concrete for precast beams shall be Class A-1 with f'c = 4,000 psi and f'ci = 3,300 psi.
Use strands: 0 Grade 70, 440, or higher in accordance with Sec 1029.
Pressurized members shall be in accordance with Sec 1029.

Fabricator shall be responsible for inspection and design of lifting devices.

Exterior and interior box beams are the same length. Collar lugs are to be reinforced with 3 1/2" diameter bars at the bent.

For Beam Center Diagram, see Sheet No.

For location of coil ties at concrete bent diaphragms, see Sheet No. __ and __.

For location of coil inserts at joint filler, see Sheet No. __ and __.

Pretensioned members shall be in accordance with Sec 1029.

All reinforcement shall be Grade 60.

Precast members shall be bonded together at the bent ends. Pretensioning of beam ends is required.

All dimensions are cut to cut. See symmetry for dimensions not shown.

All bars shall be spray coated.

For location of coil inserts for slab drains, see Sheet No. __.

For location of coil inserts at bent ends, see Sheet No. __.

Concrete for precast beams shall be Class A-1 with f'c = 4,000 psi and f'ci = 3,300 psi.
Use strands: 0 Grade 70, 440, or higher in accordance with Sec 1029.
Pressurized members shall be in accordance with Sec 1029.

Fabricator shall be responsible for inspection and design of lifting devices.

Exterior and interior box beams are the same length. Collar lugs are to be reinforced with 3 1/2" diameter bars at the bent.

For Beam Center Diagram, see Sheet No.

For location of coil ties at concrete bent diaphragms, see Sheet No. __ and __.

For location of coil supports at concrete bent diaphragms, see Sheet No. __ and __.
STANDARD DRAWING GUIDANCE (do not show on plans):
(Turn off level Bridge-Guidance to hide guidance)

1. Actual strand arrangement, bent up strands, and debonding (if any) is by
design (top two strands are required). Add or remove symbols and instructions
as required. Strands may be placed continuously across beam (eliminating 4"
space), but dimension to drain hole in Part Plan shall be revised to 10".

2. Revise if #5 is required. Use 9'-10" for #3-53 actual length and 7'-3" for #5-
52 actual length.

3. Splices shown only when necessary (girder length > 60'-2"). Use 2'-1" lap for
#4 & 2'-7" lap for #5.

   When lap is unnecessary:
   - Delete grouped elements.
   - Extend A bars to E beam.
   - Revise 10 to 3 A1 bars & 6 to 4 A2 bars.

4. Interior diaphragm & vent pipe shall be shown only when necessary (when
structure may be submerged).

   When not necessary:
   - Delete the two grouped elements.
   - Extend hidden lines to E beam.
   - In Part Plan revise remaining dimension to full length of void.

5. Revise minimum dimension if required by design.

6. By design: Typically 30.96 kips per 0.5" strand & 43.94 kips per 0.6" strand.
Rounded to nearest whole kip.
Standard Drawing Guidance (do not show on plans):

To display the strand details open the reference files dialog box and activate the display option of the file with the description that best matches what is required by the design.

See EPG for actual length of B1 bars which vary by size.

The details of the coil ties are for closed diaphragms. Include additional detail below for open diaphragms.

1. This detail only needs to be used if the structure is over water. For all other crossings remove this detail.
2. Remove if #5-B1 bars are used.
3. Use with end spans when both interior & exterior girders are detailed on the same sheet, and the 2'-6" long tie rod will not fit in the exterior diaphragm portion. Remove when not necessary.
4. By design, typically 30.98 kips per 1/2" strand & 43.94 kips per 0.6" strand, rounded to nearest whole kip.

See EPG for actual length of B1 bars which vary by size.

The details of the coil ties are for closed diaphragms. Include additional detail below for open diaphragms.

PSI_01_type2_2-8 Guidance & Alternate Details
Standard Drawing Guidance (do not show on plans):

To display the strand details open the reference files dialog box and activate the display option of the file with the description that best matches what is required by the design.

See EPG for actual length of B1 bars which vary by size.

The details of the coil ties are for closed diaphragms. Include additional detail below for open diaphragms.

① This detail only needs to be used if the structure is over water. For all other crossings remove this detail.

② Remove if #5-B1 bars are used.

③ Use with end spans when both interior & exterior girders are detailed on the same sheet, and the 2’-6” long tie rod will not fit in the exterior diaphragm portion. Remove when not necessary.

④ By design. Typically 30.98 kips per 1/2” strand & 43.94 kips per 0.6” strand, rounded to nearest whole kip.
**I-Girders - Spans (X-X) and (X-X)**

**General Notes:**

Concrete for prestressed girders shall be Class A-1 with f'c = 39 psi and f'ci = 27 psi.

Use strands, 3/8" Grade 270 with an initial prestress force of 60 kips.

All prestressed members shall be in accordance with Sec 1029.

Fabricator shall be responsible for location and design of lifting devices.

Exterior and interior girders are the same except coil ties, coil inserts, and stirrups in bents other than integral bents.

For Girder Camber Diagram, see Sheet No. 105.

The 3/8" holes shall be cast in the web for steel intermediate diaphragms. Drilling is not allowed for insertion of holes and details of steel intermediate diaphragm are shown on Sheet No. 106.

For location of coil ties at slab drains, see Sheet No. 107.

For location of coil ties at concrete bent diaphragms, see Sheets No. 108 and 109.

**Note:** This drawing is not to scale. Follow dimensions.

---

**Bill of Reinforcing Steel - Each Girder**

- **Girder Type:**
  - Type 4
  - Type 3-9

- **Effective Date:**
  - March 2022

- **Supersedes:**
  - January 2022

**Concrete for Prestressed Girders:**

- Minimum compressive strength of concrete is 39 psi.

**Precast Prestressed Concrete Girder:**

- Length: 4'-6" (Typ.)

**Stirrup and Tie Dimensions:**

- Stirrups and ties shall be in accordance with Sec 1029.

**General Notes:**

- All cables shall be epoxy coated.

**Recommended Reinforcement:**

- #6 bars shall be epoxy coated.

---

**Dimensions:**

- B1 bar shall be epoxy coated.

**Alternate Shape:**

- B1 bar shall be epoxy coated.

**Permissible Shapes:**

- B1 bar shall be epoxy coated.

---

**Conclusion:**

All dimensions are out to out.

**Headers and beams shall be in accordance with the OS-11 Manual of Standard Practice for Detailing Reinforced Concrete Structures.**

**Actual lengths are measured along centerline of bar to the nearest inch.**

**Minimum clearance to reinforcing shall be 1".**

**All reinforcement shall be Grade 60.**

The two D1 bars may be furnished as one bar at the fabricator's option.

**All B1 bars shall be epoxy coated.**

---

**Drawings:**

- End Of Girder
- Intermediate Bents
- Intermediate Bents Strands At Girder Ends
- Detailed View
- Planning
- General Notes

**References:**

Standard Drawing Guidance (do not show on plans):

To display the strand details open the reference files dialog box and activate the display option of the file with the description that best matches what is required by the design.

See EPG for actual length of B1 bars which vary by size.

The details of the coil ties are for closed diaphragms. Include additional detail below for open diaphragms.

1. This detail only needs to be used if the structure is over water. For all other crossings remove this detail.

2. Remove if #5-81 bars are used.

3. Use with end spans when both interior & exterior girders are detailed on the same sheet, and the 2'-6" long tie rod will not fit in the exterior diaphragm portion. Remove when not necessary.

4. By design. Typically 30.98 kips per 1/2" strand & 43.94 kips per 0.6" strand, rounded to nearest whole kip.
1. GIRDERS - SPANS (X-X) AND (X-X)

AT A GLANCE

- **B1 Bar Permissible Alternate Shape**
- **Closed Diaphragms and Integral Bents**
- **Open Diaphragms**
- **Coil Ties**
- **Concrete for Prestressed Girders**
- **Fabricator shall be responsible for location and design of lifting devices.**
- **Exterior and interior girders are the same except coil inserts at slab drains.**
- **For Location of Coil Ties at Concrete Drain and Steel Drain, see Sheet No.**
- **For Girder Camber Diagram, see Sheet No.**

**General Notes:**
- Concrete for prestressed girders shall be Class A-1 with f’c = 5000 psi and f’ci = 5000 psi.
- Use strands, 1/2’’ Grade 70, with an initial prestress force of f’p = 365 kips.
- Prestressed members shall be in accordance with Sec 1029.
- The two D1 bars may be furnished as one bar at the fabricator’s option.
- All D1 bars shall be epoxy coated.

**Bill of Reinforcing Steel - Each Girder:**

<table>
<thead>
<tr>
<th>MARK</th>
<th>LENGTH</th>
<th>ACTUAL LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4-B1</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>#4-C1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>#4-D1</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Reinforcement shall be Grade 60.**

**All dimensions are out to out.**

**Strands not shown for clarity.**

**Heads and bands shall be in accordance with the OBSI Manual of Standard Practice for Detailing Prestressed Concrete Structures.**

**Actual lengths are measured along centerline of bar to the nearest inch.**

**Minimum clearance to reinforcing shall be 1/16.**

**All reinforcement shall be Grade 60.**

**The two D1 bars may be furnished as one bar at the fabricator’s option.**

**All D1 bars shall be epoxy coated.**

**Note:** This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):

To display the strand details open the reference files dialog box and activate the display option of the file with the description that best matches what is required by the design.

See EPG for actual length of B1 bars which vary by size.

The details of the coil ties are for closed diaphragms. Include additional detail below for open diaphragms.

1. This detail only needs to be used if the structure is over water. For all other crossings remove this detail.
2. Remove if #5-B1 bars are used.
3. Use with end spans when both interior & exterior girders are detailed on the same sheet, and the 2'-6" long tie rod will not fit in the exterior diaphragm portion. Remove when not necessary.
4. By design. Typically 30.98 kips per 1/2" strand & 43.94 kips per 0.6" strand, rounded to nearest whole kip.
PSI_05_bulbt_6-0 Guidance & Alternate Details

Standard Drawing Guidance (do not show on plans):

To display the strand details open the reference files dialog box and activate
the display option of the file with the description that best matches what is
required by the design.

See EPG for actual length of B1 bars which vary by size.

The details of the coil ties are for closed diaphragms. Include additional
detail below for open diaphragms.

1. This detail only needs to be used if the structure is over water. For all
other crossings remove this detail.

2. Remove if #5 B1 bars are used.

3. Use with end spans when both interior & exterior girders are detailed on the
same sheet, and the 2'-6" long tie rod will not fit in the exterior diaphragm
portion. Remove when not necessary.

4. By design. Typically 30.98 kips per 1/2" strand & 43.94 kips per 0.6" strand,
rounded to nearest whole kip.

See EPG for actual length of B1 bars which vary by size.

The details of the coil ties are for closed diaphragms. Include additional
detail below for open diaphragms.

1. This detail only needs to be used if the structure is over water. For all
other crossings remove this detail.

2. Remove if #5 B1 bars are used.

3. Use with end spans when both interior & exterior girders are detailed on the
same sheet, and the 2'-6" long tie rod will not fit in the exterior diaphragm
portion. Remove when not necessary.

4. By design. Typically 30.98 kips per 1/2" strand & 43.94 kips per 0.6" strand,
rounded to nearest whole kip.
**TOP FLANGE BLOCKOUT DATA**

**FLANGE BLOCKOUT**

- **Bar Lengths**
  - For skews > 7° to 14°:
    - \( G3\) bar = \( \cos(\text{skew}) \times 10 \) inches
  - \( G4\) bar = \( \cos(\text{skew}) \times 12 \) inches
  - \( G5\) bar = \( \cos(\text{skew}) \times 11 \) inches
  - For skews > 14° to 60°:
    - \( G3\) bar = \( \cos(\text{skew}) \times 46.25 \) inches
    - \( G4\) bar = \( \cos(\text{skew}) \times 32.125 \) inches
    - \( G5\) bar = \( \cos(\text{skew}) \times 46.25 \) inches

- **Bar Arrangement**
  - Removing one bar from the first detail and adding the corresponding length bar from the other details.

- **Adjustments**
  - Use with end girders with both, if possible.
  - For modified flange blocks:
    - Use minimum detail if required by design.
  - Dimensions are typically based on the project-specific requirements.

- **Notes**
  - 1. Remove notes for NU 35 and 43.
  - 2. Remove note for NU 53, 63, 70, and 78.
  - 3. The overall height of the WWR6 shall be reduced by the appropriate notes (Note H2c1.44 for NU girders, but if required by design, add symbols to End of Girder with Spa. = 8.000). Strands are not typically debonded from the structural member in the concrete structure is over water. For all other crossings, remove detail.
  - 4. Indicate 10 strands as shown for NU 9, 16, 20, 23½, 23¾, 24, 25, and 33½.
  - 5. Use with end girders with both, if possible.
  - 6. By design. Typically 30.98 kips per 0.6" strand, rounded to nearest 0.65 kip.
  - 7. Revise minimum dimension if required by design.
  - 9. Use with end girders when both, if possible. 
  - 10. Minimum and 7 maximum strands per detail.
  - 11. Indicate 10 strands as shown for NU 9, 16, 20, 23½, 23¾, 24, 25, and 33½.
  - 12. Remove notes for NU 35 and 43.
  - 13. The overall height of the WWR6 shall be reduced by the appropriate notes (Note H2c1.44 for NU girders, but if required by design, add symbols to End of Girder with Spa. = 8.000). Strands are not typically debonded from the structural member in the concrete structure is over water. For all other crossings, remove detail.
  - 14. Indicate 10 strands as shown for NU 9, 16, 20, 23½, 23¾, 24, 25, and 33½.
  - 15. Use with end girders when both, if possible. 
  - 16. By design. Typically 30.98 kips per 0.6" strand, rounded to nearest 0.65 kip.
  - 17. Revise minimum dimension if required by design.
  - 19. Use with end girders when both, if possible. 
  - 20. Minimum and 7 maximum strands per detail.
  - 21. Indicate 10 strands as shown for NU 9, 16, 20, 23½, 23¾, 24, 25, and 33½.
FLANGE BLOCKOUT DATA

<table>
<thead>
<tr>
<th>Skew</th>
<th>Ext. Face</th>
<th>Int. Face</th>
<th>Bar Lengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2° to 7°</td>
<td>3</td>
<td>2</td>
<td>G3 bar = 46.25&quot;</td>
</tr>
<tr>
<td>&gt;7° to 14°</td>
<td>4</td>
<td>3</td>
<td>G5 bar = 32.125&quot;</td>
</tr>
<tr>
<td>&gt;14° to 37°</td>
<td>6</td>
<td>5</td>
<td>G6 bar = 27.5&quot;</td>
</tr>
<tr>
<td>&gt;37° to 60°</td>
<td>8</td>
<td>6</td>
<td>G6 bar = 25.5&quot;</td>
</tr>
</tbody>
</table>

For skews > 7° to 14°:
G6 bar = 46.25" 
G5 bar = 32.125" 
G3 bar = 46.25"

For skews > 14° to 60°:
G6 bar = 27.5" 
G5 bar = 25.5" 
G3 bar = 25.5"

The maximum strand arrangement is shown in details including top straight strands. Remove unnecessary strands from the four details where shown.

Detail only needs to be used if the structure is over water for all other crossings remove detail.

Indicate 10 strands at NU 35, 43 & 53. Indicate two more strands for NU 63, 70 and 78.

Stands are not typically debonded for NU girders, but if required by design, add symbols to End of Girder for NU girders, but if required by design.

Revise bent references as required. Specify the bent number and as shown below.

Indicates debonded for x° from end of girder.

Indicates debonded for x° from end of girder.

Actual length of S1 bars:

<table>
<thead>
<tr>
<th>NU 35</th>
<th>NU 43</th>
<th>NU 53</th>
<th>NU 63</th>
<th>NU 70</th>
<th>NU 78</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-4&quot;</td>
<td>5'-0&quot;</td>
<td>5'-10&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
<td>7'-11&quot;</td>
</tr>
<tr>
<td>4'-6&quot;</td>
<td>5'-0&quot;</td>
<td>5'-10&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
<td>7'-11&quot;</td>
</tr>
</tbody>
</table>

By design. Typically 30 98 kips per 1/2 strand & 43.94 kips per 1/2 strand, rounded to nearest kip.

Revise minimum dimension if required by design.

Adjust for modified flange thickness.

Use with end spans when both interior & exterior girders are detailed on same sheet and the 2 sides long ties can not fit in the exterior diaphragm portion. Remove when not necessary.

Substitute these values into drawing:

<table>
<thead>
<tr>
<th>Nu 35</th>
<th>Nu 43</th>
<th>Nu 53</th>
<th>Nu 63</th>
<th>Nu 70</th>
<th>Nu 78</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-2&quot;</td>
<td>4'-3&quot;</td>
<td>4'-4&quot;</td>
<td>4'-8&quot;</td>
<td>5'-0&quot;</td>
<td>5'-10&quot;</td>
</tr>
<tr>
<td>3'-4&quot;</td>
<td>4'-4&quot;</td>
<td>4'-8&quot;</td>
<td>5'-0&quot;</td>
<td>5'-10&quot;</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>3'-11&quot;</td>
<td>4'-11&quot;</td>
<td>5'-8&quot;</td>
<td>6'-6&quot;</td>
<td>7'-2&quot;</td>
<td>7'-10&quot;</td>
</tr>
</tbody>
</table>

Remove note for NU 53, 63, 70 and 78.

Remove notes for NU 35, 43, 53 and 63.

The overall height of the WWR6 shall not be increased for girder steps. Reduce this dimension by the accumulated girder step height.

Remove if #5-S3 bars are used.
Standard Drawing Guidance (do not show on plans):

1. Modify details if expansion gap is used and add Section B-B at expansion device and additional reference notes as shown on standard drawing for steel structures (PSP06).
Standard Drawing Guidance (do not show on plans):

1. Modify details if expansion gap is used and add Section B-B at expansion device and additional reference notes as shown on standard drawing for steel structures (PSP06).
Standard Drawing Guidance (do not show on plans):

1. Modify details if expansion gap is used and add Section B-B at expansion device and additional reference notes as shown on standard drawing for steel structures (PSP06).
**PLAN SHOWING PANEL PLACEMENT**

- #5-P3 bars at 6" cts. (4) bars at 12" cts. (5) bars between P2 bars (8)
- #3-P2 at abt. (6) bars near edge of panel at bottom
- #3-U1 @ 5-1/2" cts. (9)

**SECTION A-A**

- Joint Filler Dimensions: 3" (Max.)
- Panel Width: 12'-0" max.
- Panel Length: 18'-0" max.

**Reference Notes:**

- All reinforcement other than prestressing strands shall be epoxy coated.
- Stainless steel or other corrosion resistant material may be used in lieu of the #3-P2 bars shown. Wire diameter shall not be less than 0.22 sq in./ft, with a depth of scoring of 1/8" perpendicular to the prestressing strands.
- Initial prestressing force = 17.2 kips/strand. Ultimate strength = 22.95 kips (270 ksi). Larger strands may be used in lieu of the #3-P2 bars shown. Wire diameter shall not be less than 0.22 sq in./ft, with a depth of scoring of 1/8" perpendicular to the prestressing strands.

**General Notes:**

- Prestressed Panels: Concrete for prestressed panels shall be Class A-1 with f'c = 6,000 psi, f'ci = 4,000 psi.
- The prestressed panel quantities are not included in the table of estimated quantities for the slab.
- Minimum reinforcement for reinforcing steel shall be 1/12", unless otherwise shown.
- U1 bars may be used in lieu of the #3-P2 bars shown. Wire diameter shall not be less than 0.22 sq in./ft, with a depth of scoring of 1/8" perpendicular to the prestressing strands.
- The prestressed panel quantities are not included in the table of estimated quantities for the slab.
- Minimum reinforcement for reinforcing steel shall be 1/12", unless otherwise shown.
- The joint filler shall be preformed fiber expansion joint material in accordance with AASHTO M 203 Grade 270, with nominal diameter of VMA at 24 inches.

**SQUARED END PANELS OR TRUNCATED END PANELS**

- #3-P2 at abt. 18" cts. (Min.)
- #5-P3 at 12" cts. (Min.)

**BENDING DIAGRAM FOR U1 BAR**

- U1 bars may be oriented at right angles to the girder top flange.
Standard Drawing Guidance (do not show on plans):

1. Modify details if expansion gap is used and add Section B-B at expansion device and additional reference notes as shown on standard drawing for steel structures (PSP06).
**General Notes:**

- **Precast Panels:** Concrete precast panels shall be Class A with a thickness of 1.5 in. (38 mm) per ASTM C 876. The top surface of all panels shall receive a scored finish with a depth of scoring of 1/16 in. perpendicular to the prestressing strands in the panels.

- **Prestrained Tendons:** The tendons shall be high-tensile strength, uncoiled at the low-amplitude ends, and shall be hung in loops at the bottom of the panels. The top ends shall be debonded at the fabricator's option.

- **Initial Prestressing Force:** Initial prestressing force shall be 1.7\(\times\) target prestressing force. The method and sequence of releasing the strands shall be shown on the shop drawings.

- **Support from Diaphragm Formation:** Support from diaphragm formation is required under the optional skewed end panels until cast-in-place concrete has reached 3,000 psi (20 MPa) or as shown on the shop drawings.

- **Joint Filler Dimensions:** The joint filler shall be preformed fiber expansion joint material in accordance with Sec. 1057 or expanded or extruded polystyrene joint filler material in accordance with Sec. 1082. Joint filler shall be preformed fiber expansion joint material in accordance with Sec. 1057 or expanded or extruded polystyrene joint filler material in accordance with Sec. 1082. Joint filler shall be preformed fiber expansion joint material in accordance with Sec. 1057 or expanded or extruded polystyrene joint filler material in accordance with Sec. 1082. Joint filler shall be preformed fiber expansion joint material in accordance with Sec. 1057 or expanded or extruded polystyrene joint filler material in accordance with Sec. 1082.

**Joint Filler:**

- **Dimensions:** The prestressed panels shall be bent over, as necessary, to clear slab steel. The prestressed panels shall be bent over, as necessary, to clear slab steel. The prestressed panels shall be bent over, as necessary, to clear slab steel. The prestressed panels shall be bent over, as necessary, to clear slab steel.

- **Minimum Reinforcement Steel:** The minimum reinforcement steel shall be 2 1/2 in. (64 mm) in diameter.

- **Additional Materials:** The following reinforcing steel shall be tied securely to the deck: Deformed welded wire reinforcement (WWR) providing a minimum area of 0.20 square inch per foot of length plus expansion joint material. The following reinforcing steel shall be tied securely to the deck: Deformed welded wire reinforcement (WWR) providing a minimum area of 0.20 square inch per foot of length plus expansion joint material. The following reinforcing steel shall be tied securely to the deck: Deformed welded wire reinforcement (WWR) providing a minimum area of 0.20 square inch per foot of length plus expansion joint material. The following reinforcing steel shall be tied securely to the deck: Deformed welded wire reinforcement (WWR) providing a minimum area of 0.20 square inch per foot of length plus expansion joint material.

**Section A-A:**

- **Reference Notes:**
  1. **Representative Section:** A typical section shall be shown on the shop drawings.
  2. **Support Details:** Support detail shall be shown on the shop drawings.
  3. **Support from Diaphragm:** Support from diaphragm formation is required under the optional skewed end panels until cast-in-place concrete has reached 3,000 psi (20 MPa) or as shown on the shop drawings.
Standard Drawing Guidance (do not show on plans):

1. Modify details if expansion gap is used and add Section B-B at expansion device and additional reference notes as shown on standard drawing for steel structures (PSP06).
BENDING DIAGRAM FOR U1 BAR

Top Trans. Bar Reinforcement:
- #3-P3 @ 12" cts.
- #3-P3 @ 6" cts. (Max.)
- #3-P3 at 6" cts. between #3-P1 bars

Bending of #3-P1 bars at 12" cts.

PLAN OF OPTIONAL SKEWED END PANEL

- U1 Bars may be oriented at right angles to girder to reduce cast-in-place concrete thickness to within ± 0.250".
- Support from diaphragm forms is required under the optional skewed end until cast-in-place concrete has reached 3,000 psi before slab reinforcement is placed.
- Joint filler shall be glued to the girder. When thickness between adjacent panels shall be 1/4 inch to prevent water from passing through the panels.

PLAN OF OPTIONAL TRUNCATED END PANEL

- U1 Bars may be bent over, as necessary, to clear slab steel.
- Reinforcing Steel:
  - #5-S Bars at 8" (Min.)
  - #3-P2 at 16 inches.
- Deformed welded wire reinforcement (WWR) providing a minimum of 0.40% area of reinforcing perpendicular to strands of 0.22 sq. in. and minimum ultimate tensile strength = 22.95 kips (270 ksi). Larger strands may be used with the same spacing as the smaller strands.

PLAN OF SQUARED PANEL

- Reinforcing Steel:
  - #3-U1 @ 3'-0" cts.
  - #5-S Bars at 8" (Min.)
- Concrete for prestressed panels shall be Class A-1 with C ≥ 6,000 psi and γ ≥ 4,000 psi.

General Notes:
- Prestressed Panels:
  - Concrete surface of prestressed panels shall be cured with a scored finish with a depth of scoring of 1/8" perpendicular to the prestressing strands.
  - Prestressing tendons shall be high-tensile strength wire or strand, and anchorage to be designed for initial prestressing force of 15 kips/strand.

Joint Filler:
- Joint filler shall be provided for expansion gap and to reduce cast-in-place concrete thickness to within ± 0.250".
- Joint filler shall be cast within ± 2" of the face of the girder.

Concrete:
- Concrete for prestressed panels shall be Class A-1 with C ≥ 6,000 psi and γ ≥ 4,000 psi.

General Notes:
- Prestressing tendons shall be high-tensile strength wire or strand, and anchorage to be designed for initial prestressing force of 15 kips/strand.

Joint Filler:
- Joint filler shall be provided for expansion gap and to reduce cast-in-place concrete thickness to within ± 0.250".
- Joint filler shall be cast within ± 2" of the face of the girder.

Concrete:
- Concrete for prestressed panels shall be Class A-1 with C ≥ 6,000 psi and γ ≥ 4,000 psi.

General Notes:
- Prestressing tendons shall be high-tensile strength wire or strand, and anchorage to be designed for initial prestressing force of 15 kips/strand.

Joint Filler:
- Joint filler shall be provided for expansion gap and to reduce cast-in-place concrete thickness to within ± 0.250".
- Joint filler shall be cast within ± 2" of the face of the girder.

Concrete:
- Concrete for prestressed panels shall be Class A-1 with C ≥ 6,000 psi and γ ≥ 4,000 psi.

General Notes:
- Prestressing tendons shall be high-tensile strength wire or strand, and anchorage to be designed for initial prestressing force of 15 kips/strand.

Joint Filler:
- Joint filler shall be provided for expansion gap and to reduce cast-in-place concrete thickness to within ± 0.250".
- Joint filler shall be cast within ± 2" of the face of the girder.

Concrete:
- Concrete for prestressed panels shall be Class A-1 with C ≥ 6,000 psi and γ ≥ 4,000 psi.
Standard Drawing Guidance (do not show on plans):

1. Update with correct sheet no.
2. For wide flange beams, turn off Level 20 & turn on Level 21.
3. \( XX = G - 1\frac{1}{4}'' \) (1\(\frac{1}{2}'' \) max.) If \( XX \) equals \( \frac{3}{8}'' \), remove asterisk and note.
   - \( G \) is from the edge of the splice plate to the centerline of the nearest splice bolt.
4. Trade Section B-B as needed or omit if integral end bents.
5. Replace all expansion gap with integral end bents in "Plan Showing Panels Placement".
Required Lap Length For Bar Splices **

<table>
<thead>
<tr>
<th>Bar Size</th>
<th>Splice Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2'-3&quot;</td>
</tr>
<tr>
<td>6</td>
<td>3'-10&quot;</td>
</tr>
<tr>
<td>7</td>
<td>4'-11&quot;</td>
</tr>
</tbody>
</table>

** Unless otherwise shown.

General Notes:

Design Specifications:
- 2002 AASHTO LRFD (17th Ed.) Standard Specifications
- Seismic Performance Category A

Design Loading:
- HS-20 (New Construction)
- 35 lb/ft Future Wearing Surface
- 120 lb/ft Equivalent Fluid Pressure 45 lb/cf
- Fatigue Stress - Case II

Design Unit Stresses:
- Class B-2 Concrete (Barrier)  \( f'c = 4,000 \text{ psi} \)
- Class B-1 Concrete (End Bents & Superstructure)  \( f'c = 4,000 \text{ psi} \)
- Reinforcing Steel:  Grade 60  \( fy = 60,000 \text{ psi} \)

Joint Filler:
- All joint filler shall be in accordance with Sec 1057 for preformed sponge rubber expansion and partition joint filler, except as noted.

Reinforcing Steel:
- Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.

Miscellaneous:
- Protective coating for concrete bents and piers (Urethane or Epoxy) shall be applied as shown on the bridge plans and in accordance with Sec 711.

Roadway surfacing adjacent to bridge ends shall match new bridge slab surface (Roadway Items)

OPTIONAL SHIFTING TOP BARS AT BARRIER

Contractor may shift top bars as needed to tie R1 bar in barrier (or with horizontal dimensions as shown on the plans of slab). Payment for prestressed panels. Stay-in-place prestressed steel forms, conventional forms, all concrete and epoxy coated reinforcing steel will be considered completely covered by the contract unit price for the slab. Variations cannot be used for an adjustment in the contract unit price.

Cost of any required excavation for bridge will be considered completely covered by the contract unit price for other items.

The table of Estimated Quantities for Slab on Steel represents the quantities used by the State in preparing the cost estimate for Concrete Slabs. The area of the concrete slab will be measured to the nearest square yard longitudinally from end of slab to end of slab and transversely from out to out of bridge slab (or with the horizontal dimensions as shown on the plans of slab). Payment for prestressed panels, stay-in-place conventional forms, conventional forms, all concrete and epoxy coated reinforcing steel will be considered completely covered by the contract unit price for the slab. Variations cannot be used for an adjustment in the contract unit price.

Method of forming the slab shall be in accordance with Sec 703. All hardware for forming the slab to be all in place as a permanent part of the structure unless noted otherwise. No trimming or scraping of formwork or the omission of formwork is permitted.

Slab shall be cast in place with conventional forming or stay-in-place prestressed concrete forms. Precast prestressed panels will not be permitted.

For Optional Stay-In-Place Form Details, see Sheet No. 2.
Structural Steel Protective Coating:

- **Prime Coat:** The cost of the prime coat will be considered completely covered by the contract lump sum price for recoating existing bearings.
  - All exposed surfaces of the existing structural steel piles shall be coated with one 6-mil thickness of zinc primer. The cost of surface preparation will be considered completely covered by the contract lump sum price for recoating existing bearings.
  - Structures with exposed piling: All exposed surfaces of the existing structural steel piles shall be coated with one 6-mil thickness of aluminum gray epoxy-mastic primer applied over an SSPC-SP3 surface preparation in accordance with Sec 1081. The bituminous coating shall be applied one foot above and one foot below the existing ground line and in accordance with Sec 702. The cost of surface preparation will be considered completely covered by the contract lump sum price for recoating existing bearings.

- **Field Coat:** The cost of the finish field coat shall be considered completely covered by the contract unit price for recoating existing bearings.
  - The color of the finish field coat shall be Gray (Federal Standard #30045) for recoating existing bearings.
  - The bituminous coating shall be applied in accordance with Sec 1081 for recoating existing bearings.
  - The bituminous coating shall be applied one foot above and one foot below the existing ground line and in accordance with Sec 702. The cost of surface preparation will be considered completely covered by the contract lump sum price for recoating existing bearings.

**Surface Preparation:**

- Surface preparation of the existing steel shall be in accordance with Sec 1081 for recoating of structural steel.
- The color of the field field coat shall be Gray (Federal Standard #30045) for recoating existing bearings.
- The bituminous coating shall be applied in accordance with Sec 1081 for recoating of structural steel.

**Structural Steel Protective Coating:**

- **System G:** in accordance with Sec 1081, except for inorganic anticorrosion paints and bituminous coating which shall be considered completely covered by the contract unit price for recoating existing bearings.
- **System H:** in accordance with Sec 1081, except for inorganic anticorrosion paints and bituminous coating which shall be considered completely covered by the contract unit price for recoating existing bearings.

**RH Barrier:**

- Use when Rock Blanket is specified on BR Memo.
- Type H Barrier
- **ROCK BLANKET ON SPILL SLOPES**

**TYPICAL SECTION THRU SLAB:**

- **22' RDWY-4 BEAMS @ 6'-8"**
- ***SKewed BRIDGES***
38'-0" Roadway

17 #5-S1 @ 15" cts

32 #6-S2 @ 5" cts (Spa. between S1)

8'-6"± 10 Spa. @ 9"

Cl. 2"

3'-4"± 16" @ 9"

3 Spa.

38'-0" Roadway

5' 3'-4"± 16" @ 9"

REDECK01_front_sheet  Alternate Details (7 of 7)

38' RDWY-5 BEAMS @ 8'-6"
DETAILS OF CONCRETE REMOVAL AT END BENTS

The cost of concrete removal as shown will be considered completely covered by the contract unit price for Removal of Existing Bridge Deck. Vertical backwall and wingwall reinforcement and coating designation G55 of ASTM A653. Complete shop drawings of the permanent steel deck forms shall be required in accordance with Sec 1080.

Carrigations of stay-in-place forms shall be filled with an expanded polystyrene material. The polystyrene material shall be in accordance with the manufacturer's recommendations. Form sheets shall not rest directly on the top of beam flanges. Sheets shall be securely fastened to form supports with adhesives in accordance with Sec 717. Cost will be considered completely covered by the contract unit price for Slab on Steel.

The design of stay-in-place corrugated steel forms is per manufacturer which shall be in accordance with Sec 1080. Corrugated steel forms allowed shall be 0.016 thick per 1000 pounds per pc. The corrugations shall be filled with an expanded polystyrene material per manufacturer which shall be in accordance with Sec 703. The corrugations shall be filled with an expanded polystyrene material. The polystyrene material shall be in accordance with the manufacturer's recommendations.

Concrete Bents and Piers (Urethane or Epoxy) shall be clean and seal with Piers (Urethane or Epoxy) (See Sec 711).


details of shear connectors

The cost of supplying and installing shear connectors shall be considered completely covered by the contract unit price for Slab on Steel. Shear connectors shall be in accordance with Sec 711, 1080 & 1085.

The contractor shall provide a method of preventing the direct contact of the stay-in-place forms and connection components with uncoated weathering steel members that is approved by the engineer.

Pouring and Finishing Slab:

The contractor shall provide bracing necessary for lateral and torsional stability of the beams during construction of the slab. The slabs shall be poured in accordance with Sec 1080. Certified field welders will not be required for welding of the form supports.

The contractor shall provide bracing necessary for lateral and torsional stability of the beams during construction of the slab. The slabs shall be poured in accordance with Sec 1080. Certified field welders will not be required for welding of the form supports.

Haunching:

(1) Slab is to be considered a uniform thickness as shown on the plans. Haunching will vary. See front sheet for slab thickness.

Specify form sheet thickness and agreed upon tolerances.

See front sheet for slab thickness.
Standard Drawing Guidance (do not show on plans):

Some notes on the standard redecking template drawings are not shown in EPG 751.50 Standard Detailing Notes.

Remove details that do not apply.

Check slab pouring sequencing and revise notes as required.

Including alternate pour sequences is per approval of Structural Project Manager or Liaison.

---

ELEVATION SHOWING SHEAR CONNECTOR SPACING FOR END BEAMS

ELEVATION SHOWING SHEAR CONNECTOR SPACING FOR INT. BENT BEARING BEAMS

ELEVATION SHOWING SHEAR CONNECTOR SPACING FOR COMBINED BEARING & MID SPAN BEAMS

---

TABLE SHOWING SHEAR CONNECTOR UNIT SPACING

<table>
<thead>
<tr>
<th>Beam</th>
<th>C per unit</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Beam (Spans 1-2 &amp; 3-4)</td>
<td>x</td>
<td>&quot;x&quot;</td>
<td>Units @&quot;±&quot; cts.</td>
<td>&quot;x&quot;</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Brg. Beam (Bent 2 &amp; Span 2-3) &amp; Brg. Beam (Bent 4 &amp; Span 4-5)</td>
<td>x</td>
<td>&quot;x&quot;</td>
<td>Units @&quot;±&quot; cts.</td>
<td>&quot;x&quot;</td>
<td>Units @&quot;±&quot; cts.</td>
<td>&quot;x&quot;</td>
</tr>
<tr>
<td>Brg. Beam (Bent 3)</td>
<td>x</td>
<td>&quot;x&quot;</td>
<td>Units @&quot;±&quot; cts.</td>
<td>&quot;x&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total shear connectors required: xxx

---

Continuous Spans

---

Details of Concrete Removal at End Bents

---

Part Section Thru Slab at End Bent No. 1

Use when replacing expansion joint with sliding slab.
STRENGTHENING EXISTING BEAMS

Notes:
Beam with end-bolted cover plates shall be installed in the following sequence after existing bridge deck is removed:
1. Drill holes in cover plate and flange.
2. Clean faying surfaces. (See Special Provisions)
3. Install and tighten bolts.
4. Weld cover plate to flange.

Fabricated Structural Steel shall be ASTM A709 Grade 36, except as noted.
Payment for ___ pounds of new cover plates complete in place will be considered completely covered by the contract lump sum price for Strengthening Existing Beams.
Notch toughness is required for all cover plates.

Standard Drawing Guidance (do not show on plans):
① Use Type 3 for weathering steel bolted connections and Type 1 for plain or galvanized steel bolted connections.

Note: This drawing is not to scale. Follow dimensions.
U.I.P. AND REHABILITATE EXISTING (X'-X'-X') SPANS (SKEW: x)

Estimated Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Surface Repair (Concrete)</td>
<td>216.12</td>
</tr>
<tr>
<td>Removal of Concrete Wearing Surface</td>
<td>216.12</td>
</tr>
<tr>
<td>Replacement of Concrete Deck Repair</td>
<td>176.14</td>
</tr>
<tr>
<td>Full Depth Repair</td>
<td>176.14</td>
</tr>
<tr>
<td>Substructure Repair (Unformed)</td>
<td>331.00</td>
</tr>
<tr>
<td>Replacement of Concrete Wearing Surface</td>
<td>331.00</td>
</tr>
<tr>
<td>Full Depth Repair</td>
<td>331.00</td>
</tr>
<tr>
<td>Slab Edge Repair (Bridges)</td>
<td>274.57</td>
</tr>
<tr>
<td>Cleaning and Deadly Coating</td>
<td>274.57</td>
</tr>
</tbody>
</table>

General Notes:

- Supplementary wearing surface material for monolithic deck repair will be paid for at the fixed unit price in accordance with Sec 109.
- Note A3.8 if required.

Traffic Handling:

- Structure to be closed during construction.
- Repair work to be performed in accordance with Sec 109.
- Traffic to be maintained on adjacent roadway during construction.

All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.

Contractor shall verify all dimensions in field before ordering new material.

In order to maintain grade and a minimum thickness of wearing surface as shown on plans, it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishing and installing the wearing surface will be considered completely covered in the contract unit price, including all additional labor, materials or equipment for variations in thickness of wearing surface.

Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).

Cleaning and Epoxy Coating

Supplementary Wearing Surface Material

<table>
<thead>
<tr>
<th>Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latex Modified Concrete Wearing Surface</td>
<td>704-01.03</td>
</tr>
<tr>
<td>Superstructure Repair (Unformed)</td>
<td>704-01.07</td>
</tr>
<tr>
<td>Slab Edge Repair (Bridges)</td>
<td>704-01.01</td>
</tr>
<tr>
<td>Cleaning and Deadly Coating</td>
<td>704-01.13</td>
</tr>
</tbody>
</table>

B3.0 Supplementary wearing surface material for monolithic deck repair will be paid for at the fixed unit price in accordance with Sec 109.

Note B3.9 if required.

Concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.

Contractor shall verify all dimensions in field before ordering new material.

In order to maintain grade and a minimum thickness of wearing surface as shown on plans, it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishing and installing the wearing surface will be considered completely covered in the contract unit price, including all additional labor, materials or equipment for variations in thickness of wearing surface.

Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).

Cleaning and Epoxy Coating

Supplementary Wearing Surface Material

Note B3.9 if required.

Concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.

Contractor shall verify all dimensions in field before ordering new material.

In order to maintain grade and a minimum thickness of wearing surface as shown on plans, it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishing and installing the wearing surface will be considered completely covered in the contract unit price, including all additional labor, materials or equipment for variations in thickness of wearing surface.

Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).

Cleaning and Epoxy Coating

Supplementary Wearing Surface Material

Note B3.9 if required.

Concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.

Contractor shall verify all dimensions in field before ordering new material.

In order to maintain grade and a minimum thickness of wearing surface as shown on plans, it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishing and installing the wearing surface will be considered completely covered in the contract unit price, including all additional labor, materials or equipment for variations in thickness of wearing surface.

Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).

Cleaning and Epoxy Coating

Supplementary Wearing Surface Material

Note B3.9 if required.

Concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.

Contractor shall verify all dimensions in field before ordering new material.

In order to maintain grade and a minimum thickness of wearing surface as shown on plans, it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishing and installing the wearing surface will be considered completely covered in the contract unit price, including all additional labor, materials or equipment for variations in thickness of wearing surface.
**STANDARD DRAWING GUIDANCE**

This is an index of Standard Drawing details. Draw typical section as required and scale to fit within attached border. Use appropriate deck repair details and modify to fit as necessary. See Bridge Memo.

Wearing surface thickness can vary according to grade elevation requirements and minimum barrier joint height requirements. Maximum thickness should be limited to 1.5" (Ref. Organizational Results Research Report ORGR 104, May 2008).

Limit excludes reinforced concrete slab wearing surfaces.

Use appropriate reference (Structure, Roadway, Median, etc.)

Cleaning and sealing is preferred because of the relative short life of slab edge repair and unformed repair especially when over traffic. However, in urban regions repairing the overhang may be preferred. Consult with SPM or SLE.

Scarcification prior to adding first wearing surface or removing a portion of the deck when removing an existing wearing surface is not required for seal coat, asphalt, epoxy polymer or MMA polymer slurry wearing surfaces.

**FILLED JOINT DETAILS FOR ALL APPLICATIONS**

**FOR EPOXY POLYMER OR MMA POLYMER SLURRY WEARING SURFACE**

**FOR ALL OTHER WEARING SURFACES**

**SECTION THRU JOINT**

(EPOXY POLYMER OR MMA POLYMER SLURRY)

**SECTION THRU JOINT**

(ASPHALTIC CONCRETE WEARING SURFACE)

**SECTION THRU JOINT**

(POLYESTER POLYMER, LATEX, LOW SLUMP OR SILICA FUME CONCRETE)
Hydro Demolition Case 1: Monolithic Deck Repair

**STANDARD DRAWING GUIDANCE (do not show on plans):**

- 3" to 4" Steel Fiber Reinforced
- 1 3/4" to 3" CSA Cement Very Early Strength
- 1 3/4" to 3" Latex Modified Very Early Strength
- 2 1/4" to 3" Silica Fume
- 1 3/4" to 3" Latex Modified

May be used with the following concrete wearing surfaces:

- Hydro Demolition Case 1:
  - Coating (Overhang)
  - Cleaning and Epoxy
  - Steel Trans. Exist.

**REQUIRING INCIDENTAL FORMING**

**DETAIL A**

- Milling and Hydro Demolition Limits
- Monolithic Deck Repair
- Top of Existing Wearing Surface
- Limits of Mechanical Milling
- Top of New Wearing Surface
- Deck Repair Monolithic

**REPAIR BEFORE HYDRO DEMOLITION**

- Removal of Existing ___"± ___________ wearing surface
- Match existing grade _________±

**REMOVAL OF EXISTING DECK**

- ___" minimum total surface hydro demolition scarification of Bridge Deck & Total Scarification of Surface Hydro Demolition
- ___" vertical side shall be established outside the deteriorated area.
- ___" minimum total surface hydro demolition scarification of Surface Hydro Demolition

**MONOLITHIC DECK REPAIR**

- Match existing grade _________±
- ___" minimum total surface hydro demolition scarification of Surface Hydro Demolition
- ___" vertical side shall be established outside the deteriorated area.
- ___" minimum total surface hydro demolition scarification of Surface Hydro Demolition

**DETAIL A**

- Entire steel barrier may be suitably drained if desired
- Existing Aggregate
- Existing Aggregate
- Existing Aggregate
- Existing Aggregate
- Existing Aggregate
- Existing Aggregate

**X'-X"± Roadway**

- Steel Trans. Exist.
- Steel Trans. Exist.
- Steel Trans. Exist.
- Steel Trans. Exist.
- Steel Trans. Exist.
- Steel Trans. Exist.
- Steel Trans. Exist.
- Steel Trans. Exist.

**TYPICAL SECTION THRU EXISTING DECK**

- (Adding First Wearing Surface)

- (Replacing Existing Wearing Surface)
Semi-CIP Deck on Girders  Guidance & Alternate Details (6 of 6)

Conventional Deck Repair Only

Conventional Deck Repair Only may be used with all wearing surfaces.

- 1 1/4" to 2" Low-Strength Concrete
- 1 1/4" to 2" Low-Strength Concrete
- 1 1/4" to 2" Low-Strength Concrete
- 1 1/4" to 2" Low-Strength Concrete
- 2 1/4" to 3" Silica Fume Concrete
- 1 3/4" to 3" CSA Cement Very Early Strength Concrete
- 1 3/4" to 3" Latex Modified Very Early Strength Concrete
- 2 1/4" to 3" Latex Modified Concrete
- 2 1/4" to 3" Silica Fume Concrete
- 1/2" to 3/4" Alternate Ultrathin Bonded Asphalt
- 1" to 3" Alternate Asphaltic Concrete
- 3/8" MMA Polymer Slurry
- 3/4" to 3" Polyester Polymer Concrete
- 1/4" Epoxy Polymer
- 3" to 4" Steel Fiber Reinforced Concrete
- 1 3/4" to 3" CSA Cement Very Early Strength Concrete
- 1 3/4" to 3" Latex Modified Very Early Strength Concrete
- 2 1/4" to 3" Silica Fume Concrete
- 1 3/4" to 3" Latex Modified Concrete
- 2 1/4" to 3" Low Slump Concrete

Scarification of Bridge Deck

- Clearance around top bar is exposed.
- Half the diameter of the top bar shall be exposed at the intersection of the top bar and around bottom bar.
- 1" vertical side shall be established outside the deteriorated area.

Scarification not required with the following wearing surfaces:
- Or when applying concrete crack filler.
- May be used with all wearing surfaces.

For application of concrete crack filler:

- Adjust wearing surface thickness for thin wearing surfaces
- Adjust top of the original depth dimension to bottom of new wearing surface
- Delete top existing line
- Delete Dimension/Note (1) and renumber others

SDG: For seal coat, asphalt, UBAWS, epoxy polymer or MMA polymer slurry:

- Adjust depth for thin wearing surfaces
- Adjust top of the original depth dimension
- Delete existing line inside wearing surface
- Delete Dimension/Note (1) and renumber others

Match existing grade ±

(Adding First Wearing Surface or Applying Concrete Crack Filler)

(Replacing Existing Wearing Surface)
**Estimated Quantities**

<table>
<thead>
<tr>
<th>Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Surface Repair Material</td>
<td>250-02.50 sq. yard</td>
</tr>
<tr>
<td>Removal of Concrete Wearing Surface</td>
<td>255-15.75 sq. foot</td>
</tr>
<tr>
<td>Removal of Existing Deck Repair</td>
<td>255-16.10 sq. foot</td>
</tr>
<tr>
<td>Substructure Repair (Unformed)</td>
<td>255-2.50 sq. foot</td>
</tr>
<tr>
<td>Substructure Repair (Formed)</td>
<td>255-1.00 sq. foot</td>
</tr>
<tr>
<td>Full Depth Repair</td>
<td>255-1.25 sq. foot</td>
</tr>
<tr>
<td>Half-Sole Repair</td>
<td>255-1.00 sq. foot</td>
</tr>
<tr>
<td>Cleaning and Epoxy Coating</td>
<td>255-1.00 sq. foot</td>
</tr>
<tr>
<td>Latex Modified Concrete Wearing Surface</td>
<td>704-01.03 sq. foot</td>
</tr>
<tr>
<td>Superstructure Repair (Unformed)</td>
<td>704-01.01 sq. foot</td>
</tr>
<tr>
<td>Superstructure Repair (Formed)</td>
<td>704-01.02 sq. foot</td>
</tr>
<tr>
<td>Removal of Existing Deck Repair</td>
<td>704-01.07 sq. foot</td>
</tr>
<tr>
<td>Substructure Repair (Formed)</td>
<td>704-01.06 sq. foot</td>
</tr>
<tr>
<td>Slab Edge Repair (Bridges)</td>
<td>704-01.05 sq. foot</td>
</tr>
<tr>
<td>Structural Repair (Bridges)</td>
<td>704-01.04 sq. foot</td>
</tr>
</tbody>
</table>

**Miscellaneous:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class B-2 Concrete (Half-Sole and Full-Depth Repair)</td>
<td>704-01.02 sq. foot</td>
</tr>
<tr>
<td>Supplementary Wearing Surface Material</td>
<td>704-01.03 sq. foot</td>
</tr>
<tr>
<td>Supplementary Wearing Surface Material</td>
<td>704-01.01 sq. foot</td>
</tr>
<tr>
<td>Removal of Existing Deck Repair</td>
<td>704-01.07 sq. foot</td>
</tr>
<tr>
<td>Half-Sole Repair</td>
<td>704-01.05 sq. foot</td>
</tr>
<tr>
<td>Cleaning and Epoxy Coating</td>
<td>704-01.04 sq. foot</td>
</tr>
<tr>
<td>Latex Modified Concrete Wearing Surface</td>
<td>505-00.04 cu. yard</td>
</tr>
</tbody>
</table>

**General Notes:**

- Supplementary wearing surface material for monolithic deck repair will be paid for at the fixed unit price in accordance with Sec 109.
- Note B3.9 if required

**Roadway Handling:**

- I1.0 Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).
- I1.0.3 (if required) All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.
- I1.0.2A All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

**Contractor Notes:**

- Contractor shall verify all dimensions in field before ordering new material.
- In order to maintain grade and a minimum thickness of wearing surface as shown on plans it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishig and installing the wearing surface will be considered completely covered in the contract unit price. Additional labor, materials or equipment for variations in thickness of wearing surface shall be considered at the fixed unit price.

**Traffic Handling:**

- Traffic handling adjacent to bridge ends shall match new bridge wearing surface (roadway item).
- Traffic handling shall be maintained for traffic control during the construction period.

**Repaired Areas:**

- Repaired areas shall be marked with roadway plants, where applicable.
Hydro Demolition Case 1: Monolithic Deck Repair After Hydro Demolition

STANDARD DRAWING GUIDANCE (do not show on plans):
- May be used with the following concrete wearing surfaces:
  1. 3" to 4" Steel Fiber Reinforced Very Early Strength
  2. 1 3/4" to 3" Latex Modified Very Early Strength
  3. 2 1/4" to 3" Silica Fume
- Use appropriate details below on first sheet and add a sheet title using the guidance options for the below details.

REMOTE PANEL JOINT REPAIR

REPAIR BEFORE HYDRO DEMOLITION

Top of Existing Wearing Surface

Milling and Hydro Demolition Limits

Top of New Wearing Surface (Panel joint)

Top of Existing Deck

Match existing grade _________±

Existing Aggregate Coat with Epoxy

New Wearing Surface

Match existing grade _________±

Existing Aggregate Coat with Epoxy

New Wearing Surface

Match existing grade _________±

Existing Aggregate Coat with Epoxy

New Wearing Surface

Match existing grade _________±

Existing Aggregate Coat with Epoxy

New Wearing Surface
Hydro Demolition Case 2: Conventional Deck Repair

After Hydro Demolition

REPAIR BEFORE HYDRO DEMOLITION

DETAIL A

Removal of Existing Wearing Surface

(Replacing Existing Wearing Surface)

DETAIL B

After Hydro Demolition

Removal of Existing Wearing Surface

Adding First Wearing Surface

TYPICAL SECTION THRU EXISTING DECK

TYPICAL SECTION THRU EXISTING DECK

Match existing grade ±

Match existing barrier

1" Vertical side shall be required when more than half the diameter of the top bar is exposed.

Clearance around top bar shall be used when only half the diameter or less shall be required when more than half the diameter of the top bar is exposed.

Top of Existing Deck

Top of Existing Wearing Surface

Top of New Wearing Surface

Top of New Deck

Details:

1. Hydro demolition (do not show on plans)
2. Removal of existing ± wearing surface
3. 1" Vertical side shall be established outside the intersection of top bar and around bottom bar at the top of the bar is exposed.
4. Clearance around top bar shall be required when more than half the diameter or less shall be used when only half the diameter or less
5. Match existing grade ±
6. Match existing barrier

Concrete Wearing Surface

Cleaning and Epoxy Coating

Monolithic Deck Repair

Half-Sole Repair

Cleaning and Epoxy Coating

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.

Steel Trans. Exist.
Conventional Deck Repair Only

**Standard Drawing Guidance (do not show on plans):**

- **Scarification not required with the following wearing surfaces:**
  - 2 3/4" to 3" Latex Modified Concrete
  - 2 3/4" to 3" Silica Fume Concrete
  - 2 3/4" to 3" Medium Early Strength Concrete
  - 2 3/4" to 3" ISA Cement Very Early Strength Concrete
  - 3" to 4" Steel Fiber Reinforced Concrete
  - 1/4" Epoxy Polymer
  - 3" to 4" Steel Fiber Reinforced Concrete
  - 1 3/4" to 3" CSA Cement Very Early Strength Concrete
  - 1 3/4" to 3" Latex Modified Very Early Strength Concrete
  - 2 1/4" to 3" Silica Fume Concrete
  - 2 1/4" to 3" Low Slump Concrete

- **Temporary Concrete:**
  - Match existing grade _________±

- **Traffic Barrier:**
  - Match existing grade _________±

- **Wearing Surface:**
  - Match existing grade _________±

- **Concrete Crack Filler:**
  - Replace "Wearing Surface" with "Concrete Crack Filler."

- **Depth:**
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **MMA Polymer Slurry:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Asphalt:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Temporary Concrete:**
  - Match existing grade _________±

- **SDG:** For seal coat, asphalt, UBAWS, epoxy polymer or MMA polymer slurry:
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Existing Line:**
  - Delete existing line inside wearing surface
  - Delete Dimension/Note (1) and renumber others
  - Delete Dimension/Note (3) and renumber others
  - Delete Dimension/Note (4) and renumber others

- **Concrete Crack Filler:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Wearing Surface:**
  - Match existing grade _________±

- **Temporary Concrete:**
  - Match existing grade _________±

- **Traffic Barrier:**
  - Match existing grade _________±

- **Wearing Surface:**
  - Match existing grade _________±

- **Concrete Crack Filler:**
  - Replace "Wearing Surface" with "Concrete Crack Filler."

- **Depth:**
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **MMA Polymer Slurry:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Asphalt:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Temporary Concrete:**
  - Match existing grade _________±

- **SDG:** For seal coat, asphalt, UBAWS, epoxy polymer or MMA polymer slurry:
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Existing Line:**
  - Delete existing line inside wearing surface
  - Delete Dimension/Note (1) and renumber others
  - Delete Dimension/Note (3) and renumber others
  - Delete Dimension/Note (4) and renumber others

- **Concrete Crack Filler:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Wearing Surface:**
  - Match existing grade _________±

- **Temporary Concrete:**
  - Match existing grade _________±

- **Traffic Barrier:**
  - Match existing grade _________±

- **Wearing Surface:**
  - Match existing grade _________±

- **Concrete Crack Filler:**
  - Replace "Wearing Surface" with "Concrete Crack Filler."

- **Depth:**
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **MMA Polymer Slurry:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Asphalt:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Temporary Concrete:**
  - Match existing grade _________±

- **SDG:** For seal coat, asphalt, UBAWS, epoxy polymer or MMA polymer slurry:
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface

- **Existing Line:**
  - Delete existing line inside wearing surface
  - Delete Dimension/Note (1) and renumber others
  - Delete Dimension/Note (3) and renumber others
  - Delete Dimension/Note (4) and renumber others

- **Concrete Crack Filler:**
  - Adjust depth for thin wearing surfaces
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
  - Adjust top of the original depth dimension to the bottom of new wearing surface
**STANDARD DRAWING GUIDANCE (do not show on plans)**

This is an index of Standard Drawing details. Draw typical sections as required and scale to fit within attached border. Use appropriate deck repair details and modify as required in demolition of actual reinforcements.

For bridges with epoxy coated steel, see Sec 716 for repair details and add notes as necessary. See SM.

**Wearing surface thickness** can vary according to grade elevation requirements and minimum barrier curb height requirements. Minimum thickness should be limited to 3" (Ref. Organizational Results Report ORW 606, May 2006). Limit excludes reinforced concrete slab wearing surfaces.

**Will need to adjust wearing surface thickness** when detailing a thin wearing surface (I” or less), but it is a preferred method detailing practice to show a desirable thickness on the plans. No thickness is shown for crack filler application.

**Consideration should be made** for additional notes for repairing deterioration of the precast prestressed panels. See SM.

The Prestressed Panel Joint Repair detail is shown transverse because typically deterioration follows the strand length of the panel. A repair is referred to as a “Joint”.

**Show difference as ±X”**, see Bridge Memo or SM.

- **Trans.**
- **Exist.**
- **Orig.**
- **P/S Panel**
- **Long.**

**Identify new wearing surface** (See Bridge Memo or SM). Specify minimum thickness in deck details.

**Identify existing wearing surface and thickness**, see Bridge Memo or existing plans.

**See Bridge Memo or SM** typically 1/2". Use 1” if more than 30% of existing deck needs repair. Verify there will be a minimum of 1/2” of concrete above the top bars after scarification.

**See Bridge Memo or SM, typically 1/2”**.

**See existing plans.**

Use appropriate reference (E Structure, K Roadway, C Median, etc.)

- **Concrete and asphalt joint repair** is preferred because of the relative short life of slab edge repair and unformed repair especially when over traffic. However, in urban regions requiring the overhang may be preferred. Consult with SM or SPM.

**Scarification prior to adding first wearing surface or removing a portion of the deck when removing an existing wearing surface is not required for seal coat, asphalt, UBAWS, epoxy, or MMA polymer slurry wearing surfaces.**

The following note will be required if concrete removal exposing prestressing strands is anticipated.

Adequate precaution shall be taken to prevent any nicks or cuts of the prestressing strands.

- **If full depth repair through panels is anticipated** additional deck repair details will be required. Details shown for conventional deck repair post-hydro demolition when adding first wearing surface. Details for other cases are similar.

**MONOLITHIC DECK REPAIR REQUIRING INCIDENTAL FORMING**

**MONOLITHIC DECK REPAIR REQUIRING FULL DEPTH REPAIR**

**Add note:** (5) One inch vertical side shall be established outside the deteriorated area. See Sec 704.

**# Hold Point: Concrete removal exposing prestressing strands within a special repair zone shall require engineer approved repair.**

**# Special Repair Zone (Typ.) #**

**#IDG: This will allow the bridge office to assess situation and develop repair method.**

**FILLED JOINT DETAILS FOR ALL APPLICATIONS**

**FOR EPOXY POLYMER OR MMA POLYMER SLURRY WEARING SURFACE**

**SECTION THRU JOINT**

**EPOXY POLYMER OR MMA POLYMER SLURRY**

**SECTION THRU JOINT**

**FOR ALL OTHER WEARING SURFACES**

**SECTION THRU JOINT**

**ASPHALTIC CONCRETE WEARING SURFACE**

**Add note:** (5) One inch vertical side shall be established outside the deteriorated area. See Sec 704.
Hydro Demolition Case 1A:
Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Monolithic Deck Repair After Hydro Demolition
(Adding First Wearing Surface)
DECK REPAIR DETAILS

Deck Repair Notes:

Order of Repair:
1. Scarify existing deck
2. Power wash deck to identify sound and unsound concrete
3. Inside special repair zones, complete the following repairs:
   a. Removal of existing deck repair
   b. Full depth repair
   c. Half-sole repair
4. Outside special repair zones, remove existing deck repair
5. Complete total surface hydro demolition, removing ___" minimum of sound concrete inside special repair zones and ___" minimum of sound concrete outside special repair zones.

MONOLITHIC DECK REPAIR

FULL DEPTH REPAIR

- Minimum depth of full depth repair shall not exceed 1/3 of the deck width at one time. For any area of deck repair that extends over a web and is more than 6 inches in length along the web, the concrete removal shall stop at the longitudinal reinforcing bar. Prior to continuing work in this area, the concrete shall have gained a compressive strength at least 3200 psi. No traffic shall be permitted over the web that is undergoing repair.

FULL DEPTH REPAIR WITH HALF-SOLE REPAIR

- If any single repair area does not exceed 9 square feet in size and the total repair area within a special repair zone does not exceed 27 square feet, the repairs in all special repair zones shall be completed before hydro demolition.

DECK REPAIR INSIDE SPECIAL REPAIR ZONES (BEFORE HYDRO DEMOLITION)

Order of Repair:
2. Power wash deck to identify sound and unsound concrete
3. Inside special repair zones, complete the following repairs:
   a. Removal of existing deck repair
   b. Full depth repair
   c. Half-sole repair

DECK REPAIR OUTSIDE SPECIAL REPAIR ZONES (AFTER HYDRO DEMOLITION)

Order of Repair:
2. Power wash deck to identify sound and unsound concrete
3. Outside special repair zones, complete full depth repair with half-sole repair

Special Repair Zones:
- Deck repairs in the areas designated as special repair zones shall be completed before hydro demolition.
- Removal and deck repair shall be completed in the following sequence.

Deck Repair Notes:

1. Scarify existing deck
2. Power wash deck to identify sound and unsound concrete
3. Inside special repair zones, complete the following repairs:
   a. Removal of existing deck repair
   b. Full depth repair
   c. Half-sole repair
4. Outside special repair zones, remove existing deck repair
5. Complete total surface hydro demolition, removing ___" minimum of sound concrete inside special repair zones and ___" minimum of sound concrete outside special repair zones.

PART PLAN OF SLAB SHOWING SPECIAL REPAIR ZONES

Note: This drawing is not to scale. Follow dimensions.

DECK REPAIR DETAILS

Detailed:
Checked:
Note: This drawing is not to scale. Follow dimensions.

Sheet No. of
Hydro Demolition Case 1B:
Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Monolithic Deck Repair After Hydro Demolition

(Replacing Existing Wearing Surface)
Deck Repair Details:

**Order of Repair:**
1. Remove existing wearing surface plus ___" of existing deck.
2. Power wash deck to identify sound and unsound concrete areas.
3. Inside special repair zones, complete the following repairs:
   - Removal of existing deck repair.
   - Exposed reinforcing bar.
4. Outside special repair zones, remove existing deck repair.
5. Complete total surface hydro demolition, removing minimum of sound concrete inside special repair zones and removing a minimum area of deteriorated concrete outside special repair zones.
6. Sound deck and if needed complete incidental concrete removal.
7. Outside special repair zones, complete full depth repairs.
8. Place new wearing surface including additional material for areas of monolithic deck repair.

**Special Repair Zones:**
- Deck repair required in the areas designated as special repair zones shall be completed before hydro demolition.
- Any deck repair in areas not designated as a special repair zone shall be completed after hydro demolition.

**Deck Repair Notes:**
- Full depth repair shall not exceed 1/3 of the deck width at one time. For any area of deck repair that extends over a web and is more than 18 inches in length along the web, the concrete removal and deck repair shall be completed in one web without prior review and approval from the engineer.
- A half depth repair for structures with single column bents.
- For structures with single column bents, the special repair zone does not exceed 27 square feet, and the total repair area within a special repair zone does not exceed 9 square feet in size and the total repair area within a special repair zone does not exceed 9 square feet in size. Any deck repair in areas not designated as a special repair zone shall be completed after hydro demolition.
- Any deck repair in areas not designated as a special repair zone shall be completed after hydro demolition.
- The total width of full depth repair shall not exceed 1/3 of the deck width at one time. For any area of deck repair that extends over a web and is more than 18 inches in length along the web, the concrete removal and deck repair shall be completed in one web without prior review and approval from the engineer.
- Concrete slab repair that extends over a web and is more than 18 inches in length along the web, the concrete removal and deck repair shall be completed in one web without prior review and approval from the engineer.
- Sound deck and if needed complete incidental concrete removal.
- Place new wearing surface including additional material for areas of monolithic deck repair.

**Deck Repair Details:**
- Order of repair: 1. Remove existing wearing surface plus ___" of existing deck.
- Power wash deck to identify sound and unsound concrete areas.
- Inside special repair zones, complete the following repairs:
  - Removal of existing deck repair.
  - Exposed reinforcing bar.
- Outside special repair zones, remove existing deck repair.
- Complete total surface hydro demolition, removing minimum of sound concrete inside special repair zones.
- Sound deck and if needed complete incidental concrete removal.
- Place new wearing surface including additional material for areas of monolithic deck repair.

**Special Repair Zones:**
- Deck repair required in the areas designated as special repair zones shall be completed before hydro demolition.
- Any deck repair in areas not designated as a special repair zone shall be completed after hydro demolition.

**Deck Repair Notes:**
- Full depth repair shall not exceed 1/3 of the deck width at one time. For any area of deck repair that extends over a web and is more than 18 inches in length along the web, the concrete removal and deck repair shall be completed in one web without prior review and approval from the engineer.
- A half depth repair for structures with single column bents.
- For structures with single column bents, the special repair zone does not exceed 27 square feet, and the total repair area within a special repair zone does not exceed 9 square feet in size. Any deck repair in areas not designated as a special repair zone shall be completed after hydro demolition.
- Any deck repair in areas not designated as a special repair zone shall be completed after hydro demolition.
- The total width of full depth repair shall not exceed 1/3 of the deck width at one time. For any area of deck repair that extends over a web and is more than 18 inches in length along the web, the concrete removal and deck repair shall be completed in one web without prior review and approval from the engineer.
- Concrete slab repair that extends over a web and is more than 18 inches in length along the web, the concrete removal and deck repair shall be completed in one web without prior review and approval from the engineer.
- Sound deck and if needed complete incidental concrete removal.
- Place new wearing surface including additional material for areas of monolithic deck repair.

**Deck Repair Details:**
- Order of repair: 1. Remove existing wearing surface plus ___" of existing deck.
- Power wash deck to identify sound and unsound concrete areas.
- Inside special repair zones, complete the following repairs:
  - Removal of existing deck repair.
  - Exposed reinforcing bar.
- Outside special repair zones, remove existing deck repair.
- Complete total surface hydro demolition, removing minimum of sound concrete inside special repair zones.
- Sound deck and if needed complete incidental concrete removal.
- Place new wearing surface including additional material for areas of monolithic deck repair.
Hydro Demolition Case 2A:
Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Conventional Deck Repair After Hydro Demolition
(Adding First Wearing Surface)

Standard Drawing Guidance: (Do not show on plans):
Use for the following concrete wearing surfaces:
- Low slump concrete
- Polyester concrete
- Hydro demolition

If optional concrete wearing surface is specified and low slump or polyester
polymer is an option follow guidance on Sheet RHB03a.

If optional concrete wearing surface is specified and low slump or polyester
polymer is an option follow guidance on Sheet RHB03a.

If optional concrete wearing surface is specified and low slump or polyester
polymer is an option follow guidance on Sheet RHB03a.

Design Loading:
- Bridge Deck Rating = 505-10.00
- Design Unit Stresses:
  - HS20-44 Modified (   ) and Military 24,000 lb Tandem Axle (    )

General Notes:
- Contractor shall verify all dimensions in field before ordering new material.
- In order to maintain grade and a minimum thickness of wearing surface as shown on
  plans it may be necessary to use additional quantities of wearing surface at various
  locations throughout the structure. The cost of furnishing and installing the wearing
  surface will be considered completely covered in the contract unit price, including
  all additional labor, materials or equipment for variations in thickness of wearing
  surface.
- Traffic Handling:
  - Trucking and Traffic Control

Design Specifications:
- General Notes:
  - Design loading:
  - Bridge deck rating:
  - Design unit stresses:

General Notes:
- General Notes:
  - General Notes:

General Notes:
- General Notes:
  - General Notes:

Hydro Demolition Case 2A:
Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Conventional Deck Repair After Hydro Demolition
(Adding First Wearing Surface)
Deck Repair Details:

**Order of Repair:**
1. Scarify existing deck ___".
2. Demolish deck to a minimum sound and gauged existing deck area ___".
3. Inside special repair zones, complete the following repairs before hydro demolition:
   - Full Depth Repair
   - Half-Sole Repair
   - Full-Sole Repair
   - Square Foot Repair
4. Outside special repair zones, complete the following repairs:
   - Half-Sole Repair
   - Full-Sole Repair
5. Complete total surface hydro demolition, removing:
   - Minimum of sound concrete inside special repair zones and removing minimum of sound concrete and all deteriorated concrete outside special repair zones.
6. Sound deck and if needed complete incidental concrete removal.
7. Outside special repair zones, complete the following repairs:
   - Half-Sole Repair
   - Full-Sole Repair
8. Place new wearing surface including additional material for areas of monolithic deck repair.

**Special Repair Zones:**
- Deck repairs required in the areas designated as special repair zones shall be completed after hydro demolition. Zones with the same letter designation may be repaired at the same time. Hydro demolition shall not be used to repair the special repair zone may not be performed at the same time. Hydro demolition shall not be used to repair the special repair zone may not be performed at the same time.
- Special repair zones are completed and properly cured before any deck repair area is started in the next special repair zone.
- Total width of all depth repair shall not exceed 1/3 of the deck width at one time. For any area of deck repair, the total repair area shall be a minimum of ___" in length along the web, the concrete removal and deck repair shall be completed in one pass. For any area of deck repair, the total repair area shall be a minimum of ___" in length along the web, the concrete removal and deck repair shall be completed in one pass.
- Full-depth repair with half-sole repair shall be used when half or more of the diameter of the longitudinal reinforcing bars is exposed.
- Full-depth repair shall be used when more than half the diameter of the longitudinal reinforcing bars is exposed.
- Monolithic deck repair shall be used when half the diameter or less of the top bar is exposed.
- Clearance around top bar and around bottom bar at the intersection of top bar shall be required when more than half the diameter of the top bar is exposed.

**Deck Repair Notes:**
- Note: This drawing is not to scale. Follow dimensions.
Hydro Demolition Case 2B:
Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Conventional Deck Repair After Hydro Demolition
(Replacing Existing Wearing Surface)

STANDARD DRAWING GUIDELINES (do not show on plans):
Use for the following concrete wearing surfaces:
- Polymeric is an option follow guidance on Sheet RHB03c.
- If optional concrete wearing surface is specified and low slump or polyester, use for the following concrete wearing surfaces:
  - STANDARD DRAWING GUIDANCE (do not show on plans):
    - Repairs to existing concrete.
    - Apply tinted sealer to blend with existing concrete color.

HI21-AB: Design loading (1 and 2 Tandem Axle or 1) Year
HI21-AC: Design loading (3 and 4 Tandem Axle or 2) Year

Superstructure Repair (Unformed)
- Wearing Surface and Removal of Concrete Wearing Surface

Removal of Existing Deck Repair

Removal of Concrete Wearing Surface and Total Surface Hydro Demolition

Removal of Concrete Wearing Surface and Total Surface Hydro Demolition

Slab Edge Repair (Bridges)
- Slab Edge Repair (Bridges) (Before hydro demolition) and Epoxy Coating

Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).

Repaired areas or low slump or polyester, use for the following concrete wearing surfaces:
- STANDARD DRAWING GUIDANCE (do not show on plans):
  - Repairs to existing concrete.
  - Apply tinted sealer to blend with existing concrete color.

<replacement as required>

<replacement as required>
Deck Repair Notes:

Order of Repair:
1. Remove existing wearing surface plus ___" of existing deck. Deck repair required in the areas designated as special repair zones shall be completed before hydro demolition. Zones with the same letter designation may be repaired at the same time. If any part of a special repair zone is available, all of the special repair zones shall be completed before hydro demolition commences.
2. Partial depth repair to identify and sound and unrepaired area of the special repair zone. Sound existing reinforcing bar shall be repaired and replaced as full depth repair. Concrete in webs shall not be removed below the slab haunch of the girder without prior review and approval from the engineer.
3. Interior falsework installed by the contractor resting on the bottom slab shall be removed where noted. Existing reinforcing bar shall be repaired and reinforced as full depth repair. Concrete in webs shall not be removed below the slab haunch of the girder without prior review and approval from the engineer.
4. Half-sole repair in the special repair zone on either side of the tearout. Sound reinforcing bar shall remain in place. Full depth repair shall be made when repair is required in the longitudinal reinforcing bar. Full depth repair shall be made when repair is required in the longitudinal reinforcing bar. Full depth repair shall be made when repair is required in the longitudinal reinforcing bar.

Deck Repair Procedure:
5. Complete total surface hydro demolition, removing ___" minimum of sound concrete inside special repair zones and ___" minimum of sound concrete outside special repair zones. Replace with Note I3.3.
6. Sound deck and ___" minimum of concrete removed. Place new wearing surface over the entire repair area. Strength of 3200 psi before work can be moved forward until the repairs in all special repair zones are completed and properly cured
7. Sound deck and ___" minimum of concrete removed. Place new wearing surface over the entire repair area. Strength of 3200 psi before work can be moved forward until the repairs in all special repair zones are completed and properly cured.
8. Sound deck and ___" minimum of concrete removed. Place new wearing surface over the entire repair area. Strength of 3200 psi before work can be moved forward until the repairs in all special repair zones are completed and properly cured.

Specified Repair Zones:
9. Sound deck and ___" minimum of concrete removed. Place new wearing surface over the entire repair area. Strength of 3200 psi before work can be moved forward until the repairs in all special repair zones are completed and properly cured.
10. Sound deck and ___" minimum of concrete removed. Place new wearing surface over the entire repair area. Strength of 3200 psi before work can be moved forward until the repairs in all special repair zones are completed and properly cured.

Removal and deck repair shall be completed in one remove and repair areas. Repair completed in the special repair zone shall be completed in three steps.

Order of Repair:

1. Remove existing wearing surface plus ___" of existing deck. Deck repair required in the areas designated as special repair zones shall be completed before hydro demolition. Zones with the same letter designation may be repaired at the same time. If any part of a special repair zone is available, all of the special repair zones shall be completed before hydro demolition commences.
2. Partial depth repair to identify and sound and unrepaired area of the special repair zone. Sound existing reinforcing bar shall be repaired and replaced as full depth repair. Concrete in webs shall not be removed below the slab haunch of the girder without prior review and approval from the engineer.
3. Interior falsework installed by the contractor resting on the bottom slab shall be removed where noted. Existing reinforcing bar shall be repaired and reinforced as full depth repair. Concrete in webs shall not be removed below the slab haunch of the girder without prior review and approval from the engineer.
4. Half-sole repair in the special repair zone on either side of the tearout. Sound reinforcing bar shall remain in place. Full depth repair shall be made when repair is required in the longitudinal reinforcing bar. Full depth repair shall be made when repair is required in the longitudinal reinforcing bar. Full depth repair shall be made when repair is required in the longitudinal reinforcing bar.
Conventional Deck Repair Only
(Case A)
(Adding First Wearing Surface or Applying Concrete Crack Filler)

General Notes:
A1.1 Design Specifications:
2002 AASHTO LRFD (17th Ed.) Standard Specifications
Bridge Deck Rating = 25
A1.2 Design Loading:
I-194 10% 10% and Military 24,000 lb tandem axle + Year
A1.3 Design Unit Stresses:
Class B-1 Concrete (Half-Sole and Full Depth Repair) $f'_c = 4,000$ psi
Model assume:
A1.4 Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).
A1.5 B All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.
A1.6 Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.
A1.7 Contractor shall verify all dimensions in field before ordering new material.
A1.8 In order to maintain grade and a minimum thickness of wearing surface as shown on plans it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishing and installing the wearing surface will be considered completely covered in the contract unit price, including all additional labor, materials, or equipment for variations in thickness of wearing surface.
A1.9 Structure to be closed during construction. Traffic to be maintained on roadway between the repair zones, except
A1.10 Repairs to Bridge: Route *
Over *
ROUTE * FROM * TO *
ABOUT * MILES * OF *
BEGINNING STATION _______ ± (Match Existing)
**Special Repair Zones:**

1. **Half-Sole Repair:**
   - Repair half the diameter of the longitudinal reinforcing bar. Full depth repair shall be made when removal of deteriorated concrete exposes half of the diameter of the longitudinal reinforcing bar.

2. **Half-Sole Repair in Special Repair Zone:**
   - Repair half the special repair zone. If the full depth extends over a diaphragm or web and is more than 18 inches in length along the web, the concrete removal shall be completed in this area prior to continuing work in the adjacent repair zone. The adjacent repair zone shall be permitted over the web that is undergoing repair.

3. **Total Width of Full Depth Repair:**
   - Total width of full depth repair shall not exceed 1/3 of the deck width at the same location.

4. **Removal of Deteriorated Concrete:**
   - For seal coat, asphalt, UBAWS, epoxy polymer or MMA SDG:
     - Adjust top of the original depth dimension to bottom of new wearing surface.
   - For concrete crack filler:
     - Adjust wearing surface thickness for thin wearing surfaces.
     - Adjust top of the original depth dimension to bottom of new wearing surface.
     - Remove notes for repairs not required.

5. **Order of Repair:**
   1. Scarify existing deck ___".
   2. Sound deck to identify areas in need of repair.
   3. Outside special repair zones, complete the preceding repairs in alphabetical sequence beginning with Zone A. Zones with the same letter designation may be repaired at the same time.
   4. Inside special repair zones, complete the following repairs:
      - a. Half-Sole Repair
      - b. Full Depth Repair
   5. Place new wearing surface.

6. **DECK REPAIR DETAILS:**
   - Ensure that all dimensions and notes are followed.
   - Remove all notes for repairs not required.
   - Check all notes for repairs not required.
   - New notes shall be established outside the deteriorated area.
   - Minimum __________ wearing surface thickness shall be applied over the new concrete surface.
   - Original thickness of top slab shall be removed where entry access is available.
   - Replace “Wearing Surface” with “Concrete Crack Filler” and adjust leader note to point to the remaining top line.

7. **Concrete Crack Filler:**
   - For seal coat, asphalt, (SK-CO), epoxy polymer, or MMA polymer slurry wearing surfaces.
   - Adjust wearing surface thickness for thin wearing surfaces.
   - For application of concrete crack filler:
     - Delete Dimension/Note (1) and (3) and replace with Note I3.3 for structures with single column bents.
     - Replace “Wearing Surface” with “Concrete Crack Filler” and adjust leader note to point to the remaining top line.

8. **Filler:**
   - For seal coat, asphalt, (SK-CO), epoxy polymer, or MMA polymer slurry wearing surfaces.
   - Adjust wearing surface thickness for thin wearing surfaces.
   - For application of concrete crack filler:
     - Delete Dimension/Note (1) and (3) and replace with Note I3.3 for structures with single column bents.
     - Replace “Wearing Surface” with “Concrete Crack Filler” and adjust leader note to point to the remaining top line.

9. **Note:**
   - This drawing is not to scale. Follow dimensions.
### General Notes:

1. **Design Specifications:**
   - 2002 AASHTO LRFD (17th Ed.) Standard Specifications
   - 2002 AASHTO LRFD (17th Ed.) Standard Specifications
   - Bridge Deck Rating =

2. **Design Loading:**
   - Highway
     - I-18 (Mass.): 4,000 lb Tandem Axle
     - I-18 (Mass.): 4,000 lb Tandem Axle
   - Military: 24,000 lb Tandem Axle

3. **Design Unit Stresses:**
   - Class B-1 Concrete (Half-Sole and Full Depth Repair) $f'_c = 4,000$ psi
   - Class B-1 Concrete (Half-Sole and Full Depth Repair) $f'_c = 4,000$ psi
   - Class B-1 Concrete (Half-Sole and Full Depth Repair) $f'_c = 4,000$ psi

4. **General Notes:**
   - All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.
   - Outline of existing work is indicated by light dashed lines. Heavy lines indicate new work.
   - Contractor shall verify all dimensions in field before ordering new material.

5. **Traffic Handling:**
   - All roadway plans for traffic control and barrier plans are to show

6. **REPAIRS TO BRIDGE: ROUTE * OVER * ROUTE * FROM * TO * ABOUT * MILE * OF *
   - BEGINNING STATION ± (Match Existing)
**Special Repair Zones**

- Int. Bent No. 3
- Int. Bent No. 4
- Int. Bent No. 5

**Description**

- Sheet No.: 1
- of 1

**Deck Repair Notes:**

1. Remove existing wearing surface plus ___" ± ______ wearing surface.
2. Sound deck to identify areas in need of repair.
3. Outside special repair zone, complete the following repairs:
   - Half-sole repair
   - Full-depth repair
4. Inside special repair zone, complete the following repairs:
   - Half-sole repair
   - Full-depth repair
5. Place new wearing surface.

**Special Repair Zones:**

- Any deck repair in areas not designated as special repair zone shall be completed prior to work in Zone A.
- Zones with the same letter designation (may be repaired at the same time) have common criteria.
- Special repair zone does not exceed 27 square feet. No traffic shall be permitted over the web that is undergoing repair.

**Deck Repair Details:**

- Full-depth repair shall be completed in one special repair zone and structures with single column bents shall have attained a compressive strength of 3200 psi before work can be started in the next special repair zone.
- Total width of full depth repair shall not exceed 1/3 the width of the deck at this point or greater than 18 inches in length along the web. The interior longitudinal reinforcing bar that intersects the bottom slab shall be removed and replaced as full depth repair. Concrete in the deteriorated area that will not expose half the diameter of the longitudinal reinforcing bar shall be removed and replaced as full depth repair. Concrete in the deteriorated area that will not expose half the diameter of the longitudinal reinforcing bar shall be removed and replaced as full depth repair.

**Note:**

- This drawing is not to scale. Follow dimensions. Sheet No. of
STANDARD DRAWING GUIDANCE (SDG) (do not show on plans)

Select the appropriate 1st and 2nd sheet. Draw typical section as required and scale to fit within attached border replacing the provided example. Modify other details and notes as required (match orientation of actual reinforcement).

Transverse repair zoning over intermediate bents is required for these structures. Longitudinal repair zoning in spans is required only when hydro demolition is required and is based on anticipated quantity of deck repair if not overlapped. See EPG 751.40 (if only transverse zoning is required, zones shall be called “Special Repair Zones”).

Wearing surface thickness can vary according to grade requirement requirements and minimum barrier curb height requirements. Maximum thickness should be limited to 3" (Ref: Organizational Results Research Report ORDE 004, May 2009). Limit excludes reinforced concrete slab wearing surfaces.

Select the appropriate 1st and 2nd sheet. Draw typical section as required and scale to fit within attached border replacing the provided example. Modify other details and notes as required (match orientation of actual reinforcement).

Use appropriate reference (Structure, Roadway, Median, etc.)

Two types of overhang rehabilitation are shown. Cleaning and epoxy coating is preferred because of the relative short life of slab edge repair and unformed repair especially when over traffic. However in urban regions repairing the overhang may be preferred. Consult with SDG or SLE.

Scarification prior to adding first wearing surface or removing a portion of the deck when removing an existing wearing surface is not required for seal coat, asphalt, USAC, epoxy polymer or SMA polymer slurry wearing surfaces.

Monolithic deck repair should only be allowed where longitudinal zoning is not required.

May be used for aesthetics when there will be an extensive patchwork of repairs visible to the public.

If deterioration is within 4 inches of edge then slab edge repair may be used instead of unformed superstructure repair.

A Show difference as 1½" ± see Bridge Memo or SPM. Specify minimum thickness in deck details. Typically 1/4" thicker outside special repair zones for Hydro Case 1 & 2.

B Identify existing wearing surface and thickness, see Bridge Memo or existing plans.

C Identify existing wearing surface and thickness, see Bridge Memo or existing plans.

D See Bridge Memo or SPM, typically 1/2" inside special repair zones to avoid deeper penetration into newly repaired areas and 1½" outside special repair zones.

E See existing plans.

F Use appropriate reference (Structure, Roadway, Median, etc.)

Two types of overhang rehabilitation are shown. Cleaning and epoxy coating is preferred because of the relative short life of slab edge repair and unformed repair especially when over traffic. However in urban regions repairing the overhang may be preferred. Consult with SDG or SLE.

Scarification prior to adding first wearing surface or removing a portion of the deck when removing an existing wearing surface is not required for seal coat, asphalt, USAC, epoxy polymer or SMA polymer slurry wearing surfaces.

Special Repair Zones

PART PLAN OF SLAB SHOWING SPECIAL REPAIR ZONES
Hydro Demolition Case 1A:
Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Monolithic Deck Repair After Hydro Demolition

(Adding First Wearing Surface)
Hydro Demolition Case 1B:
Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Monolithic Deck Repair After Hydro Demolition
(Replacing Existing Wearing Surface)

STANDARD DRAWING GENERAL (do not show on plans):
A2.6 Use for the following concrete wearing surfaces:
3.8.2c 3" x 1" - Low Slump
3.8.2d 3" x 1" - Silica Fume
3.8.2e 3" x 1" - CSA Cement Very Early Strength
3.8.3c 2 1/4" to 3" - Latex Modified
3.8.3d 2 1/4" to 3" - Latex Modified Very Early Strength
3.8.3e 2 1/4" to 3" - Silica Fume

A Note B3.9 if required.

General Notes:
A1 Design Specifications:
2003 AASHTO LRFD (17th Ed.) Standard Specifications
Bridge Deck Rating =
A2 Design loading:
HS20-44 Modified (    ) and Military 24,000 lb Tandem Axle (    )
Design Unit Stresses:
Class B-1 Concrete (Half-Sole and Full Depth Repair) f'c = 4,000 psi

A3.0 Design Unit Stresses:
Class B-1 Concrete (Half-Sole and Full Depth Repair) f'c = 4,000 psi
Model: Unusual
A3.0.2 Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).

A3.0.3 If required:
A3.0.3.1 Roadway surfacing adjacent to bridge ends shall match new bridge wearing surface (roadway item).

A3.0.3.2 All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

A3.0.3.3 Details of existing work is indicated by light dashed lines. Heavy lines indicate new work.

A3.0.3.4 Contractor shall verify all dimensions in field before ordering new material.
A3.0.3.5 In order to maintain grade and a minimum thickness of wearing surface at shown points it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of furnishiing and installing the wearing surface will be considered completely covered in the contract unit.

A3.0.3.6 Contact ChemFil Specialty Coatings, Inc., for weatherproofing and traffic handling.
A3.1.0 Structure to be closed during construction. Traffic will be maintained on roadway item.

REPAIRS TO BRIDGE: ROUTE OVER ROUTE FROM TO A
ABORT + MILLS - OR - BEGINNING STATION _ ± (Match Existing)
**Deck Repair Notes:**

**Order of Repair:**
1. Remove existing wearing surface plus 4" of existing deck.
2. Power wash deck to identify sound and unsound areas.
3. Inside special repair zones, complete the following repairs:
   a. Deck repair with void tube replacement
   b. Half-sole repair
   c. Full depth repair

**Special Repair Zones:**
- Deck repair required in the areas designated as special repair zones shall be completed before hydro demolition in alphabetical sequence beginning with Zone E.
- Zones shall be labeled by the contractor, and the engineer shall verify the work and accept it before moving forward.
- Any deck repair in areas not designated as special repair zones shall be completed after hydro demolition.
- Any single repair area does not exceed 4 square feet in size and the total repair area within a special repair zone does not exceed 12 square feet, the special repair zone may be repaired at the same time as another zone.
- Deck repair required in special repair zones shall be completed before hydro demolition begins in alphabetical sequence beginning with Zone E.
- Following repairs shall be completed before moving forward:
   - Deck repair with void tube replacement
   - Half-sole repair
   - Full depth repair

**Deck Repair Details:**
- Any damage sustained to the void tube as a result of the contractor's operations shall be replaced as required by the engineer at the contractor's expense.
- Any exposed void shall be patched as approved by the engineer in a manner that shall maintain the void area completely free of concrete. The void area shall be maintained completely free of concrete. The portion of the deteriorated void tube shall be replaced. The void area shall be maintained completely free of concrete. Cutting of the longitudinal reinforcing steel shall be permitted when only half the diameter or less shall be used when only half the diameter or less of the top bar is exposed. The intersection of the portion of the top bar shall be maintained completely free of concrete. Cutting of the longitudinal reinforcing steel shall be permitted when only half the diameter or less shall be used when only half the diameter of the top bar is exposed.

**Special Repair Zones:**
- Detailed plans for special repair zones shall be provided as determined by the engineer.
- Removal and deck repair shall be completed in one special repair zone and concrete shall have attained a compressive strength of 3200 psi before work can be started in the next special repair zone.
- Any deck repair area does not exceed 4 square feet in size and the total repair area within a special repair zone does not exceed 12 square feet, the special repair zone may be repaired at the same time as another zone.
- Void Repair:
  - Any damaged area of the void tube as a result of the contractor's operations shall be replaced as required by the engineer at the contractor's expense.
  - Any exposed void shall be patched as approved by the engineer in a manner that shall maintain the void area completely free of concrete. The void area shall be maintained completely free of concrete. Cutting of the longitudinal reinforcing steel shall be permitted when only half the diameter or less shall be used when only half the diameter of the top bar is exposed. The intersection of the portion of the top bar shall be maintained completely free of concrete. Cutting of the longitudinal reinforcing steel shall be permitted when only half the diameter or less shall be used when only half the diameter of the top bar is exposed.
Hydro Demolition Case 2A:

Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Conventional Deck Repair After Hydro Demolition

(Adding First Wearing Surface)

STANDARD DRAWING GUIDANCE (do not show on plans):

- May be used with the following concrete wearing surfaces:
  - 3/4" to 3" Polyester Polymer

If optional concrete wearing surface is specified and low slump or polyester polymer is an option follow guidance on Sheet RHB04a.

Removal of Existing Deck Repair

Temporary roadway

Match existing grade

Full Depth

Half-Sole

Superstructure Repair

Bridge and Total Scarification of Bridge Deck

Deck Repair with Void Tube Replacement

Scarification of Bridge Deck and Total Surface Hydro Demolition

Cleaning and Epoxy Coating

Repairs to Bridge: Route * Over *

REPAIRS TO BRIDGE: ROUTE * OVER *

ROUTE * FROM * TO *

ABOUT * MILES * OF *

OVER *

REPAIRS TO BRIDGE: ROUTE * OVER *

ROUTE * FROM * TO *

ABOUT * MILES * OF *

BEGINNING STATION _________± (Match Existing)

END STATION _________± (Match Existing)
Hydro Demolition Case 2B:

Zoned Conventional Deck Repair Before Hydro Demolition and Non-Zoned Conventional Deck Repair After Hydro Demolition

(Replacing Existing Wearing Surface)

General Notes:

1. Design Specifications

2. Design Loading

3. Design Unit Stresses

4. General

5. Miscellaneous

6. Traffic Handling

7. Repairs to Bridge

8. References

Estimated Quantities

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Surface Hydro Demolition</td>
<td>sq. yd</td>
<td>216.36</td>
</tr>
<tr>
<td>Removal of Concrete Wearing Surface</td>
<td>sq. yd</td>
<td>216.36</td>
</tr>
<tr>
<td>Replacement of Void Tube</td>
<td>lb</td>
<td>216.36</td>
</tr>
<tr>
<td>Full Depth Repair</td>
<td>lb</td>
<td>216.36</td>
</tr>
<tr>
<td>Half-Sole and Full Depth Repair</td>
<td>lb</td>
<td>216.36</td>
</tr>
<tr>
<td>Deck Repair with Void Tube Replacement</td>
<td>lb</td>
<td>216.36</td>
</tr>
<tr>
<td>Cleaning and Epoxy Coating</td>
<td>lb</td>
<td>216.36</td>
</tr>
<tr>
<td>Total Surface Hydro Demolition</td>
<td>sq. yd</td>
<td>216.36</td>
</tr>
</tbody>
</table>

Note: This drawing is not to scale. Follow dimensions.
**Deck Repair Notes:**

1. **Order of Repair:**
   - 1. Remove existing wearing surface plus ___" of existing deck.
   - 2. Power wash deck to identify sound and unsound concrete.
   - 3. Inside special repair zones, complete the following repairs:
     - a. Removal of existing deck repair
     - b. Half-sole repair
   - 4. Outside special repair zones:
     - a. Full-depth repair
     - b. Fiber void tube replacement

2. **Milling and Hydro Demolition Limits:**
   - Remove if repair is not required, possibly and in steps.
   - MILLING AND HYDRO DEMOLITION LIMITS

3. **Superstructure Repair (Unformed):**
   - Top of existing wearing surface.
   - Top of new wearing surface.
   - Replace with Note 13.3 for structures with single slabs.

4. **Decks Repair Inside Special Repair Zones (Before Hydro Demolition):**
   - A. Half-Sole Repair
   - B. Deck Repair with Void Tube Replacement

5. **Decks Repair Outside Special Repair Zones (After Hydro Demolition):**
   - A. Half-Sole Repair
   - B. Deck Repair with Void Tube Replacement

6. **Deck Repair Details:**
   - Note: This drawing is not to scale. Follow dimensions.

7. **Special Repair Zones:**
   - Complete total surface hydro demolition, removing minimum of sound concrete inside special repair zone and all deteriorated concrete outside special repair zones.
   - Sound deck and if needed complete incidental concrete removal.
   - Outside special repair zones, complete the following repairs:
     - a. Half-Sole repair
   - Place new wearing surface (including additional material for areas of monolithic deck repair).

8. **Void Repair:**
   - Any damage sustained to the void tube as a result of the contractor's operations shall be patched or replaced as required by the engineer at the contractor's expense.
   - An exposed void in the deck shall be patched as approved by the engineer in a manner that shall maintain the void area completely free of concrete. Void repair may be repaired at the same time hydro demolition shall not move forward.
   - Void tube replacement:
     - 1. Remove existing deck repair
     - 2. Half-sole repair
     - 3. Full-depth repair
     - 4. Fiber void tube replacement

9. **Fiber Void Tube Replacement:**
   - Fiberglass void tube replacement:
   - Minimum outside special repair zones:
   - Minimum inside special repair zones:
   - Original depth minus previous scarification:
   - Restore existing weep hole, if encountered.

10. **Superstructure Repair (Unformed):**
    - Existing wearing surface:
    - Replacement of void tube:
    - Existing tubes:
    - Tubes for producing the voids shall have an outside diameter of 4 inches and shall be anchored at not more than 12 inches from each end of each new void.
    - One 3/4" weep hole shall be provided at 2 inches from each end of each new void.

11. **Fiber Void Tube Replacement:**
    - Removal of existing deck repair:
    - Half-sole repair:
    - Full-depth repair:
    - Fiber void tube replacement:
    - Minimum outside special repair zones:
    - Minimum inside special repair zones:
    - Original depth minus previous scarification:
    - Restore existing weep hole, if encountered.

12. **End Notes:**
    - Remove if repair is not required.

---

**PART PLAN OF SLAB SHOWING SPECIAL REPAIR ZONES**

**DETAIL A**

- Deck repair required in the areas designated as special repair zones shall be completed before hydro demolition.
- Void tubes for producing the voids shall be covered by the joint unit price for half-sole repair.
- Full-depth repair:

**DETAIL B**

- Deck repair required in the areas designated as special repair zones shall be completed after hydro demolition.
- Void tubes for producing the voids shall be covered by the joint unit price for half-sole repair.

**DETAIL C**

- Deck repair required in the areas designated as special repair zones shall be completed after hydro demolition.
- Void tubes for producing the voids shall be covered by the joint unit price for half-sole repair.
Conventional Deck Repair Only

(Replacing Existing Wearing Surface)

U.I.P. AND REHABILITATE EXISTING [X'-X'-X'] CONTINUOUS CONCRETE VOIDED SLAB SPANS (SKEW: X)

TYPICAL SECTION THRU EXISTING DECK

Estimated Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Total</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal of Concrete Wearing Surface</td>
<td>256.50</td>
<td>sq. ft</td>
</tr>
<tr>
<td>Substructure Repair (Formed)</td>
<td>355.60</td>
<td>sq. ft</td>
</tr>
<tr>
<td>Superstructure Repair (Unformed)</td>
<td>360.90</td>
<td>sq. ft</td>
</tr>
<tr>
<td>Half-Sole Repair</td>
<td>171.40</td>
<td>sq. ft</td>
</tr>
<tr>
<td>Void Tube Replacement</td>
<td>168.20</td>
<td>sq. ft</td>
</tr>
<tr>
<td>Deck Repair with Void Tube Replacement</td>
<td>255.20</td>
<td>sq. ft</td>
</tr>
<tr>
<td>Wearing Surface</td>
<td>255.20</td>
<td>sq. ft</td>
</tr>
</tbody>
</table>

General Notes:

2. Design Loading: HS20-44 Modified
3. Design Unit Stresses:

Concrete (Half-Sole and Full Depth Repair and Deck Repair with Void Tube Replacement): f'c = 4,000 psi

All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

May be used for all wearing surfaces:

Scarification not required with the following wearing surfaces:

- Seal Coat
- Asphalt
- UBAWS
- Epoxy Polymer
- MMA Polymer Slurry

II.1.0.2 All concrete repairs shall be in accordance with Sec 704, unless otherwise noted.

Contractor shall verify all dimensions in field before ordering new material.

II.2 In order to maintain grade and a minimum thickness of wearing surface as shown on plans it may be necessary to use additional quantities of wearing surface at various locations throughout the structure. The cost of wearing surface shall be considered completely covered in the contract unit price of each bridge deck repair item.

Note: This drawing is not to scale. Follow dimensions.
RHB04_CIP_VS_or_SS_Slab  Guidance & Alternate Details

STANDARD DRAWING GUIDANCE (SDG) (do not show on plans)

Select the appropriate 1st and 2nd sheet. Draw typical section as required and scale to fit within attached border replacing the provided example. Modify other details and notes as required (match orientation of detail reinforcement).

For solid slabs, all details shall be modified by removing voids and all notes pertaining to void repair.

District/SPM typically estimates the percentage of void tube replacement.

Transverse repair zoning over intermediate bents is required for these structures: Longitudinal repair zoning in spans is required only when hydro demolition is required and is based on anticipated quantity of deck repaired areas and 1/2" outside special repair zones for hydro Case 1 & 2.

Identify new wearing surface, see Bridge Memo or SPM. Specify minimum thickness in deck details, typically 1/8" thicker outside special repair zones for hydro Case 1 & 2.

Identify existing wearing surface and thickness, see Bridge Memo or existing plans.

See Bridge Memo or SPM, typically 1/2". Use 1" if more than 30% of existing deck needs repair. Verify there will be a minimum of 1/2" of concrete above top bars to allow for this much scarification.

See Bridge Memo or SPM, typically 1/4" inside special repair zones to avoid deeper penetration into newly repaired areas and 1/2" outside special repair zones.

See existing plans.

Use appropriate reference (Structure, Roadway, Median, etc.)

Two types of overhang rehabilitation are shown. Cleaning and epoxy coating is preferred because of the relative short life on slab edge repair and unformed repair especially when over traffic. However in urban regions repairing the overhang may be preferred. Consult with SPM or SLE.

Scarification prior to adding first wearing surface or removing a portion of the deck when removing an existing wearing surface is not required for seal coat, asphalt, UBAWS, epoxy polymer or MMA polymer slurry wearing surfaces.

Monolithic deck repair should only be allowed where longitudinal zoning is not required.

May be used for aesthetics with extensive patchwork of repairs visible to public.

Show difference as plus/minus X"±, see Bridge Memo or SPM. e.g. Match existing grade plus 2 1/2" Min.

Identify existing wearing surface, see Bridge Memo or SPM. Specify minimum thickness in deck details, typically 1/8" thicker outside special repair zones for hydro Case 1 & 2.

Identify new wearing surface, see Bridge Memo or SPM. Specify minimum thickness in deck details, typically 1/8" thicker outside special repair zones for hydro Case 1 & 2.

Maximum thickness should be limited to 3" (Ref. Organizational Results Research Report ORO6.004, May 2006). Limit excludes reinforced concrete slab wearing surfaces.

Wearing surface thickness can vary according to grade elevation requirements and minimum barrier curb height requirements. See EPG 401.40 for guidance.

May be used for aesthetics with extensive patchwork of repairs visible to public.

Monolithic deck repair should only be allowed where longitudinal zoning is not required.

Use appropriate reference (Structure, Roadway, Median, etc.)

Wearing surface thickness can vary according to grade elevation requirements and minimum barrier curb height requirements. See EPG 401.40 for guidance.

Detach all unused Drawing Models & Sheet Models before requesting PDFs for sign and seal.
U.I.P., STRENGTHEN AND REHABILITATE EXISTING (X', X', X') WIDE FLANGE BEAM SPANS (SKEW: X)

STANDARD DETAILING GUIDANCE
(do not show on plans)
Use for adding welded cover plates and applying a jacking load to increase capacity.
A "no jack" option may be used by designer in lieu of "jacking" option. Welding in both cases should not be performed under live load, especially direct live load.

GENERAL NOTES:
- Design Specifications:
  - 2002 AASHTO LFD (11th Ed) Standard Specifications
  - 1993 Missouri Posting Loads (H20 & 3S2)
  - No Future Wearing Surface
- Design Loading:
  - 1993 Missouri Posting Loads (H20 & 3S2)
- Design Unit Stresses:
  - Structural Carbon Steel Fy = 36,000 psi (New Steel)
  - Existing Steel Fy = (Existing)
- Working Stress Design = 68% of Fy (Existing)
- Paint:
  - Calcium Sulfonate (2 coats)
- Beam Support:
  - All existing beams in the span being strengthened shall be raised simultaneously with load on jacking point and supported during welding of new steel plates.
  - The temporary supports must be capable of safely supporting a service load of approximately load. Tons per beam (Factor of safety not included). See special provisions.
- Traffic Handling:
  - One lane of traffic shall be maintained on structure during construction. See roadway plans for traffic control.
- Miscellaneous:
  - Outline of existing work is indicated by light dashed lines.
  - Heavy lines indicate new work.

REPAIRS TO BRIDGE: ROUTE *
OVER *
ROUTE FROM TO *
ADJUST MILES OR *
STA. ___________ (Metric Existing)
**Optional Slab Cantilever Replacement**

MoDOT Construction personnel will indicate the method used:
- Optional replacement method was used.
- Optional replacement method was not used.

**Notes:**
- Minimum distance required for mechanical bar splice. All existing transverse slab reinforcement in this area will be cleanly stripped.
- With the optional slab cantilever replacement, the contractor shall use a mechanical bar splice for the existing exposed transverse slab reinforcement. The length of the new #6 reinforcing bars used with the mechanical bar splice shall be determined by the contractor based on the style of mechanical bar splice used and other considerations. Mechanical bar splices shall be in accordance with Sec 706 except that there will be no separate pay item for mechanical bar splices. The mechanical bar splices and accompanying new #6 reinforcing bars will be considered completely covered by contract unit price for other items included in the contract.

**For spacing of longitudinal reinforcing steel, see Sheet No.**

**For details of barrier, see Sheets No.**

**Details of Optional Slab Cantilever Replacement**

Note: This drawing is not to scale. Follow dimensions.
### Bid Quantities:

<table>
<thead>
<tr>
<th>Bridge Number</th>
<th>County</th>
<th>Route Carried</th>
<th>Bridge Over</th>
<th>Average Roadway Width (feet)</th>
<th>Bridge Deck Rating</th>
<th>Length of Bridge Deck (feet)</th>
<th>Bridge Approach, 5' Ped. (sq. yard)</th>
<th>Estimated Quantity of Concrete Crack Filler (sq. yard)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
- Outline of existing work is indicated by light dashed lines.
- Heavy lines indicate new work.
- Contractor shall verify all dimensions in field before ordering new material.
- Traffic to be maintained on structure during construction. See roadway plans for traffic control.

**Variable Scope Bid Quantities:**

- (1) End of slab to end of slab includes semi-deep abutment slab.
- (2) Concrete Crack Filler shall not be applied in bridge approach slab.
- (3) Estimated area of bridge approach slab to be coated with Concrete Crack Filler is included in this quantity. See special provisions.
- (4) Do not apply Concrete Crack Filler to portions of bridge approach slab with an existing asphalt overlay.

**Standard Drawing Guidance (Do not show on plans):**
- Add note (4) if applicable for individual structures.
- Add (1), (2) & (3) after the total quantity for applicable bridge (in last column).

**Add note (4) if applicable for individual structures**.
**BENT CAP SHEAR STRENGTHENING USING FRP WRAP**

**Notes:**
- Design Force is the factored shear force at any cross section in each design region that shall be resisted entirely by the FRP reinforcement.
- See special provisions.

**Standard Drawing Guidance (do not show on plans):**
- Modify standard drawing details as required.
- Use pay item Fiber Reinforced Polymer Wrap, __sq. foot.
- Add the following note to Expansion Bent Details:
  - Protective Coating - Concrete Bents and Piers (Epoxy or Urethane) shall not be applied on the FRP system.

**PART PLAN**

**PART ELEVATION**

**FRP WRAP AT INT. BENT NO.**

**RHB08_FRP_Strength**
- Effective: Nov. 2020
- Supersedes: Aug. 2019

**Date Prepared:** 10/17/2023

**JEFFERSON CITY, MO 65102**

105 WEST CAPITOL COMMISSION

MISSOURI HIGHWAYS AND TRANSPORTATION

---

**Notes:**
- This drawing is not to scale. Follow dimensions.

**Sheet No:** 41
Instructions for Pile Plating:

Only one pile shall be repaired at a time. Repair shall be a continuous operation from removal through splicing, than, the existing pile (ASTM A709 Grade 36 or 50).

New steel pile section shall be coated in accordance with Sec 702.

All new or existing structural steel shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum). The cost of furnishing and installing structural steel, all steel coatings and any other incidental material or labor to complete pile repair shall be paid in full. Any variations may be encountered in the estimated quantities but the variations can not be used for an adjustment in the contract unit price.

Cost of all excavation shall be considered completely covered by the contract lump sum price for Steel Pile Repair Variations may be encountered in the estimated quantities but the variations can not be used for an adjustment in the contract unit price.

Cost of all excavation shall be considered completely covered by the contract lump sum price for Steel Pile Repair Variations may be encountered in the estimated quantities but the variations can not be used for an adjustment in the contract unit price.

All exposed surfaces of the existing structural steel pile shall be coated in accordance with Sec 1081 for surface preparation. New steel pile section shall be the same grade as, or greater than, the existing pile (ASTM A709 Grade 36 or 50). Cost of dewatering will be considered completely covered by the contract lump sum price for Dewatering. Only one pile shall be repaired at a time. Repair shall be a continuous operation from removal through splicing.

Note: This drawing is not to scale. Follow dimensions. See special provisions for details of pile encasement; see Sheet No.
Standard Drawing Guidance (do not show on plans):

1. Show only pile repair method required. Delete all other details. If used in combination, specify associated piles by method.

- Based on similar percentage of section loss, pile plating may be more attractive than partial pile replacement. Details can be modified if only the web or flanges need to be plated. If only the web is plated, plates on each side of the web are required. If only a flange is to be plated, both flanges are required. Overall symmetry of the section shall be maintained.

- Based on additional factors other than just percent of section loss, partial pile replacement may be considered. Minimizing or eliminating traffic loading, adding falsework, or just having support conditions such as integral bents can help to determine the repair method. Pile replacement shall not be used if multiple piles need repair and falsework is not provided.

- Use this note for coating any remaining piles or pile sections, and any bracing not being repaired. Use this note on Front Sheet or Notes Sheet when no repair or no encasement is required. Include standard pay item, "Surface Preparation for Applying Epoxy-Mastic Primer", and if "Aluminum Epoxy-Mastic Primer" is preferred, see EPG 751.40.1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

2. Show Quantity Table on sheet. (Possible items given)

- New steel pile section shall be galvanized. See special provisions.

- If galvanizing is preferred, add splice detail and replace note with:

  "Galvanizing material shall be omitted or removed 1 inch clear of weld locations. See Special Provisions."

  "Aluminum" is preferred because it acts as both a barrier and corrosion protection where "Gray" only acts as a barrier. If other anodized pile is embedded in fresh concrete or elsewhere, "Gray" shall not be used.

  Steel pile repair shall not be used if multiple piles need repair and falsework is not provided.

These quantities are included in the estimated quantities table on Sheet No. 1.
Note: This drawing is not to scale. Follow dimensions.

Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.

All concrete for pile encasement shall be Class B (f'c = 3000 psi).
The reinforcing steel shall be epoxy coated Grade 60 with fy = 60,000 psi.

The exposed and accessible surfaces of the existing structural steel that will be encased in concrete shall be cleaned with a minimum of SSPC-SP-3 surface preparation and coated with a minimum of one coat of gray epoxy-mastic primer (non-aluminum) in accordance with Sec 1081 to produce a dry film thickness of not less than 3 mils before concrete is poured. The surface preparation and coating for piles shall extend a minimum of one foot outside the face of the pile encasement.

Shear connectors shall be in accordance with Sec 712, 1037 and 1080.

A FRP pile jacketing system may be used in lieu of pile encasement at the contractor's option. No additional payment will be made for this substitution. See special provisions.

For details of pile plating, see Sheet No. .
Standard Drawing Guidance
(do not show on plans):

1. This sheet is supplemental to Details of Pile Repair Sheet. Use details that match the selected pile repair method. Delete all other details. Use general notes and bill of reinforcing steel for either method.

2. See EPG 751.40.1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

3. Delete note if there is not any existing sway bracing.

4. Existing sway bracing may need to be removed and replaced or reattached if it is located in the area of pile to be replaced or plated.

5. Shear connectors are only used for partial pile replacement.
Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.

All concrete for pile encasement shall be Class B (f'c = 3000 psi).

The reinforcing steel shall be epoxy coated Grade 60 with f_y = 60,000 psi.

All exposed surfaces of the existing structural steel piles and sway bracing shall be recoated with one 6-mil thickness of Aluminum Gray epoxy-mastic primer applied over an SSPC-SP-3 surface preparation. All concrete encasement coating shall be applied one foot above and below the existing ground line and in accordance with Sec 1081. These protective coatings will not be required below the normal low water line. The cost of surface preparation will be included in the unit price for Pile Encasement. The cost of the Aluminum Gray epoxy-mastic primer and finish concrete coating will be considered complete in the contract unit price for Pile Encasement. The cost of the surface preparation will be considered included in the contract unit price for Pile Encasement.

General Notes:

All concrete for pile encasement shall be Class B (f'c = 3000 psi).

The reinforcing steel shall be epoxy coated Grade 60 with f_y = 60,000 psi.

Minimum clearance to reinforcing steel shall be 3 1/2", unless otherwise shown.

The exposed and accessible surfaces of the existing structural steel piles and sway bracing shall be cleaned with a minimum of SSPC-SP-3 surface preparation and coated with a minimum of one coat of gray epoxy-mastic primer (min. thickness) in accordance with Sec 1081. To produce a dry film thickness of 3 mils, 2 coats of primer may be required, if possible. The painted surface shall be recoated once the pile encasement is complete one foot outside the face of the pile encasement.

Cost of all concrete, reinforcing, shear connectors, surface preparation, coatings, excavation, dewatering and any other incidental item in or related to pile encasement complete in place, will be considered completely covered by the contract unit price for Pile Encasement. A FRP pile jackets system may be used in lieu of pile encasement at the contractor’s option. No additional payment will be made for any substitution. See special provisions.

Section showing pile encasement

Note: This drawing is not to scale. Follow dimensions.

Sheet No. of
Standard Drawing Guidance

(Do not show on plans):

1. Use this note for coating any remaining piles or pile sections, and sway bracing not being repaired. Use this note on Front Sheet or Notes Sheet when no repair or no encasement is required. Include standard pay items “Surface Preparation for Applying Epoxy-Mastic Primer” and either “Aluminum Epoxy-Mastic Primer” or “Gray Epoxy-Mastic Primer”.

   “Aluminum” is preferred because it acts as both a barrier and corrosion protection where “Gray” only acts as a barrier. If for any reason coated pile is embedded in fresh concrete or “Gray” is being used elsewhere, “Aluminum” shall not be used.

2. Delete note if there is not any existing sway bracing.
General Notes:

1. Number of piles shall be determined in the field to extend past the extents of the deteriorated area.
2. Plate length shall be determined in the field.
3. Extents of deteriorated area will be determined by the engineer.

Instructions for Pile Repair:

1. New steel pile section shall be the same grade as, or greater than, the existing pile (ASTM A992 Grade 50 or 60).
2. New steel pile section shall be coated in accordance with Sec 101.5.2.9.3.
3. Only one pile shall be repaired at a time. Repair shall be a continuous operation from removal through backfilling.
4. Length and location of pile replacement will be determined by the engineer.
5. Cost of all excavation will be considered completely covered by the contract lump sum price for Steel Pile Repair. Variations may be encountered in the estimated quantities but the variations can not be used for an adjustment in the contract unit price.
6. Cost of all excavation will be considered completely covered by the contract lump sum price for Steel Pile Repair. Variations may be encountered in the estimated quantities but the variations can not be used for an adjustment in the contract unit price.
7. Length and location of pile replacement will be determined by the engineer.
8. All exposed surfaces of the existing structural steel pile and pile coatings shall be recoated with one coat of primer and two coats of epoxy-mastic primer applied over an SSPC-SP3 surface preparation in accordance with Sec 1081. The cost of the primer and epoxy-mastic primer coating shall be applied one foot above and below the existing pile. The cost of surface preparation shall be considered completely covered by the contract lump sum price for Surface Preparation of Existing Pile. The cost of the primer and epoxy-mastic primer coating shall be applied one foot above and below the existing pile. The cost of surface preparation shall be considered completely covered by the contract lump sum price for Surface Preparation of Existing Pile.
9. Damaged areas of existing pile coating shall be canted in accordance with Sec 102.
10. Cost of furnishing and installing structural steel, all pile coatings and any other incidental material or labor to complete pile repair, complete in place, will be considered completely covered by the contract lump sum price for Steel Pile Repair. Variations may be encountered in the estimated quantities but the variations can not be used for an adjustment in the contract unit price.
11. Cost of dewatering will be considered completely covered by the contract lump sum price for Class 2 Excavation.
12. Cost of dewatering will be considered completely covered by the contract lump sum price for Class 2 Excavation.
Standard Drawing Guidance
(do not show on plans):

Show only pile repair method required. Delete all other details. If used in combination, specify associated pile(s) by method.

1. Based on similar percentage of section loss, pile plating may be more attractive than partial pile replacement. Details can be modified if only the web or flanges need to be plated. If only the web is plated, plates on each side of the web are required. If only a flange is to be plated, both flanges and plates on each side of the flanges are required. Overall symmetry of the section shall be maintained.

2. Based on additional factors other than just percent of section loss, partial pile replacement may be considered. Minimizing or eliminating traffic loading, adding falsework, or just having support conditions such as integral bents can help to determine the repair method. Pile replacement shall not be used if multiple piles need repair and falsework is not provided.

3. Use this note for coating any remaining piles or pile sections, and away bracing not being repaired. Use this note on Front Sheet or Notes Sheet when no repair or no encasement is required. Include standard pay items “Surface Preparation for Applying Epoxy-Mastic Primer” and either “Aluminum Epoxy-Mastic Primer” or “Gray Epoxy-Mastic Primer”. “Aluminum” is preferred because it acts as both a barrier and corrosion protection where “Gray” only acts as a barrier. If for any reason coated pile is embedded in fresh concrete or “Gray” is being used elsewhere, “Aluminum” shall not be used.

4. If galvanizing is preferred, add splice detail and replace note with:

New steel pile section shall be galvanized. See special provisions.

See EPG 751.40.1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

Show Quantity Table on sheet. (Possible items given)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 2 Excavation</td>
<td>lump sum</td>
</tr>
<tr>
<td>Dewatering</td>
<td>lump sum</td>
</tr>
<tr>
<td>Surface Preparation for Applying Epoxy-Mastic Primer</td>
<td>lump sum</td>
</tr>
<tr>
<td>Aluminum Epoxy-Mastic Primer</td>
<td>lump sum</td>
</tr>
<tr>
<td>Gray Epoxy-Mastic Primer</td>
<td>lump sum</td>
</tr>
<tr>
<td>Steel Pile Repair</td>
<td>linear foot</td>
</tr>
<tr>
<td>Pile Encasement</td>
<td>linear foot</td>
</tr>
</tbody>
</table>

These quantities are included in the Estimated Quantities table on Sheet No. .
**Note:** This drawing is not to scale. Follow dimensions.

### General Notes:
- All concrete for pile encasement shall be Class D (f’c = 3000 psi).
- The reinforcing steel shall be epoxy coated Grade 60 with fy = 60,000 psi.
- Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.
- The exposed and accessible surfaces of the existing structural steel that will be encased in concrete shall be cleaned with a minimum of SSPC-SP-3 surface preparation and coated with a minimum of one coat of gray epoxy-mastic primer (non-aluminum) in accordance with Sec 1081 to produce a dry film thickness of not less than 3 mils before concrete is poured. The surface preparation and coating for piles shall extend a minimum of one foot outside the face of the pile encasement.
- Cost of all concrete, reinforcement, shear connectors, surface preparation, coatings, and other incidental material or labor to complete pile encasement, complete in place, will be considered completely covered by the contract unit price for Pile Encasement.

### Cost of Pile Jacketing System:
- A FRP pile jacketing system may be used in lieu of pile encasement at the contractor's option. No additional payment will be made for this substitution. See special provisions.

### Notes:
- All dimensions are out to out.
- Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.
- Actual lengths are measured along centerline of bar to the nearest inch.
- All bars shall be epoxy coated.

### Bill of Reinforcing Steel - Each Pile

<table>
<thead>
<tr>
<th>No.</th>
<th>Size &amp; Mark</th>
<th>Actual Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-P1</td>
<td>16</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>5-V1</td>
<td>Varies</td>
<td>20</td>
</tr>
</tbody>
</table>

### Shear Connectors
- @ about 2'-0" cts. (Max Spacing)
- Ø 4" Shear Connectors

### Pile Encasement with Pile Repair

**PART ELEVATION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

**SECTION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

**PART ELEVATION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

**SECTION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

### Part Elevation Showing Pile Encasement

**PART ELEVATION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

**SECTION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

**PART ELEVATION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

**SECTION SHOWING PILE ENCASEMENT**
- Clean and seal top only with Protective Coating - Concrete Bents and Piers (Urethane) (See Sec 711).
- Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

### Notes:
- For details of pile plating, see Sheet No. 35.
Standard Drawing Guidance
(do not show on plans):

1. This sheet is supplemental to Details of Pile Repair Sheet. Use details that match the selected pile repair method. Delete all other details. Use general notes and bill of reinforcing steel for either method.

2. See EPG 751.40 1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

3. Existing sway bracing may need to be removed and replaced or reattached if it is located in the area of pile to be replaced or plated.

4. Shear connectors are only used for partial pile replacement.

5. Delete note if there is not any existing sway bracing.

This sheet is supplemental to Details of Pile Repair Sheet. Use details that match the selected pile repair method. Delete all other details. Use general notes and bill of reinforcing steel for either method.
General Notes:
- All exposed surfaces of the existing structural steel piles and sway bracing shall be recoated with one 6-mil thickness of American Greaseless® epoxy-mastic primer applied over an SSPC-SP-3 surface preparation in accordance with Sec. 1081. The protective coatings will not be required below the normal low water line.
- All concrete for pile encasement shall be Class B (f'c = 3000 psi).
- The reinforcing steel shall be epoxy coated Grade 60 with fy = 60,000 psi.
- Cost of dewatering will be considered completely covered by the contract lump sum price for Dewatering. See special provisions.

Detailed Notes:
- The reinforcing steel shall be in accordance with Sec. 712, 1037 and 1080.
- A FRP pile jacketing system may be used in lieu of pile encasement at the contractor's option. No additional payment will be made for this substitution. See special provisions.
- All bar lengths are measured along centerline of bar to the nearest inch.
- All exposed surfaces of the existing structural steel piles and sway bracing shall be recoated with one 6-mil thickness of American Greaseless® epoxy-mastic primer applied over an SSPC-SP-3 surface preparation in accordance with Sec. 1081. The protective coatings shall be applied one foot above and below the existing ground line and in accordance with Sec. 1082. These protective coatings will not be required below the normal low water line.
- All concrete for pile encasement shall be Class B (f'c = 3000 psi).
- The reinforcing steel shall be epoxy coated Grade 60 with fy = 60,000 psi.
- Cost of dewatering will be considered completely covered by the contract lump sum price for Dewatering. See special provisions.
Standard Drawing Guidance
(do not show on plans):

1. Use this note for coating any remaining piles or pile sections, and sway bracing not being repaired. Use this note on Front Sheet or Notes Sheet when no repair or no encasement is required. Include standard pay items “Surface Preparation for Applying Epoxy-Mastic Primer” and either “Aluminum Epoxy-Mastic Primer” or “Gray Epoxy-Mastic Primer”.

“Aluminum” is preferred because it acts as both a barrier and corrosion protection where “Gray” only acts as a barrier. If for any reason coated pile is embedded in fresh concrete or “Gray” is being used elsewhere, “Aluminum” shall not be used.

See EPG 751.40.1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

2. Delete note if there is not any existing sway bracing.
For details of pile encasement, see Sheet No. __.

Cost of dewatering will be considered completely covered by the contract lump sum price for Steel Pile Repair.

Cost of furnishing and installing structural steel pile, all steel coatings and any other incidental material or labor to complete pile repair, complete in place, will be considered completely covered by the contract lump sum price for Steel Pile Repair.

Variations may be encountered in the estimated quantities but the variations can not be used for an adjustment in the contract unit price.

All new or existing structural steel shall be coated in accordance with Sec 702. Damaged areas of existing coatings will be recoated with one 6-mil thickness of aluminum gray epoxy-mastic primer. The cost of the aluminum gray epoxy-mastic primer and the recoating will be considered completely covered by the contract lump sum price for Aluminum Gray Epoxy-Mastic Primer.

New steel pile section shall be the same grade as, or greater than, the existing pile (ASTM A709 Grade 36 or 50).

New steel pile section shall be coated in accordance with Sec 702. Surface preparation in accordance with Sec 1081. The bituminous coating shall be applied one foot above and below the existing surface. Cochran and SSPC-SP3 damage will be repaired for repainting Epoxy-Mastic Primer. The cost of the additional paint epoxy-mastic primer and the recoating will be considered completely covered by the contract lump sum price for Aluminum Gray Epoxy-Mastic Primer.

Cost of all excavation will be considered completely covered by the contract lump sum price for Class 2 Excavation.

Cost of dewatering will be considered completely covered by the contract lump sum price for Dewatering. See special provisions for Applying Epoxy-Mastic Primer. The cost of the aluminum gray epoxy-mastic primer applied over an SSPC-SP3 damage will be considered completely covered by the contract lump sum price for Aluminum Gray Epoxy-Mastic Primer.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance
(do not show on plans):

Show only pile repair method required. Delete all other details. If used in combination, specify associated pipe(s) by method.

1. Based on similar percentage of section loss, pile plating may be more attractive than partial pile replacement. Details can be modified if only the web or flanges need to be plated. If only the web is plated, plates on each side of the web are required. If only a flange is to be plated, both flanges and plates on each side of the flanges are required. Overall symmetry of the section shall be maintained.

2. Based on additional factors other than just percent of section loss, partial pile replacement may be considered. Minimizing or eliminating traffic loading, adding falsework, or just having support conditions such as integral bents can help to determine the repair method. Pile replacement shall not be used if multiple piles need repair and falsework is not provided.

3. Use this note for coating any remaining piles or pile sections, and sway bracing not being repaired. Use this note on front sheet or Notes Sheet when no repair or no encasement is required. Include standard pay items “Surface Preparation for Applying Epoxy-Mastic Primer” and either “Aluminum Epoxy-Mastic Primer” or “Gray Epoxy-Mastic Primer”.

   “Aluminum” is preferred because it acts as both a barrier and corrosion protection where “Gray” only acts as a barrier. If for any reason coated pile is embedded in fresh concrete or “Gray” is being used elsewhere, “Aluminum” shall not be used.

4. If galvanizing is preferred, add splice detail and replace note with:

   New steel pile section shall be galvanized. See special provisions.

See EPG 751.40.1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

Show Quantity Table on sheet. (Possible items given)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 2 Excavation</td>
<td>lump sum</td>
</tr>
<tr>
<td>Dewatering</td>
<td>lump sum</td>
</tr>
<tr>
<td>Surface Preparation for Applying Epoxy-Mastic Primer</td>
<td>lump sum</td>
</tr>
<tr>
<td>Aluminum Epoxy-Mastic Primer</td>
<td>lump sum</td>
</tr>
<tr>
<td>Gray Epoxy-Mastic Primer</td>
<td>lump sum</td>
</tr>
<tr>
<td>Steel Pile Repair</td>
<td>linear ft</td>
</tr>
<tr>
<td>Pipe Encasement</td>
<td>linear ft</td>
</tr>
</tbody>
</table>

These quantities are included in the Estimated Quantities table on Sheet No.
**Notes:**

- All dimensions are out to out.
- Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.
- Actual lengths are measured along centerline of bar to the nearest inch.
- All bars shall be epoxy coated.

**General Notes:**

- All concrete for pile encasement shall be Class D (f’c = 3000 psi).
- The reinforcing steel shall be epoxy coated Grade 60 with fy = 60,000 psi.
- Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.
- The exposed and accessible surfaces of the existing structural steel that will be encased in concrete shall be cleaned with a minimum of SSPC-SP-3 surface preparation and coated with a minimum of one coat of gray epoxy-mastic primer (non-aluminum) in accordance with Sec 1081 to produce a dry film thickness of not less than 3 mils before concrete is poured. The surface preparation and coating for piles shall extend a minimum of one foot outside the face of the pile encasement.
- Cost of all concrete, reinforcement, shear connectors, surface preparation, coatings and any other incidental material or labor to complete pile encasement, complete in place, will be considered completely covered by the contract unit price for Pile Encasement.
- A FRP pile jacketing system may be used in lieu of pile encasement at the contractor’s option. No additional payment will be made for this substitution. See special provisions.

**Pile Encasement with Pile Repair**

- For details of pile plating, see Sheet No. __.

**Notes:**

- Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.
Standard Drawing Guidance
(do not show on plans):

1. This sheet is supplemental to Details of Pile Repair Sheet. Use details that match the selected pile repair method. Delete all other details. Use general notes and bill of reinforcing steel for either method.

   See EPG 751.40.1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

2. Delete note if there is not any existing sway bracing.
   Existing sway bracing may need to be removed and replaced or reattached if it is located in the area of pile to be replaced or plated.

3. Shear connectors are only used for partial pile replacement.
Bill of Reinforcing Steel - Each Pile

<table>
<thead>
<tr>
<th>No.</th>
<th>Size &amp; Mark</th>
<th>Actual</th>
<th>Bending Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 P1</td>
<td>10'-0&quot;</td>
<td>16</td>
<td>SHAPE 16</td>
</tr>
<tr>
<td>5 V1</td>
<td>Varies</td>
<td>20</td>
<td>SHAPE 20</td>
</tr>
</tbody>
</table>

Notes:
- All dimensions are out to out.
- Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.
- The reinforcing steel shall be epoxy coated Grade 60 with fy = 60,000 psi.
- All concrete for pile encasement shall be Class B (f'c = 3000 psi).
- The exposed and accessible surfaces of the existing structural steel that will be encased in concrete shall be cleaned with a minimum of SSPC-SP-3 surface preparation and coated with a minimum of one coat of gray epoxy-mastic primer (non-aluminum) in accordance with Sec 1081 to produce a dry film thickness of not less than 3 mils before concrete is poured. The surface preparation and coating for piles shall extend a minimum of one foot outside the face of the pile encasement.
- The exposed surfaces of the existing structural steel piles and sway bracing shall be recoated with one 6-mil thickness of aluminum gray epoxy-mastic primer applied over an SSPC-SP-3 surface preparation in accordance with Sec. 1081. The bituminous coating shall be applied one foot above and below the existing ground line and in accordance with Sec 702. The cost of surface preparation and coating for piles shall be considered completely covered by the contract lump sum price for Surface Preparation for Applying Epoxy-Mastic Primer. The cost of the aluminum gray epoxy-mastic primer and bituminous coating will be considered completely covered by the contract lump sum price for Aluminum Gray Epoxy-Mastic Primer.
- All exposed surfaces of the existing structural steel piles and sway bracing shall be recoated with one 6-mil thickness of aluminum gray epoxy-mastic primer applied over an SSPC-SP-3 surface preparation in accordance with Sec 1081. The bituminous coating shall be applied one foot above and below the existing ground line and in accordance with Sec 702. The cost of surface preparation and coating for piles shall be considered completely covered by the contract lump sum price for Surface Preparation for Applying Epoxy-Mastic Primer. The cost of the aluminum gray epoxy-mastic primer and bituminous coating will be considered completely covered by the contract lump sum price for Aluminum Gray Epoxy-Mastic Primer.
- A FRP pile jacketing system may be used in lieu of pile encasement at the contractor's option. No additional payment will be made for this substitution. See special provisions.

General Notes:
- All concrete for pile encasement shall be Class B (f'c = 3000 psi).
- The reinforcing steel shall be epoxy coated Grade 60 with fy = 60,000 psi.
- Minimum clearances to reinforcing steel shall be 1 1/2", unless otherwise shown.
- The exposed and accessible surfaces of the existing structural steel piles and sway bracing shall be recoated with one 6-mil thickness of aluminum gray epoxy-mastic primer applied over an SSPC-SP-3 surface preparation in accordance with Sec. 1081. The bituminous coating shall be applied one foot above and below the existing ground line and in accordance with Sec 702. The cost of surface preparation and coating for piles shall be considered completely covered by the contract lump sum price for Surface Preparation for Applying Epoxy-Mastic Primer. The cost of the aluminum gray epoxy-mastic primer and bituminous coating will be considered completely covered by the contract lump sum price for Aluminum Gray Epoxy-Mastic Primer.
- All exposed surfaces of the existing structural steel piles and sway bracing shall be recoated with one 6-mil thickness of aluminum gray epoxy-mastic primer applied over an SSPC-SP-3 surface preparation in accordance with Sec 1081. The bituminous coating shall be applied one foot above and below the existing ground line and in accordance with Sec 702. The cost of surface preparation and coating for piles shall be considered completely covered by the contract lump sum price for Surface Preparation for Applying Epoxy-Mastic Primer. The cost of the aluminum gray epoxy-mastic primer and bituminous coating will be considered completely covered by the contract lump sum price for Aluminum Gray Epoxy-Mastic Primer.
- A FRP pile jacketing system may be used in lieu of pile encasement at the contractor's option. No additional payment will be made for this substitution. See special provisions.

Part Elevation Showing Pile Encasement

Note: Existing sway bracing not shown for clarity. Shift reinforcing steel in the field to clear existing sway bracing.

Section Showing Pile Encasement

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance

(Do not show on plans):

1. Use this note for coating any remaining piles or pile sections, and sway bracing not being repaired. Use this note on Front Sheet or Notes Sheet when no repair or no encasement is required. Include standard pay items “Surface Preparation for Applying Epoxy-Mastic Primer” and either “Aluminum Epoxy-Mastic Primer” or “Gray Epoxy-Mastic Primer”.

“Aluminum” is preferred because it acts as both a barrier and corrosion protection where “Gray” only acts as a barrier. If for any reason coated pile is embedded in fresh concrete or “Gray” is being used elsewhere, “Aluminum” shall not be used.

See EPG 751.40.1.2.1 for guidance on when coating, encasement or jacketing, and plating or partial replacement should be considered.

2. Delete note if there is not any existing sway bracing.
**General Notes:**
- Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of same type.
- Slab drain bracket assembly shall be ASTM A500 Grade 36 steel.
- The bracket assembly shall be galvanized in accordance with ASTM A232.
- All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A307, and A123.
- All 1/2-inch diameter bolts shall be ASTM A325. Class C.
- All drain materials and connectors shall be ASTM A522 (ASTM A325), Class C.
- The combination of materials used in the manufacture of the drain shall be tested for their resistance to corrosion in accordance with ASTM D1126. The representation material shall be tested with a minimum of 1000 cycles in accordance with ASTM G85 and without any physical deterioration. The results shall be compared to those of the required outdoor testing. The acceptance of the slab drain shall be at the option of the contractor.
- At the contractor’s option, drains may be field cut. The method of cutting FRP slab drains shall be as recommended by the manufacturer to ensure a smooth, chip-free cut.

**Notes for FRP Drain:**
- Drains shall be machine filament-wound thermosetting resins. Tubing meeting the requirements of ASTM C909 with the following exceptions:
  - Minimum reinforced wall thickness shall be 1/4 inch.
  - The resin used shall be ultraviolet (UV) resistant and/or filled with UV stabilizers and shall be resistant to exposure to sunlight. The resin shall be non-toxic and non-hazardous.
  - The color of the slab drain shall be gray as specified in Federal Standard 26373. The color shall be uniform throughout the resin and any coating applied.
- The combination of materials used in the manufacture of the drain shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall be tested with a minimum of 500 hours of cycling and without any physical deterioration. The results shall be compared to those of the required outdoor testing. The acceptance of the slab drain shall be at the option of the contractor.
- At the contractor’s option, drains may be field cut. The method of cutting FRP slab drains shall be as recommended by the manufacturer to ensure a smooth, chip-free cut.

**Notes for Steel Drain:**
- Slab drain shall be fabricated from 1/4-inch structural steel tubing ASTM A500 or A522.
- Drains shall be galvanized in accordance with ASTM A653.
- The drain shall be inserted through slab such that it aligns with window and is reconnected to the foundations.

**Notes on Slab Drain Locations:**
- Slab drain locations may be shifted the contractor’s option. Percussion drilling will not be permitted. Holes for slab drains shall be cored by the contractor. For slab drain locations, see Sheet No. _.

**Standard Drawing Guidance (Do not show on plans):**
1. Modify as needed.
2. Approximately one sixth of girder beam height, 5” minimum.
3. Per Notes 3.3.6.3 for attaching to weathering steel girders or slabs.
4. Slab drain bracket assembly shall be ASTM A500 Grade 36 steel. The bracket assembly shall be galvanized in accordance with ASTM A232.
5. All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A307, Class C.
6. All 1/2-inch diameter bolts shall be ASTM A325. Class C.
7. All drain materials and connectors shall be ASTM A522 (ASTM A325), Class C.

**Details:**
- Drain shall be as recommended by the manufacturer to ensure a smooth, chip-free cut.
- The slab drain shall be designed to align with the window and be reconnected to the foundations.

**Drawing Information:**
- Date Prepared: 10/17/2023
- Sheet No.: 0102
- Project No.: 105 WEST CAPITOL
- Job No.: 11-1
- District: MISSOURI HIGHWAYS AND TRANSPORTATION
- County: MO

**Part Section Near Drain:**
- Use backer rod around drain at bottom of slab and epoxy inject from the top.

**Part Plan of Slab at Drain:**
- Drain shall be as recommended by the manufacturer to ensure a smooth, chip-free cut.

**Part Plan Showing Bracket Assembly:**
- Bracket assembly shall be ASTM A500 Grade 36 steel. The bracket assembly shall be galvanized in accordance with ASTM A232.
- All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A307, Class C.
- All 1/2-inch diameter bolts shall be ASTM A325. Class C.
- All drain materials and connectors shall be ASTM A522 (ASTM A325), Class C.

**Part Plan Showing Cored Slab Drain Locations:**
- Slab drain locations may be shifted the contractor’s option. Percussion drilling will not be permitted. Holes for slab drains shall be cored by the contractor. For slab drain locations, see Sheet No. _.
ANCHOR TO EXISTING SLAB, STEEL GIRDER

(Based on A2015 & A46301)
PART PLAN SHOWING CORED SLAB DRAIN LOCATIONS

EXAMPLE PLAN

PART SECTION NEAR DRAIN

PRESTRESSED GIRDER, EXISTING CURB BLOCKOUT

PART SECTION SHOWING BRACKET ASSEMBLY

CURB BLOCKOUT

EXISTING PRESTRESSED GIRDER,

Attach angle to existing prestressed girder web using an approved epoxy adhesive.

Fill with epoxy mortar. See Sec 623.20 (1)

Attach angle to existing prestressed girder web using an approved epoxy adhesive.

(1) Use backer rod around drain @ bottom of slab and epoxy inject from the top.

PART PLAN SHOWING CORED SLAB DRAIN LOCATIONS

SPAN (1-2)

SPAN (2-3)

SPAN (3-4)
General Notes:
Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of same type.
Slab drain bracket assembly shall be ASTM A709 Grade 36 steel.
Locate drains in slab by dimensions shown in Part Section Near Drain.
Reinforcing steel shall be shifted to clear drains.
The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153, Class 2.
All 1/2" bolts shall be ASTM A307.
Shop drawings will not be required for the slab drains and the bracket assembly.
The coil inserts required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.
Coil inserts shall have a concrete pull-out strength (ultimatum load) of at least 2,500 pounds in 5,000 psi concrete.
The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be galvanized by the prestressed girder manufacturer.

Notes for Steel Drain:
Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.
Outside dimensions of drains are 8" x 4".
The drains shall be galvanized in accordance with ASTM A123.

Notes for FRP Drain:
Drains shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D2996 in the following exceptions:
Shape of drains shall be rectangular with height to width ratio of 1.5:1.
Minimum reinforced wall thickness shall be 0.14 inch.

The resin used shall be ultraviolet (UV) resistant and have high impact strength through the required ultraviolet testing with only minor discoloration and without any physical deterioration. The representative material shall withstand at least 500 hours of testing with only minor discoloration and without any physical deterioration. The material shall be tested for at least 500 hours. The manufacturer shall have the material prior to acceptance of the slab drains.

At the contractor's option, drains may be field cut. The method of cutting FRP slab drain shall be as recommended by the manufacturer to ensure a smooth, chip free cut.

Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of the same type.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153, Class 2.

All 1/2" bolts shall be ASTM A307.

Shop drawings will not be required for the slab drains and the bracket assembly.

The coil inserts required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength (ultimatum load) of at least 2,500 pounds in 5,000 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be galvanized by the prestressed girder manufacturer.

Slab drain bracket assembly shall be ASTM A709 Grade 36 steel.

Locate drains in slab by dimensions shown in Part Section Near Drain.
Reinforcing steel shall be shifted to clear drains.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153, Class 2.

All 1/2" bolts shall be ASTM A307.

Shop drawings will not be required for the slab drains and the bracket assembly.

The coil inserts required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength (ultimatum load) of at least 2,500 pounds in 5,000 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be galvanized by the prestressed girder manufacturer.

Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.

Notes for Steel Drain:
Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.

Notes for FRP Drain:
Drains shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D2996 in the following exceptions:
Shape of drains shall be rectangular with height to width ratio of 1.5:1.
Minimum reinforced wall thickness shall be 0.14 inch.

The resin used shall be ultraviolet (UV) resistant and have high impact strength through the required ultraviolet testing with only minor discoloration and without any physical deterioration. The representative material shall withstand at least 500 hours of testing with only minor discoloration and without any physical deterioration. The material shall be tested for at least 500 hours. The manufacturer shall have the material prior to acceptance of the slab drains.

At the contractor's option, drains may be field cut. The method of cutting FRP slab drain shall be as recommended by the manufacturer to ensure a smooth, chip free cut.

Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of the same type.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153, Class 2.

All 1/2" bolts shall be ASTM A307.

Shop drawings will not be required for the slab drains and the bracket assembly.

The coil inserts required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength (ultimatum load) of at least 2,500 pounds in 5,000 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be galvanized by the prestressed girder manufacturer.

Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.

Notes for Steel Drain:
Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.

Notes for FRP Drain:
Drains shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D2996 in the following exceptions:
Shape of drains shall be rectangular with height to width ratio of 1.5:1.
Minimum reinforced wall thickness shall be 0.14 inch.

The resin used shall be ultraviolet (UV) resistant and have high impact strength through the required ultraviolet testing with only minor discoloration and without any physical deterioration. The representative material shall withstand at least 500 hours of testing with only minor discoloration and without any physical deterioration. The material shall be tested for at least 500 hours. The manufacturer shall have the material prior to acceptance of the slab drains.

At the contractor's option, drains may be field cut. The method of cutting FRP slab drain shall be as recommended by the manufacturer to ensure a smooth, chip free cut.

Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of the same type.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153, Class 2.

All 1/2" bolts shall be ASTM A307.

Shop drawings will not be required for the slab drains and the bracket assembly.

The coil inserts required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength (ultimatum load) of at least 2,500 pounds in 5,000 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be galvanized by the prestressed girder manufacturer.

Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.

Notes for Steel Drain:
Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.

Notes for FRP Drain:
Drains shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D2996 in the following exceptions:
Shape of drains shall be rectangular with height to width ratio of 1.5:1.
Minimum reinforced wall thickness shall be 0.14 inch.

The resin used shall be ultraviolet (UV) resistant and have high impact strength through the required ultraviolet testing with only minor discoloration and without any physical deterioration. The representative material shall withstand at least 500 hours of testing with only minor discoloration and without any physical deterioration. The material shall be tested for at least 500 hours. The manufacturer shall have the material prior to acceptance of the slab drains.

At the contractor's option, drains may be field cut. The method of cutting FRP slab drain shall be as recommended by the manufacturer to ensure a smooth, chip free cut.

Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of the same type.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153, Class 2.

All 1/2" bolts shall be ASTM A307.

Shop drawings will not be required for the slab drains and the bracket assembly.

The coil inserts required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength (ultimatum load) of at least 2,500 pounds in 5,000 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be galvanized by the prestressed girder manufacturer.

Slab drains may be fabricated of either prestressed or non-prestressed ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.

2. Details shown inside the sheet border are for drains transverse to roadway requiring a cantilever 4 feet or more. Use the below details for drains parallel to roadway requiring a cantilever 3'-8" or more.

3. Delete panels for CIP slab.

4. Total drain length is equal to 9" + maximum girder and haunch + slab thickness, rounded up to the next whole inch.

Alternate details for Type B barrier (SBC):
Detailed Notes:

- This drawing is not to scale. Follow dimensions.

General Notes:

- Contractor shall have the option to construct either steel or FRP slab drains.
- All slab drains shall be of the same type.
- Slab drain bracket assembly shall be ASTM A36 or A500 steel.
- Locate drains in slab by dimensions shown in Part Section Near Drain.
- Reinforcing steel shall be shifted to slab drains.
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
- All bolts, hardened washers, lock washers, and coil inserts shall be furnished by the pre-stressed girder manufacturer.
- All 1/2" bolts shall be ASTM A307.

Shop drawings will be required for the slab drains and the bracket assembly.

Notes for Steel Drain:

- The drains shall be galvanized in accordance with ASTM A123.
- Outside dimensions of drains are 8" x 4".
- The drains shall be galvanized in accordance with ASTM A123.

Notes for FRP Drain:

- Drain shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D2996 and D4329 Cycle A.
- Shape of drain shall be rectangular with outside nominal dimensions of 8" x 4".
- Minimum reinforced wall thickness shall be 1/16".
- The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed throughout. Drains may have an exterior coating for additional UV resistance.
- The color of the slab drain shall be gray (Federal Standard 26373). The color shall be uniform throughout the resin and any coating used.
- The combination of materials used in the manufacture of the drains shall be tested for UV resistance in accordance with ASTM D2329 Cycle A. The representative material for testing shall be cut from the drain completely soaked in water and let dry before testing with only minor discoloration and without any physical deterioration. Contractor shall furnish the results of the required ultraviolet testing prior to acceptance of the slab drains.
- All the contractor’s options, drains may be field cut. The method of cutting FRP slab drain shall be as recommended by the manufacturer to ensure a smooth, chip free cut.
- Both upper and lower drain pieces shall be rigidly connected to each other. Drain flow shall not be obstructed. Approval of the engineer is required.
Alternate details for Type B barrier (SBC):

Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.
2. Details shown inside the sheet border are for drains transverse to roadway requiring a cantilever 4 feet or more. Use the below details for drains parallel to roadway requiring a cantilever 3'-8" or more.
3. Delete panels for CIP slab.
4. Total drain length is equal to 9" + maximum girder and haunch + slab thickness, rounded up to the next whole inch.

PART PLAN OF SLAB AT DRAIN

PART PLAN OF SLAB AT DRAIN

ELEVATION OF DRAIN

PART SECTION SHOWING BRACKET ASSEMBLY

PLAN OF STEEL DRAIN OPTION

PLAN OF FRP DRAIN OPTION
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.
2. Details shown inside the sheet border are for drains transverse to roadway. Use the below details for drains parallel to roadway.
3. Use 1/6 of web depth.
4. Use with weathering steel. Delete for painted or galvanized steel.
5. Type 3 for weathering steel; Type 1 for painted or galvanized steel.
6. Delete panel for CIP slab.
7. Total drain length is equal to 9" + maximum girder and haunch + slab thickness, rounded UP to the next whole inch.

Alternate details for Type B barrier (SBC):

PART PLAN OF SLAB AT DRAIN

PART PLAN OF SLAB AT DRAIN

PART SECTION SHOWING BRACKET ASSEMBLY

PLAN OF STEEL DRAIN OPTION

PLAN OF FRP DRAIN OPTION

ELEVATION OF DRAIN

PART PLAN OF SLAB AT DRAIN
General Notes:
Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of same type. Locate drains in slab by dimensions shown in Part Section Near Drain. Reinforcing steel shall be shifted to clear drains. Shop drawings will not be required for the slab drains.

Notes for Steel Drain:
Slab drains may be fabricated of either 1/4" welded sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing ASTM A500 or A501.
Outside dimensions of drains are 8" x 4". The drains shall be galvanized in accordance with ASTM A123.

Notes for FRP Drain:
Drains shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D2996 with the following exceptions:

- The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed through:
- The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed through:
- The color of the slab drain shall be grey (Federal Standard 26373). The color shall be uniform throughout the resin and any coating used.
- The combination of materials used in the manufacture of the drain shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the required ultraviolet testing prior to acceptance of the slab drains.

Notes for FRP Drain:
Drains shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D2996 with the following exceptions:

- The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed through:
- The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed through:
- The color of the slab drain shall be grey (Federal Standard 26373). The color shall be uniform throughout the resin and any coating used.
- The combination of materials used in the manufacture of the drain shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the required ultraviolet testing prior to acceptance of the slab drains.

At the contractor's option, drains may be field cut. The method of cutting FRP slab drain shall be as recommended by the manufacturer to ensure a smooth, chip free cut.
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.

2. Details shown inside the sheet border are for drains transverse to roadway. Use the below details for drains parallel to roadway.

Alternate details for Type B barrier (SBC):

- **Connector (Typ.):** 1/2"Ø x 3" ± Shear (ASTM A709 Grade 36)
- **1/2"Ø x 3" Rod:**
- **Lock Washer (Typ.):** with Hex Nut and Carriage Bolt
- **1/2"Ø x 3" Galv. Carriage Bolt:** with Hex Nut and Lock Washer (Typ.)

**PART PLAN OF SLAB AT DRAIN**

**ELEVATION OF DRAIN**

**PART PLAN OF SLAB AT DRAIN**

**PLAN OF STEEL DRAIN OPTION**

**PLAN OF FRP DRAIN OPTION**
General Notes:

Contractor shall have the option to construct either steel or FRP slab drains. All drains shall be of the same type.

Slab drain or bracket assembly shall be ASTM A709 Grade 36 steel.

Locate drains in slab by dimensions shown in Part Section Near Drain.

Reinforcing steel shall be shifted to clear drains.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A522.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A522, Class C.

All 1/2" bolts shall be ASTM A507.

Shop drawings will not be required for the slab drains and the bracket assembly.

The coil insert required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength (ultimatum load) of at least 2,500 pounds in 2,900 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be supplied by the prestressed girder manufacturer.

Notes for Steel Drain:

Slab drains may be fabricated of either 1/4" thick sheets of ASTM A 709 Grade 36 or 1/4" thick structural steel tubing ASTM A 500 or A 501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A 522.

Notes for FRP Drain:

Drains shall be machine filament-wound thermosetting resin tubing meeting the requirements of ASTM D 909 and the associated 28999 with the coating used.

Shape of drains shall be rectangular with outside nominal dimensions of 8" x 4".

Minimum reinforced wall thickness shall be 0.14 inch.

The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed throughout the resin and any coating used.

The color of the slab drain shall be gray (Federal Standard 2991). The color shall be uniform throughout. Drains may have an exterior color.

The combination of materials used in the manufacture of the drains shall be tested in accordance with ASTM D 4329 Cycle A. The representative material shall be tested in accordance with the requirements of the FRP manufacturer to ensure a smooth, chip free finish.

All contractors shall be responsible for all pre-fabrication and shop work. The equipment and materials to be used shall be such as to ensure the required ultraviolet testing prior to acceptance of the slab drains.

All contractors shall furnish the results of the required ultraviolet testing prior to acceptance of the slab drains.

All contractors shall have the option to construct either steel or FRP slab drains. The method of cutting FRP slab at the contractor's option, drains may be field cut. The manufacturer to ensure a smooth, chip free finish.

Slab drains may be fabricated of either 1/4" thick sheets of ASTM A 709 Grade 36 or 1/4" thick structural steel tubing ASTM A 500 or A 501.

Outside dimensions of drains are 8" x 4".

All bolts, hardened washers and lock washers shall be galvanized in accordance with ASTM A 522.

At the contractor's option, drains may be field cut. The manufacturer to ensure a smooth, chip free finish.
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.

2. Details shown inside the sheet border are for drains transverse to roadway requiring a cantilever of at least 2'-9 1/2" for Type 2, 3 & 4 and at least 3'-3" for Type 6. Use the below details for drains parallel to roadway requiring a cantilever of at least 2'-5 1/2" for Type 2, 3 & 4 and at least 2'-11" for Type 6.

3. Details shown inside the sheet border are for Type 2, 3 & 4 girders. Use the below left details for Type 6 girders.

4. Delete panel for CIP slab.

5. Total drain length is equal to 9" + maximum girder and haunch + slab thickness, rounded up to the next whole inch.
**General Notes:**

Contractor shall have the option to construct either steel or FRP slab drains. All slab drains shall be of same type.

Slab drain bracket assembly shall be ASTM A709 Grade 36 steel.

Locate drains in slab by dimensions shown in Part Section Near Drain.

Reinforcing steel shall be shifted to clear drains.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A123 (A529).

All 1/2"Ø bolts shall be ASTM A570.

Shop drawings will not be required for slab drains and the bracket assembly.

The coil insert required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength ultimate load of at least 2,500 pounds in 3,000 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder shall be supplied by the prestressed girder fabricator.

---

**Notes for Steel Drain:**

Slab drains may be fabricated of either 1/14" thick sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing ASTM A500 or A501.

Outside dimensions of drain are 8" x 4". The drain shall be galvanized in accordance with ASTM A123.

**Notes for FRP Drain:**

Drains shall be made up from filament wound thermosetting resin tubing meeting the requirements of ASTM D2996 with the following exceptions:

Shape of slab drain shall be rectangular with outside nominal dimensions of 8" x 4".

Minimum reinforced wall thickness shall be 1/4 inch.

The resin used shall be ultraviolet (UV) resistant and/or have ultraviolet inhibitors throughout. Drains may have an external coating for additional UV resistance.

The color of the slab drain shall be gray (Federal Standard 28755). The color shall be uniform throughout the resin and any coating used.

The combination of materials used in the manufacture of the drains shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall be teste with at least 500 hours of testing with only minor discoloration and/or physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and/or physical deterioration within 10 days from the date of acceptance of the slab drains.

At the contractor's option, drains may be field cut. The method of cutting FRP slab drain shall be as recommended by the manufacturer to ensure a smooth, chip free cut.

---

**Total Sheet:** 6

**Biomech:** MO

**Project No.:**

**Job No.:**

**County:**

**Distance Prepared:**

**Date:** 10/17/2023

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**JEFFERSON CITY, MO 65102**

**1-888-ASK-MODOT (1-888-275-6636)**

---

**PLAN OF SLAB SHOWING SLAB DRAIN LOCATIONS**

**PLAN OF SLAB AT DRAIN**

**PART SECTION NEAR DRAIN**

**PART PLAN OF SLAB AT DRAIN**

**SLAB DRAINS**

**PLAN OF FRP DRAIN OPTION**

**PLAN OF STEEL DRAIN OPTION**

---

**PART SECTION SHOWING Bracket Assembly**

**ELEVATION OF DRAIN**

**PLAN OF SLAB SHOWING SLAB DRAIN LOCATIONS**

---

**Detailed Checked**

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.

2. Details shown inside the sheet border are for drains transverse to roadway requiring a cantilever 4 feet or more. Use the below details for drains parallel to roadway requiring a cantilever 3’-8” or more.

3. Delete panels for CIP slab.

4. Total drain length is equal to 9” + maximum girder and haunch + slab thickness, rounded UP to the next whole inch.

Alternate details for Type B barrier (SBC):

- 9/16”Ø Hole in angle for 1/2”Ø bolt with 2 hardened washers, lock washer, and nut (Typ.)
- 9/16”Ø Hole for 1/2”Ø bolt with lock washer and nut (Typ.)
- Prestressed Girder Web
- 1/2”Ø x 3” Rod (ASTM A709 Grade 36)
- 1/2”Ø x 3” Galv. Carriage Bolt with Hex Nut and Lock Washer (Typ.)
SLAB DRAINS

**General Notes:**
- Contractor shall have the option to construct slab drains or FRP slab drains. All drains shall be of the same type.
- Slab drain bracket assembly shall be ASTM A500 Grade 36 steel.
- Locate drains in slab by dimensions shown in Part Section Near Drain.
- Reinforcing steel shall be shifted to clear drains
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
- All bolts, hardened washers, lock washers, and nuts shall be galvanized in accordance with ASTM A123.
- Shop drawings shall not be required for the slab drain and the bracket assembly.
- The coil insert required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.
- All 1/2" bolts shall be ASTM A500.
- Shop drawings will not be required for the slab drain bracket assembly.
- The bolt required to attach the slab drain bracket assembly to the prestressed girder web shall be supplied by the prestressed girder fabricator.

**Notes for Steel Drain:**
- Slab drains may be fabricated of either 1/4" thick sheets of ASTM A990 Grade 50 steel or from 3/4" structural steel tubing ASTM A500 or A501.
- Outside dimensions of drains are 8" x 4".
- The drain shall be galvanized in accordance with ASTM A123.
- The drains shall be galvanized in accordance with ASTM A709.
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
- Reinforcing steel shall be shifted to clear the required ultraviolet testing prior to manufacture of the drains shall be tested in accordance with ASTM D2996 with the thermosetting resin tubing meeting the requirements of ASTM D2996. The combination of materials used in the construction of the slab drain shall meet the requirements of ASTM D2996. The slab drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.
- At the contractor's option, the drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.

**Notes for FRP Drain:**
- Slab drain bracket assembly shall be ASTM A709 Grade 36 structural steel tubing ASTM A500 or A501.
- Outside dimensions of drains are 8" x 4".
- The drain shall be galvanized in accordance with ASTM A123.
- The drains shall be galvanized in accordance with ASTM A709.
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
- Reinforcing steel shall be shifted to clear the required ultraviolet testing prior to manufacture of the drains shall be tested in accordance with ASTM D2996 with the thermosetting resin tubing meeting the requirements of ASTM D2996. The combination of materials used in the construction of the slab drain shall meet the requirements of ASTM D2996. The slab drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.
- At the contractor's option, the drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.

**General Notes:**
- Contractor shall have the option to construct slab drains or FRP slab drains. All drains shall be of the same type.
- Slab drain bracket assembly shall be ASTM A500 Grade 36 steel.
- Locate drains in slab by dimensions shown in Part Section Near Drain.
- Reinforcing steel shall be shifted to clear drains.
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
- All bolts, hardened washers, lock washers, and nuts shall be galvanized in accordance with ASTM A123.
- All 1/2" bolts shall be ASTM A500.
- Shop drawings shall not be required for the slab drain and the bracket assembly.
- The coil insert required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.
- Coil inserts shall have a concrete pull-out strength ultimate load factor of at least 2,500 pounds in 3,500 psf concrete.
- The bolt required to attach the slab drain bracket assembly to the prestressed girder web shall be supplied by the prestressed girder fabricator.

**Notes for Steel Drain:**
- Slab drains may be fabricated of either 1/4" thick sheets of ASTM A990 Grade 50 steel or from 3/4" structural steel tubing ASTM A500 or A501.
- Outside dimensions of drains are 8" x 4".
- The drain shall be galvanized in accordance with ASTM A123.
- The drains shall be galvanized in accordance with ASTM A709.
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
- Reinforcing steel shall be shifted to clear the required ultraviolet testing prior to manufacture of the drains shall be tested in accordance with ASTM D2996 with the thermosetting resin tubing meeting the requirements of ASTM D2996. The combination of materials used in the construction of the slab drain shall meet the requirements of ASTM D2996. The slab drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.
- At the contractor's option, the drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.

**Notes for FRP Drain:**
- Slab drain bracket assembly shall be ASTM A709 Grade 36 structural steel tubing ASTM A500 or A501.
- Outside dimensions of drains are 8" x 4".
- The drain shall be galvanized in accordance with ASTM A123.
- The drains shall be galvanized in accordance with ASTM A709.
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.
- Reinforcing steel shall be shifted to clear the required ultraviolet testing prior to manufacture of the drains shall be tested in accordance with ASTM D2996 with the thermosetting resin tubing meeting the requirements of ASTM D2996. The combination of materials used in the construction of the slab drain shall meet the requirements of ASTM D2996. The slab drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.
- At the contractor's option, the drain shall be tested for its resistance in accordance with ASTM D2996, Cycle 8. The composite material shall withstand at least 500 hours of testing with only minor deterioration and without any physical deterioration. The contractor shall furnish the results of the testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the testing to the engineer is required.
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.
2. Details shown inside the sheet border are for drains transverse to roadway requiring a cantilever 3'-9 1/2" or more. Use the below details for drains parallel to roadway requiring a cantilever 3'-3 3/4" or more.
3. Delete panel for CIP slab.
4. Total drain length is equal to 9" + maximum girder and haunch + slab thickness, rounded up to the next whole inch.

Alternate details for Type B barrier (SBC):

PART PLAN OF SLAB AT DRAIN

PART SECTION SHOWING BRACKET ASSEMBLY

PART PLAN OF SLAB AT DRAIN

Plan of Steel Drain Option

Plan of FRP Drain Option
Note: This drawing is not to scale. Follow dimensions.

General Notes:
- Contractor shall have the option to construct either steel or FRP slab drains.
- All drains shall be of same type.
- Slab drain bracket assembly shall be ASTM A709 Grade 36 steel.
- Locate drains in slab by dimensions shown in Part Section Near Drain.
- Rebar shall be shifted to clear drains.
- The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A153.
- All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A123.
- All 1/2" bolts shall be ASTM A307.
- Shop drawings will not be required for the slab drain and the bracket assembly.
- The coil inserts required for the bracket assembly shall be located on the prestressed beam shop drawings.
- Coil inserts shall have a concrete pull-out strength (ultimate load) of at least 2,500 pounds in 5,000 psi concrete.
- The bolts required to attach the slab drain bracket assembly to the prestressed beam shall be supplied by the prestressed beam fabricator.

General Notes for Steel Drain:
- Drain shall be machine filament wound thermosetting resin tubing meeting the requirements of ASTM D2996 with the following exceptions:
  - Minimum reinforced wall thickness shall be 1/4 inch.
  - The resin used shall be ultraviolet (UV) resistant and/or have the required resistance mixed throughout.
  - Drains may have an exterior coating for additional UV resistance.
  - The color of the slab drain shall be gray (Federal Standard 26373). The color shall be uniform throughout. Drains may have an exterior coating for additional UV resistance.
  - Reinforcing steel shall be shifted to clear drains.
  - Reinforcing steel shall be ASTM A500 or A501.
  - Slab drains may be fabricated of either structural steel tubing or 1/4" structural steel tubing.
  - Slab drains may be fabricated of 1/4" welded sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing.

General Notes for FRP Drain:
- Slab drains may be machine filament wound thermosetting resin tubing meeting the requirements of ASTM D2996 with the following exceptions:
  - Slab drains may have a concrete pull-out strength (ultimate load) of at least 2,500 pounds in 5,000 psi concrete.
  - All drains shall be of same type.
  - Contractors shall have the option to construct either steel or FRP slab drains.
  - The required ultraviolet testing prior to acceptance of the slab drains.
  - The combination of materials used in the manufacture of the slab drains shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and/or has UV inhibitors mixed throughout. Drains may have an exterior coating for additional UV resistance.
  - The combination of materials used in the manufacture of the slab drains shall be accepted if the required ultraviolet testing prior to acceptance of the slab drains.
  - The color of the slab drain shall be gray (Federal Standard 26373). The color shall be uniform throughout. Drains may have an exterior coating for additional UV resistance.

SLAB DRAINS

PLAN OF SLAB AT DRAIN

Notes for FRP Drain:
- The resin used shall be ultraviolet (UV) resistant and/or have the required resistance mixed throughout.
- Drains may have an exterior coating for additional UV resistance.
- The color of the slab drain shall be gray (Federal Standard 26373). The color shall be uniform throughout. Drains may have an exterior coating for additional UV resistance.
- Reinforcing steel shall be shifted to clear drains.
- Reinforcing steel shall be ASTM A500 or A501.
- Slab drains may be fabricated of either structural steel tubing or 1/4" structural steel tubing.
- Slab drains may be fabricated of 1/4" welded sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing.

Notes for Steel Drain:
- Drain shall be machine filament wound thermosetting resin tubing meeting the requirements of ASTM D2996 with the following exceptions:
  - Minimum reinforced wall thickness shall be 1/4 inch.
  - The resin used shall be ultraviolet (UV) resistant and/or have the required resistance mixed throughout.
  - Drains may have an exterior coating for additional UV resistance.
  - The color of the slab drain shall be gray (Federal Standard 26373). The color shall be uniform throughout. Drains may have an exterior coating for additional UV resistance.
  - Reinforcing steel shall be shifted to clear drains.
  - Reinforcing steel shall be ASTM A500 or A501.
  - Slab drains may be fabricated of either structural steel tubing or 1/4" structural steel tubing.
- Slab drains may be fabricated of 1/4" welded sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing.

PLAN OF SLAB SHOWING SLAB DRAIN LOCATIONS

PLAN OF FRP DRAIN OPTION

PLAN OF STEEL DRAIN OPTION

PART SECTION SHOWING BRACKET ASSEMBLY

PART SECTION NEAR DRAIN

ELEVATION OF DRAIN

SLAB DRAINS
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan. Verify slab drain does not block vent pipe in box beam.

2. Details shown inside the sheet border are for drains transverse to roadway requiring a cantilever 4'-3" or more. Use the below details for drains parallel to roadway requiring a cantilever 3'-11" or more.

3. Use half of the beam depth.

4. Beam manufacturer determines required distance between inserts with coordination between contractor and drain supplier.

Alternate details for Type B barrier (SBC):

- 9/16"Ø Hole for 1/2"Ø bolt with lock washer and nut (Typ.)
- 5/8"Ø Steel Spacer to Bent Strip 10 Gage (Min.) x 2"
- Prestressed Box Beam
- 1/2"Ø x 3" Rod (ASTM A709 Grade 36) or 1/2"Ø x 3" Shear Connector (Typ.)

PART SECTION SHOWING BRACKET ASSEMBLY

PART PLAN OF SLAB AT DRAIN

PART PLAN OF SLAB AT DRAIN

PLAN OF STEEL DRAIN OPTION

PLAN OF FRP DRAIN OPTION
General Notes:
Contractor shall have the option to construct slab drains of either FRP or steel. All slab drains shall be of same type.

Slab drain bracket assembly shall be ASTM A500 or ASTM A501. Outside dimensions of drains are 8" x 4". Slab drain bracket assembly shall be galvanized to the requirements of ASTM D2996 with the thermosetting resin tubing meeting the requirements of ASTM 26373. The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed in the coating used.

The combination of materials used in the fabrication of the slabs shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and/or weathering, and the combination of materials used in the fabrication of the slabs shall be tested for UV resistance in accordance with ASTM D7329. The representative material shall withstand at least 500 hours of testing with only minor discoloration and/or weathering.

The combination of materials used in the fabrication of the slabs shall be tested for UV resistance in accordance with ASTM D7329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and/or weathering.

Notes for Steel Drain:
Slab drain shall be machine-fabricated from 1/4" x 0.060" hot-rolled, galvanized structural steel tubing for ASTM A500 or ASTM A501. The outside dimensions of drains are 8" x 4". Reinforcing steel shall be shifted to maintain 1" (min.) clearance to box beam (Typ.). The bolts required to attach the slab drain shall be ASTM A307. All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A123 or ASTM A153, Class C.

Outside dimensions of drain is 6'-6" x 6'-6". The drains shall be galvanized in accordance with ASTM A525. Slab drain bracket assembly shall be ASTM A500 or ASTM A501. Outside dimensions of drains are 6'-6" x 6'-6". Slab drain bracket assembly shall be galvanized to the requirements of ASTM D2996 with the thermosetting resin tubing meeting the requirements of ASTM 26373. The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed in the coating used.

Notes for FRP Drain:
Drain shall be machine-fabricated from 1/4" x 0.060" hot-rolled, galvanized structural steel tubing for ASTM A500 or ASTM A501. The outside dimensions of drains are 8" x 4". Reinforcing steel shall be shifted to maintain 1" (min.) clearance to box beam (Typ.). The bolts required to attach the slab drain shall be ASTM A307. All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A123 or ASTM A153, Class C.

Outside dimensions of drain is 8" x 4". The drains shall be galvanized in accordance with ASTM A525. Slab drain bracket assembly shall be ASTM A500 or ASTM A501. Outside dimensions of drains are 8" x 4". Slab drain bracket assembly shall be galvanized to the requirements of ASTM D2996 with the thermosetting resin tubing meeting the requirements of ASTM 26373. The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed in the coating used.

The combination of materials used in the fabrication of the slabs shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and/or weathering, and the combination of materials used in the fabrication of the slabs shall be tested for UV resistance in accordance with ASTM D7329. The representative material shall withstand at least 500 hours of testing with only minor discoloration and/or weathering.

The combination of materials used in the fabrication of the slabs shall be tested for UV resistance in accordance with ASTM D7329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and/or weathering.

As the contractor's option, slab drains may be field cut. The method of cutting FRP slab drains shall be as recommended by the manufacturer to ensure a smooth, chip free cut. Both upper and lower drain pieces shall be simply connected to each other. Drain flow shall not be obstructed. Approval of the engineer is required.
**Standard Drawing Guidance (do not show on plans):**

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.
   Verify slab drain does not block vent pipe in box beam.

2. Details shown inside the sheet border are for drains transverse to roadway requiring a cantilever 3'-9 3/8" or more. Use the below details for drains parallel to roadway requiring a cantilever 3'-3 5/8" or more.

3. Use half of the beam depth.

4. Beam manufacturer determines required distance between inserts with coordination between contractor and drain supplier.

**Alternate details for Type B barrier (SBC):**

- **Part Plan of Slab at Drain**
  - Drain
  - Inside Face of Barrier
  - Prestressed Box Beam
  - 9/16" Ø Holes for 1/2" Ø bolt with lock washer and nut (Typ.)
  - Prestressed Box Beam
  - Prestressed Box Beam
  - Prestressed Box Beam

- **Plan of Steel Drain Option**
  - Drain
  - Inside Face of Barrier
  - Prestressed Box Beam
  - Prestressed Box Beam
  - Prestressed Box Beam

- **Plan of FRP Drain Option**
  - Drain
  - Inside Face of Barrier
  - Prestressed Box Beam
  - Prestressed Box Beam
  - Prestressed Box Beam

**Part Section Showing Bracket Assembly**

- Drain
- Inside Face of Barrier
- Prestressed Box Beam
- Prestressed Box Beam
- Prestressed Box Beam

**Elevation of Drain**

- Drain
- Inside Face of Barrier
- Prestressed Box Beam
- Prestressed Box Beam
- Prestressed Box Beam

---

**Alternate Details for Type B barrier (SBC):**

- **Part Plan of Slab at Drain**
  - Drain
  - Inside Face of Barrier
  - Prestressed Box Beam
  - Prestressed Box Beam
  - Prestressed Box Beam

- **Plan of Steel Drain Option**
  - Drain
  - Inside Face of Barrier
  - Prestressed Box Beam
  - Prestressed Box Beam
  - Prestressed Box Beam

- **Plan of FRP Drain Option**
  - Drain
  - Inside Face of Barrier
  - Prestressed Box Beam
  - Prestressed Box Beam
  - Prestressed Box Beam
Standard Drawing Guidance (do not show on plans):

1. Replace example Plan of Slab Showing Slab Drain Locations with actual plan.
2. Details shown inside the sheet border are for drains transverse to roadway. Use the below details for drains parallel to roadway.
3. Use 1/6 of web depth.
4. For slab thickness less than 7 3/4", revise dimension to be equal to the slab thickness minus 3 1/4".
5. Type 3 for weathering steel; Type 1 for painted or galvanized steel.
6. Use with weathering steel. Delete for painted or galvanized steel.
7. Total drain length is equal to 9" + maximum girder and haunch + slab thickness, rounded up to the next whole inch.

Alternate details for Type B barrier (SBC):

- See Sec 1080.4
SLAB DETAIL

Optional shifting top bars at barrier

Contractor may shift bar as needed to tie R3 bar in barrier (4" min. bar spacing)

Fill each side of joint with 1/4" radius edging tool

Finish each side of joint with 1/4" radius edging tool

Key to extend full width of full depth slab

Finish each side of joint with 1/4" radius edging tool

Notes:

For details of precast prestressed panels, see Sheet No.

For reinforcement of barrier, see Sheet No.

For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No.

For Plan of Slab Showing Reinforcement, see Sheet No.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):

1. Remove if not required.

2. Use the following values for clearance to top longitudinal bars:
   - 3\(\frac{3}{8}\)" for #5 bars
   - 3" for #6 bars
   - 2\(\frac{3}{8}\)" for #7 bars
   - 2\(\frac{7}{8}\)" for #8 bars

   Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed): this will be the only asterisk note for CIP decks:

   *** 3\(\frac{3}{8}\)" (#5)
   3" (#6)
   2\(\frac{3}{8}\)" (#7)
   2\(\frac{7}{8}\)" (#8)

   Clearances values based on the #6 top transverse bar used for this standard slab. Values will need to be revised for other size transverse bars.

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges.

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

For 8" thick slabs, change top dimension to 3\(\frac{1}{4}\)" and center dimension to 2\(\frac{1}{2}\)"

Finish each side of joint with 1/4" radius edging tool.

Key to extend full width of slab

SLAB CONSTRUCTION JOINT

7. Remove for CIP deck

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
OPTIMAL SHIFTING TOP BARS AT BARRIER

1. Contractor may shift or swap bars at needed points to fit R2 bar spacing.

2. Optional shifting top bars at barrier.

3. Full depth slab in the construction joint.

4. Profile grade of slab.

5. Parabolic crown.

6. Top of slab profile grade.

7. Roadway.


11. Finish each side of joint with 1/4" radius edging tool.

12. Key to extend full width of deck.

13. Finish each side of joint with 1/4" radius edging tool.


16. **Adjust the construction joint to a clearance of 6 inches minimum from the panel joint.

17. Diagram not to scale. Follow dimensions.

Notes:
- For details of precast prestressed panels, see Sheet No.
- For reinforcement of barrier, see Sheet No.
- For theoretical bottom of slab elevations, girder camber diagram and theoretical slab thinning diagram, see Sheet No.
- For plan of slab showing reinforcement, see Sheet No.

SLAB DETAILS

Note: This drawing is not to scale. Follow dimensions.

Sheet No. of

Detailed
Checked

SLAB CONSTRUCTION JOINT

1. For details of precast prestressed panels, see Sheet No.
2. For reinforcement of barrier, see Sheet No.
3. For theoretical bottom of slab elevations, girder camber diagram and theoretical slab thinning diagram, see Sheet No.
4. For plan of slab showing reinforcement, see Sheet No.
Standard Drawing Guidance (do not show on plans):

1. Remove if not required.
2. Use the following values for clearance to top longitudinal bars:
   - 3/4" for #5 bars
   - 3" for #6 bars
   - 2" for #7 bars
   - 2 1/4" for #8 bars

Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed) (this will be the only asterisk note for CIP decks):

*** 3/4" (#5)
   3" (#6)
   2 1/4" (#7)
   2" (#8)

Clearance values based on the #6 top transverse bar used for this standard slab. Values will need to be revised for other size transverse bars.

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges.

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

Finish each side of joint with 1/4" radius edging tool.

Key to extend full width of slab.

SLAB CONSTRUCTION JOINT

7. Remove for CIP deck

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
SLAB02_26ft_symm  Guidance & Alternate Details (2 of 3)

4-Beam Panel Deck

4-Beam CIP Deck

Type 2, 3, 4

Plate Girder

10'-0" Roadway

13'-0"

3'-9"

7'-6"

3'-1"

CL. 1"

SECTION THRU SLAB

2% Slope (Min.)

#6-S

#5-S

#5-S

Detail B

HALF SECTION NEAR MIDSPAN

HALF SECTION NEAR INTERMEDIATE BENT

#6-S

#5-S

#5-S

Alternate bar shape available, see barrier sheet.
SLAB DETAIL S

- Contractor may shift top bars at needed to tie R3 bars in barrier
- Finish each side of joint with 1/4" radius edging tool

OPTIONAL SHIFTING TOP BARS AT BARRIER

Notes:
- For details of precast prestressed panels, see Sheet No.
- For reinforcement of barrier, see Sheet No.
- For theoretical bottom of slab elevations, girder camber diagram and theoretical slab haunching diagram, see Sheet No.
- For plan of slab showing reinforcement, see Sheet No.
Standard Drawing Guidance
**do not show on plans:**

1. Remove if not required.
2. Use the following values for clearance to top longitudinal bars:
   - 3\(\frac{3}{4}\)" for #5 bars
   - 3" for #6 bars
   - 2\(\frac{2}{3}\)" for #7 bars
   - 2\(\frac{1}{2}\)" for #8 bars

   Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed) (this will be the only asterisk note for CIP decks):
   - *** 3\(\frac{3}{4}\)" (#5)
   - 3" (#6)
   - 2\(\frac{2}{3}\)" (#7)
   - 2\(\frac{1}{2}\)" (#8)

   Clearance values based on the #6 top transverse bar used for this standard slab. Values will need to be revised for other size transverse bars.

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges. <Ctrl> U to ungroup

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

   For 8" thick slabs, change top dimension to 3 1\(\frac{1}{4}\)" and center dimension to 2 1\(\frac{1}{2}\)".

   Finish each side of joint with 1\(\frac{1}{4}\)" radius edging tool

   Key to extend full width of slab

   **SLAB CONSTRUCTION JOINT**

7. Remove for CIP deck

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
4-Beam Panel Deck

4-Beam CIP Deck

Type 2,3,4

Plate Girder

Type 6

SLAB03_28ft_symm Guidance & Alternate Details (2 of 4)
4-Beam Panel Deck

4-Beam CIP Deck

* Alternate bar shape available, see barrier sheet.
SLAB DETAILS

Key to extend full width of deck

For details of precast prestressed panels, see Sheet No.

For reinforcement of barrier not shown, see Sheet No.

For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No.  

For Plan of Slab Showing Reinforcement, see Sheet No.

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance
(do not show on plans):

1. Remove if not required.

2. Use the following values for clearance to top longitudinal bars:
   - 3/4" for #5 bars
   - 3" for #6 bars
   - 2 1/8" for #7 bars
   - 2 1/2" for #8 bars
   Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed) (this will be the only asterisk note for CIP decks):
     - 3 1/8" (#5)
     - 3" (#6)
     - 2 7/8" (#7)
     - 2 3/4" (#8)

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges. <Ctrl> U to ungroup

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

Finish each side of joint with 1/4" radius edging tool.

Key to extend full width of slab

 Alternat detail for Type H barrier

OPTIONAL SHIFTING TOP BARS AT BARRIER

Contractor may shift or swap bars as needed to tie R4 bar in barrier (4" min. bar spacing).

For CIP decks, change top dimension to 3 1/4" and center dimension to 2 1/2".

Remove for CIP deck

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
4-Beam Panel Deck

16” 30'-0” Roadway

16” 15'-0”

16” 15'-0”

16” 30'-0” Roadway

16” 15'-0”

16” 15'-0”

4-Beam CIP Deck

4” Cl.

#5-S_ 3'-4”

#5-S_ 8’-8” (Min.)

1” Cl.

#6-S_ 4’-4”

2% Slope

Detail B

SECTION THRU SLAB

HALF SECTION NEAR MIDSPAN

HALF SECTION NEAR INTERMEDIATE BENT

HALF SECTION NEAR MIDSPAN

HALF SECTION NEAR INTERMEDIATE BENT

HALF SECTION NEAR MIDSPAN

HALF SECTION NEAR INTERMEDIATE BENT

HALF SECTION NEAR MIDSPAN

HALF SECTION NEAR INTERMEDIATE BENT

Alternate bar shape available, see barrier sheet.
SLAB DETAILS

- **SLAB CONSTRUCTION JOINT**
  - Finish each side of joint with 1/4" radius edging tool.
  - Key to extend full width of deck.
  - **Const. Jt.**
  - Panel Joint.
  - **Adjust the construction joint to a clearance of 6 inches minimum from the panel joint.**

- **OPTIONAL SHIFTING TOP BARS AT BARRIER**
  - Contractor may shift or swap bars as needed to tie R3 bar (4" min. bar spacing).

Notes:
- For details of precast prestressed panels, see Sheet No.
- For reinforcement of barrier, see Sheet No.
- For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No.
- For Plan of Slab Showing Reinforcement, see Sheet No.

**SLAB CONSTRUCTION JOINT**

1. Finish each side of joint with 1/4" radius edging tool.
2. Key to extend full width of deck.
3. **Const. Jt.**
4. Panel Joint.
5. **Adjust the construction joint to a clearance of 6 inches minimum from the panel joint.**

**SLAB DETAILS**

Note: This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance
(do not show on plans):

1. Remove if not required.
2. Use the following values for clearance to top longitudinal bars:
   - 3/4" for #5 bars
   - 3" for #6 bars
   - 2 3/4" for #7 bars
   - 2 1/4" for #8 bars

   Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed): this will be the only asterisk note for CIP decks:
   - *** 3/4" (#5)
   - 3" (#6)
   - 2 3/4" (#7)
   - 2 1/4" (#8)

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges. <Ctrl>U to ungroup

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

Finish each side of joint with 1/4" radius edging tool.

Key to extend full width of slab:

---

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
**SLAB DETAILS**

**SLAB CONSTRUCTION JOINT**

- **For details of precast prestressed panels, see Sheet No.**
- **For reinforcement of barrier, see Sheet No.**
- **For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No.**
- **For Plan of Slab Showing Reinforcement, see Sheet No.**

**Notes**
- **Parabolic Crown**

**OPTIONAL SHIFTING TOP BARS AT BARRIER**

1. Contractor may shift or swap bars as needed to tie R2 bar in barrier (4" min. bar spacing)

2. Contractor may shift or swap bars as needed to tie R3 bar in barrier (4" min. bar spacing)

3. Adjust the construction joint to a clearance of 1/2" minimum from the panel joint.

**EXPLANATION**

- **Finish each side of joint with 1/8" radius edging tool**

**SLAB ON PANELS**

- **Full Depth Slab**

**DETAIL A**

- **Profile Grade**

**DETAIL B**

- **3/8" Grip Groove (Type 3)**

**OPTIONAL SHIFTING TOP BARS AT BARRIER**

- **Finish each side of joint with 1/8" radius edging tool**

**Panel Joint**

- **Key to extend full width of deck**

**FULL DEPTH SLAB**

- **2'-0" Top of Slab**

- **2'-0" Parabolic Crown**

**Crown of Slab**

- **2'-0" Roadway**

- **Past Slope**

**SHEET CONTENTS**

- **Contractor may shift or swap bars as needed to tie R2 bar in barrier (4" min. bar spacing)**

**PROJECT NO.**

- **1-888-ASK-MODOT (1-888-275-6636)**

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

**JEFFERSON CITY, MO 65102**

**105 WEST CAPITOL**

**COUNTY JOB NO.**

- **CONTRACT ID.**

**ROUTE**

- **DATE**

**DESCRIPTION**

- **SLAB DECK DETAILS**

- **SHEET NO.**

**NOTE:** This drawing is not to scale. Follow dimensions.
Standard Drawing Guidance (do not show on plans):

1. Remove if not required.
2. Use the following values for clearance to top longitudinal bars:
   - 3\(\frac{1}{4}\)" for #5 bars
   - 3" for #6 bars
   - 2\(\frac{1}{2}\)" for #7 bars
   - 2\(\frac{3}{4}\)" for #8 bars

   Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed) (this will be the only asterisk note for CIP decks):
   - *** 3\(\frac{1}{4}\)" (#5)
   - 3" (#6)
   - 2\(\frac{1}{2}\)" (#7)
   - 2\(\frac{3}{4}\)" (#8)

   Clearance values based on the #6 top transverse bar used for this standard slab. Values will need to be revised for other size transverse bars.

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges. <Ctrl> U to ungroup

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

   - For 8" thick slabs, change top dimension to 3 1\(\frac{1}{4}\)" and center dimension to 2 1\(\frac{1}{2}\)".

   Finish each side of joint with 1\(\frac{1}{4}\)" radius edging tool.

   Key to extend full width of slab.

   Const. Jt.

   SLAB CONSTRUCTION JOINT

7. Remove for CIP deck

   Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
SLAB DETAILS

Note: This drawing is not to scale. Follow dimensions.

Details:
- Full Depth Slab
- Slab on Panels
- Optional Shifting Top Bars at Barrier
- Construction Joint

Key to:
- Full Depth Slab
- Slab on Panels
- Contractor may shift bars as needed to tie R2 bar in barrier
- Contractor may shift or swap bars as needed to tie R3 bar in barrier (4" min. bar spacing)
- Contractor may shift or swap bars as needed to tie R3 bar in barrier

For details of precast prestressed panels, see Sheet No.
For reinforcement of barrier not shown, see Sheet No.
For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No.
For Plan of Slab Showing Reinforcement, see Sheet No.

Note: This drawing is not to scale. Follow dimensions.
SLAB CONSTRUCTION JOINT

Finish each side of joint with 1/4" radius edging tool.

Key to extend full width of slab

Const. Jt.

OPTIONAL SHIFTING TOP BARS AT BARRIER

Contractor may shift or swap bars as needed to tie R4 bar in barrier
(4" min. bar spacing)

Alternate detail for Type H barrier

For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

Standard Drawing Guidance (do not show on plans):

1. Remove if not required.
2. Use the following values for clearance to top longitudinal bars:
   - 3" for #5 bars
   - 4" for #6 bars
   - 2 1/2" for #7 bars
   - 2" for #8 bars

   Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed) (this will be the only asterisk note for CIP decks):
   - *** 3 1/8" (#5)
   - 3" (#6)
   - 2 7/8" (#7)
   - 2 3/4" (#8)

   Clearance values based on the #6 top transverse bar used for this standard slab. Values will need to be revised for other size transverse bars.

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges. <Ctrl> U to ungroup

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

7. Remove for CIP deck

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
Panel Deck

CIP Deck

Type 2, 3, 4 Plate Girder

Type 6

SLAB07_38ft_symm  Guidance & Alternate Details (2 of 3)

Cl. 1"
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0" 2
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

Cl. 1"
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0"
5
8'-8"
8'-8" 4
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

1" Cl.
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0"
5
8'-8"
8'-8" 4
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

1" Cl.
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0"
5
8'-8"
8'-8" 4
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

1" Cl.
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0"
5
8'-8"
8'-8" 4
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

1" Cl.
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0"
5
8'-8"
8'-8" 4
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

1" Cl.
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0"
5
8'-8"
8'-8" 4
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

1" Cl.
3'-0" #5-S _
8'-8" (Min.) 1" Cl.
8'-8" #6-S _
3'-0"
5
8'-8"
8'-8" 4
2% Slope

Detail B

SECTION THRU SLAB
3 Girder
4
1
4

HALF SECTION NEAR MIDSPAN
HALF SECTION NEAR INTERMEDIATE BENT

1" Cl.
4" 4" Cl.
19'-0" 19'-0" 16" 38'-0" Roadway
16" 19'-0" 19'-0" 16" 38'-0" Roadway
16" 19'-0" 19'-0" 16" 38'-0" Roadway
16" 19'-0" 19'-0" 16" 38'-0" Roadway

Alternate bar shape available, see barrier sheet.
SLAB08_38ft_unsymm  Effective: Jan. 2022  Supersedes: July 2021

SLAB DETAILS

Finish each side of joint with 1/4" radius edging tool.

Key to:
- Full Depth Slab
- Slab on Panels

OPTIONAL SHIFTING TOP BARS AT BARRIER

Contractor may shift or swap bars as needed to tie R3 bar (4" min. bar spacing)

Notes:
- For details of precast prestressed panels, see Sheet No.
- For reinforcement of barrier not shown, see Sheet No.
- For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No.
- For Plan of Slab Showing Reinforcement, see Sheet No.

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 1 of 1

Full Depth Slab

SLAB CONSTRUCTION JOINT

For details of precast prestressed panels, see Sheet No.
Standard Drawing Guidance
(do not show on plans):

1. (Remove if not required.
2. Use the following values for clearance to top longitudinal bars:
   - 3/4" for #5 bars
   - 3" for #6 bars
   - 2 1/8" for #7 bars
   - 2 3/4" for #8 bars

Use a triple asterisk when there are different size top bars and add below the single asterisk note the following [modified as needed]:

*** 3/4" (#5)  
   3" (#6)  
   2 1/8" (#7)  
   2 3/4" (#8)

Clearance values based on the #6 top transverse bar used for this standard slab. Values will need to be revised for other size transverse bars.

3. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

4. The subheadings and negative moment bars are grouped and can be deleted for single span bridges.

5. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

Finish each side of joint with 1/4" radius edging tool.

Key to extend full width of slab

Const. Jt.

Contractor may shift or swap bars as needed to tie R3 bar in barrier (4" min. bar spacing)

Optional shifting top bars at barrier

Alternate detail for Type H barrier

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
SLAB DETAILS

Notes:
1. For details of precast prestressed panels, see Sheet No.
2. For reinforcement of barrier not shown, see Sheet No.
3. For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No.
4. For Plan of Slab Showing Reinforcement, see Sheet No.

1. Contractor may shift or swap bar as needed to tie R2 bar in barrier.
2. Contractors may shift or swap bars as needed to tie R3 bar (4 in. min. bar spacing).
3. Optional shifting top bars at barrier.
4. Adjust the construction joint to a clearance of 6 inches minimum from the panel joint.
5. Finish each side of joint with 1/4" radius edging tool.

For Plan of Slab Showing Reinforcement, see Sheet No.
Standard Drawing Guidance (do not show on plans):

1. Remove if not required.

2. Use the following values for clearance to top longitudinal bars:
   - 3/8" for #5 bars
   - 3" for #6 bars
   - 2 7/8" for #7 bars
   - 2 3/4" for #8 bars

Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed) (this will be the only asterisk note for CIP decks):

- 3/8" (#5)
- 3" (#6)
- 2 7/8" (#7)
- 2 3/4" (#8)

Clearance values based on the #6 top transverse bar used for this standard slab. Values will need to be revised for other size transverse bars.

4. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

5. The subheadings and negative moment bars are grouped and can be deleted for single span bridges. <Ctrl>U to ungroup

4. Place appropriate slab pouring sequence cell and modify as required.

6. Use alternate detail for CIP decks:

   For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

   Finish each side of joint with 3/4" radius edging tool.

   Key to extend full width of slab

   For alternate detail for CIP deck

   Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
Note: This drawing is not to scale. Follow dimensions.

For details of precast prestressed panels, see Sheet No. 5.
For reinforcement of barrier not shown, see Sheet No. 6.
For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No. 7.
For Plan of Slab Showing Reinforcement, see Sheet No. 8.

Full Depth Slab
Adjust the construction joint to a clearance of 4 inches minimum from the panel joint.

Finish each side of joint with 1/4" radius edging tool.

Finish each side of joint with 1/4" radius edging tool.

Key to extend full width of full depth slab.

Contractor may shift or swap bars as needed to tie R3 bar in barrier
Contractor may shift or swap bars as needed to tie R2 bar in barrier (4" min. bar spacing).

Finish each side of joint with 1/4" radius edging tool.

OPTIONAL SHIFTING TOP BARS AT BARRIER

Contractor may shift or swap bars as needed to tie R2 bar in barrier.
Contractor may shift or swap bars as needed to tie R3 bar in barrier.

For Plan of Slab Showing Reinforcement, see Sheet No. 8.
For theoretical section of Slab Details, Slab Camber Diagram and theoretical Slab Haunching Diagram, see Sheet No. 7.
For reinforcement of barrier not shown, see Sheet No. 6.
For details of precast prestressed panels, see Sheet No. 5.
Standard Drawing Guidance
(don't show on plans):

1. Remove if not required.

2. Use the following values for clearance to top longitudinal bars:
   - 3/4" for #5 bars
   - 3" for #6 bars
   - 2 1/4" for #7 bars
   - 2 1/2" for #8 bars

3. Use a triple asterisk when there are different size top bars and add below the single asterisk note the following (modified as needed): (this will be the only asterisk note for CIP decks):
   - *** 3/4" (#5)
   - 3" (#6)
   - 2 1/4" (#7)
   - 2 1/2" (#8)

4. The larger negative moment reinforcement shown is grouped and can be deleted if the negative moment steel is the same size as the distribution reinforcement. A set of bars the same size as the distribution bars exist behind the larger bars shown, and will become visible when the larger bars are deleted. (No need to resize)

5. The subheadings and negative moment bars are grouped and can be deleted for single span bridges. <Ctrl> U to ungroup

6. Place appropriate slab pouring sequence cell and modify as required.

7. Use alternate detail for CIP decks:

For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

For 8" thick slabs, change top dimension to 3 1/4" and center dimension to 2 1/2".

Finish each side of joint with 1/4" radius edging tool.

SLAB CONSTRUCTION JOINT

1. Remove for CIP deck

Girder spacing and reinforcement size & spacing shown are not necessarily standard. Follow design.
1/2”Ø Machine Bolt at about 18” cts. (Cut machine bolt flush with steel armor after concrete on each side has taken initial set.)

**DETAIL A**

- **Fill Face of End Bento**
- **Strap Seal Gland**
- **Steel Armor**
- **1/2”Ø Machine Bolt at about 18” cts.**
- **Propressed Order**

**SECTION A-A**

- **Strip Seal Gland**

**PART PLAN**

- **Roadway Face (Gutter line)**
- **3/4”Ø x 12” anchor bolt with 2 nuts and washer**
- **Shear Connector Studs**
- **Alternately spaced at about 9” cts.**

**PART ELEVATION OF BARRIER**

- **Extend Strip Seal Gland 3” past edge of slab**
- **Alternately at about 9” cts.**

**PART B-B**

- **Selector holes at the 1/2”Ø Machine bolts**
- **Connector gland not allowed**

**DETAIL B**

- **Steel Armor**
- **Cavity**
- **Shear Connector Studs**
- **Alternating at about 9” cts.**

**Table of Allowed Transverse Strip Seal Expansion Joint System**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Strip Seal System (Designated Name)</th>
<th>Movement</th>
<th>Allowed Installation Gap (in)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>D S Brown</td>
<td>SE-500</td>
<td>Parallel</td>
<td>3/4” x 3”</td>
<td></td>
</tr>
<tr>
<td>D S Brown</td>
<td>SE-400</td>
<td>Parallel</td>
<td>3/4” x 3”</td>
<td></td>
</tr>
<tr>
<td>Watson Bowman Acme</td>
<td>SE-300</td>
<td>Parallel</td>
<td>3/4” x 3”</td>
<td></td>
</tr>
<tr>
<td>Watson Bowman Acme</td>
<td>SE-200</td>
<td>Parallel</td>
<td>3/4” x 3”</td>
<td></td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

Expansion joint system shall be fabricated in one section, except for shaped construction and the length is over 20 feet. A complete joint generation groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. Expansion joint shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous piece without field splices. Factory splicing will be permitted for the expansion joint system. Anchors for the expansion joint system shall be in accordance with Sec 212.

Structural steel for the expansion joint system shall be ASTM A36 Grade 36 except the steel armor may be ASTM A572 Grade 50. Anchors for the expansion joint system shall be in accordance with Sec 212.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized steel in accordance with ASTM A653. Anchors need not be protected from corrosion.

Concrete shall be set with 2 nuts and washer (See Standard Specifications for Concrete). Proper consolidation of the concrete shall be achieved by localized overspray.

Proper consolidation of the concrete shall be achieved by localized overspray.

Proper consolidation of the concrete shall be achieved by localized overspray.

Proper consolidation of the concrete shall be achieved by localized overspray.

Proper consolidation of the concrete shall be achieved by localized overspray.

Longitudinal reinforcing steel shall be placed to that ends shall be 1” from the vertical leg of the steel armor at the expansion joint system.

Concrete shall be forced under and around steel armor and anchor bolts. Proper consolidation of the concrete shall be achieved by localised internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT Construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.
Standard Drawing Guidance (do not show on plans):
Modify drawing as necessary.

- Piece angle length to center of first slotted hole.
- Use squared, left advanced or right advanced Part Plan as needed.
- E = 3/4" (Min.) @ 60°. Verify only.
- D = 1 @ 60° + 1/2" upper lips + 3/4" (Min.)
  Verify only.
- Remove precast panel for CIP slab.

Alternate details for Type B barrier (SBC)
GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for welded construction and when the length is over 50 feet. A complete joint penetrations groove welded splice shall be required. Welds shall be ground flush to prevent a stress failure. The Expansion Joint System shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous piece without field splices. Field splicing will be permitted for proper consolidation of the concrete shall be achieved by localized grouting for anchor bolts.

Structural steel for the expansion joint system shall be ASTM A633 Grade 36 except the steel arm may be ASTM A572 Grade 50. Anchors for the Expansion Joint System shall be in accordance with Sec. 1037. The Structural Steel Expansion Joint System shall be in accordance with Sec. 212.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A618. Anchors need not be protected from exposure to conditions.

Longitudinal reinforcing steel shall be so placed that ends shall be from the vertical leg of the steel arm at the expansion joint system. Concrete shall be cured and stressed steel and anchor bolts shall be placed in accordance with Sec. 1204. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

Missouri DOT: Construction personnel will indicate the strip seal expansion joint system installed.

Steel arm may also be referred to as extrusion or rail.

Missouri DOT: Construction personnel will indicate the strip seal expansion joint system installed.

Steel arm may also be referred to as extrusion or rail.

GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for welded construction and when the length is over 50 feet. A complete joint penetrations groove welded splice shall be required. Welds shall be ground flush to prevent a stress failure. The Expansion Joint System shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous piece without field splices. Field splicing will be permitted for proper consolidation of the concrete shall be achieved by localized grouting for anchor bolts.

Structural steel for the expansion joint system shall be ASTM A633 Grade 36 except the steel arm may be ASTM A572 Grade 50. Anchors for the Expansion Joint System shall be in accordance with Sec. 1037. The Structural Steel Expansion Joint System shall be in accordance with Sec. 212.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A618. Anchors need not be protected from exposure to conditions.

Longitudinal reinforcing steel shall be so placed that ends shall be from the vertical leg of the steel arm at the expansion joint system. Concrete shall be cured and stressed steel and anchor bolts shall be placed in accordance with Sec. 1204. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

Missouri DOT: Construction personnel will indicate the strip seal expansion joint system installed.

Steel arm may also be referred to as extrusion or rail.

GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for welded construction and when the length is over 50 feet. A complete joint penetrations groove welded splice shall be required. Welds shall be ground flush to prevent a stress failure. The Expansion Joint System shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous piece without field splices. Field splicing will be permitted for proper consolidation of the concrete shall be achieved by localized grouting for anchor bolts.

Structural steel for the expansion joint system shall be ASTM A633 Grade 36 except the steel arm may be ASTM A572 Grade 50. Anchors for the Expansion Joint System shall be in accordance with Sec. 1037. The Structural Steel Expansion Joint System shall be in accordance with Sec. 212.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A618. Anchors need not be protected from exposure to conditions.

Longitudinal reinforcing steel shall be so placed that ends shall be from the vertical leg of the steel arm at the expansion joint system. Concrete shall be cured and stressed steel and anchor bolts shall be placed in accordance with Sec. 1204. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

Missouri DOT: Construction personnel will indicate the strip seal expansion joint system installed.

Steel arm may also be referred to as extrusion or rail.
Standard Drawing Guidance (do not show on plans):
Modify drawing as necessary.
Remove non-applicable rows in table.
A Piece angle length to center of first slotted hole.
B Use squared, left advanced or right advanced Part Plan as needed.
C = 3/4" (Min.) @ 60° Verify only.
D = 1 @ 60° + 1/2" upper lips + 3/4" (Min.)
Verify only.
E Remove precast panel for CIP slab.

Alternate details for Type B barrier (SBC)
GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A complete joint generation groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous plane without field splices. Factory splicing will be permitted for system lengths greater than 50 feet.

Structural steel for the expansion joint system shall be ASTM A992 Grade 50. Anchors for the expansion joint system shall be in accordance with Sec 191.

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer and may have a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized in accordance with ASTM A792. Anchors need not be protected from overspray.

Longitudinal reinforcing steel shall be placed so that ends shall be from the vertical leg of the steel arm at the expansion joint system.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.

Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by total bond internal vibration.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT construction personnel will indicate the strip seal expansion joint system installed.

Steel armor may also be referred to as extrusion or rail.
STRIP03_stl_end  Guidance & Alternate Details

Standard Drawing Guidance (do not show on plans):
Modify drawing as necessary.
Remove non-applicable rows in table.

- Use squared, left advanced or right advanced Part Plan as needed.
- Use 3' (Min.) @ 60° Verify only.
- Use 6' long angle for rehab bridge, modify angle length based on shop drawing or field check.
- Delete precast panel for CIP slab.

Include this detail on redecks & rehabs when slab thickness is less than 8".
If slab thickness + haunch to bear is less than 8" within the girder bays, a shorter armor may be used.

Alternate details for Type B barrier (SBC)
GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A complete joint generation groove welded splice shall be required. We do not recommend this connection for a direct concrete expansion joint system. The joint shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous piece without field splices. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

STEEL ARMOR:

Structural steel for the expansion joint system shall be ASTM A709 Grade 36 except the steel armor may be ASTM A709 Grade 50W. Anchors need not be protected from overspray. Anchors shall be field-drilled or field-reamed with 9/16"Ø hole in the top flange (Shop or field drill).

Proper consolidation of the concrete shall be achieved by localized internal vibration. Proper finishing of the concrete surface shall be maintained. The concrete shall be cured in accordance with ASTM C947. Anchors shall not be protected from overspray.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT (Construction personnel) will indicate the strip seal expansion joint system installed. Steel armor may also be referred to as extrusion or rail.

STRUCTURAL STEEL:

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized steel armor may also be referred to as extrusion or rail.

GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A complete joint generation groove welded splice shall be required. We do not recommend this connection for a direct concrete expansion joint system. The joint shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous piece without field splices. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

STEEL ARMOR:

Structural steel for the expansion joint system shall be ASTM A709 Grade 36 except the steel armor may be ASTM A709 Grade 50W. Anchors need not be protected from overspray. Anchors shall be field-drilled or field-reamed with 9/16"Ø hole in the top flange (Shop or field drill).

Proper consolidation of the concrete shall be achieved by localized internal vibration. Proper finishing of the concrete surface shall be maintained. The concrete shall be cured in accordance with ASTM C947. Anchors shall not be protected from overspray.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT (Construction personnel) will indicate the strip seal expansion joint system installed. Steel armor may also be referred to as extrusion or rail.

STRUCTURAL STEEL:

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized steel armor may also be referred to as extrusion or rail.

GENERAL NOTES:

Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A complete joint generation groove welded splice shall be required. We do not recommend this connection for a direct concrete expansion joint system. The joint shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continuous piece without field splices. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

STEEL ARMOR:

Structural steel for the expansion joint system shall be ASTM A709 Grade 36 except the steel armor may be ASTM A709 Grade 50W. Anchors need not be protected from overspray. Anchors shall be field-drilled or field-reamed with 9/16"Ø hole in the top flange (Shop or field drill).

Proper consolidation of the concrete shall be achieved by localized internal vibration. Proper finishing of the concrete surface shall be maintained. The concrete shall be cured in accordance with ASTM C947. Anchors shall not be protected from overspray.

The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

MoDOT (Construction personnel) will indicate the strip seal expansion joint system installed. Steel armor may also be referred to as extrusion or rail.

STRUCTURAL STEEL:

Structural steel for the expansion joint system shall be coated with a minimum of two coats of inorganic zinc primer to provide a total dry film thickness of 4 mils minimum, 6 mils maximum, or galvanized steel armor may also be referred to as extrusion or rail.
Standard Drawing Guidance (do not show on plans):

- Modify drawing as necessary.
- Remove non-applicable rows in table.
- Dimension to clear bearing stiffener (3 1/2" Min.). For rehab bridge, dimension should be based on shop drawing or field check.
- Use 3". For rehab bridge, dimension should be based on shop drawing or field check.
- Use squared, left advanced or right advanced Part Plan as needed.
- A Dimension to clear bearing stiffener (1 1/2" Min.). For rehab bridge, dimension should be based on shop drawing or field check.
- Use 3" for rehab bridge. Dimension should be based on shop drawing or field check.
- Use squared, left advanced or right advanced Part Plan as needed.
- D = 3/4" (Min.) Verify only.
- E = 1 @ 60° + 1/2" upper lips + 3/4" (Min.) Verify only.
- F = Use 6" long angle. For rehab bridge, modify angle length based on shop drawing or field check.
- Delete precast panel for CIP slab.

Alternate details for Type B barrier (SBC)

PART PLAN

Left Advanced

PART PLAN

Right Advanced
General Notes:

1. Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A complete joint generation group would be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed in the crown and grade of the roadway.

2. Strip seal gland shall be installed in joints in one continuous piece without field splices. Factory splicing will be permitted for joints in excess of 50 feet.

3. Structural steel for the expansion joint system shall be ASTM A36. Grade 50 steel may be used for the expansion joint system in accordance with Sec. 1010. Stirrup expansion joints shall be in accordance with Sec. 1016.

4. Structural steel for the expansion joint system shall be coated with a minimum of two coats of high-quality primer to provide a total dry-film thickness of 2 mils minimum. The steel shall be galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

5. Transverse reinforcing steel shall be placed in place to prevent vertical movement of the steel armor at the expansion joint system.

6. Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by localized internal vibration.

7. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

8. MoDOT construction personnel will indicate the strip seal expansion joint system installed. Steel armor may be referred to as extraction or rail. Steel armor is not indicated for use in expansion joints. The strip seal gland shall be installed in joints in one continuous piece without field splices. Factory splicing will be permitted for joints in excess of 50 feet.

9. Expansion joint system shall be fabricated in one section, except for staged construction and when the length is over 50 feet. A complete joint generation group would be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed in the crown and grade of the roadway.

10. Strip seal gland shall be installed in joints in one continuous piece without field splices. Factory splicing will be permitted for joints in excess of 50 feet.

11. Structural steel for the expansion joint system shall be ASTM A36. Grade 50 steel may be used for the expansion joint system in accordance with Sec. 1010. Stirrup expansion joints shall be in accordance with Sec. 1016.

12. Structural steel for the expansion joint system shall be coated with a minimum of two coats of high-quality primer to provide a total dry-film thickness of 2 mils minimum. The steel shall be galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

13. Transverse reinforcing steel shall be placed in place to prevent vertical movement of the steel armor at the expansion joint system.

14. Concrete shall be placed under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by localized internal vibration.

15. The installation temperature shall be taken as the actual air temperature averaged over the 24-hour period immediately preceding installation.

16. MoDOT construction personnel will indicate the strip seal expansion joint system installed. Steel armor may be referred to as extraction or rail. Steel armor is not indicated for use in expansion joints. The strip seal gland shall be installed in joints in one continuous piece without field splices. Factory splicing will be permitted for joints in excess of 50 feet.
Standard Drawing Guidance (do not show on plans):
Modify drawing as necessary.
Remove non-applicable rows in table.

1. Piece angle length to center of first slotted hole.
2. Dimensions to clear bearing stiffener (2 1/2" Min.). For rehab bridge, dimension should be based on shop drawing or field check.
3. Use 2" for rehab bridge; dimension should be based on shop drawing or field check.
4. Use Square, Right Advanced or Left Advanced Part Plan as needed.
5. Use 3/4" (Min.) @ 60° Verify only.
6. @ 60° - 1/2" upper lips
   + 2 x 3/4" (Min.)
   Verify only.
7. Use 6" long angle. For rehab bridge, modify angle length based on shop drawing or field check.
8. Delete precast panel for CIP slab.

Alternate details for Type B barrier (SBC)
All piling shall be driven to a minimum nominal axial compressive resistance which the contractor may obtain from the Commission. The contractor assumes all risks it may encounter in constructing this project. The Commission does not represent or warrant that any such boring data accurately depicts the factual records of subsurface data and investigations performed by the department for the design of the project. The locations of all subsurface borings for this structure are shown on the plan sheet(s) for this project. Notice and Disclaimer Regarding Boring Log Data

Bolts:
- All bolts shall be ASTM F3123 Grade A25 Type 3, except as noted.
- All ASTM A327 bolts and their accompanying hex nuts and washers and all ASTM A492 Type A bolts and their accompanying hex nuts shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.

Structural Steel:
- All structural steel shall be ASTM A709 Grade 50 except piles, sway bracing, thrie beam rail assembly and structural tubing. Structural tubing cladding shall be in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 36 in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 50W in accordance with Sec 758.

- All ASTM A307 bolts and their accompanying hex nuts and washers shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.
- All bolts shall be ASTM F3125 Grade A325 Type 3, except as noted.

Bolts:
- All bolts shall be ASTM F3123 Grade A25 Type 3, except as noted.
- All ASTM A327 bolts and their accompanying hex nuts and washers and all ASTM A492 Type A bolts and their accompanying hex nuts shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.

Structural Steel:
- All structural steel shall be ASTM A709 Grade 50 except piles, sway bracing, thrie beam rail assembly and structural tubing. Structural tubing cladding shall be in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 36 in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 50W in accordance with Sec 758.

- All ASTM A307 bolts and their accompanying hex nuts and washers shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.
- All bolts shall be ASTM F3125 Grade A325 Type 3, except as noted.

Bolts:
- All bolts shall be ASTM F3123 Grade A25 Type 3, except as noted.
- All ASTM A327 bolts and their accompanying hex nuts and washers and all ASTM A492 Type A bolts and their accompanying hex nuts shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.

Structural Steel:
- All structural steel shall be ASTM A709 Grade 50 except piles, sway bracing, thrie beam rail assembly and structural tubing. Structural tubing cladding shall be in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 36 in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 50W in accordance with Sec 758.

- All ASTM A307 bolts and their accompanying hex nuts and washers shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.
- All bolts shall be ASTM F3125 Grade A325 Type 3, except as noted.

Bolts:
- All bolts shall be ASTM F3123 Grade A25 Type 3, except as noted.
- All ASTM A327 bolts and their accompanying hex nuts and washers and all ASTM A492 Type A bolts and their accompanying hex nuts shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.

Structural Steel:
- All structural steel shall be ASTM A709 Grade 50 except piles, sway bracing, thrie beam rail assembly and structural tubing. Structural tubing cladding shall be in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 36 in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 50W in accordance with Sec 758.

- All ASTM A307 bolts and their accompanying hex nuts and washers shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.
- All bolts shall be ASTM F3125 Grade A325 Type 3, except as noted.

Bolts:
- All bolts shall be ASTM F3123 Grade A25 Type 3, except as noted.
- All ASTM A327 bolts and their accompanying hex nuts and washers and all ASTM A492 Type A bolts and their accompanying hex nuts shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.

Structural Steel:
- All structural steel shall be ASTM A709 Grade 50 except piles, sway bracing, thrie beam rail assembly and structural tubing. Structural tubing cladding shall be in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 36 in accordance with Sec 758.
- All structural steel shall be ASTM A709 Grade 50W in accordance with Sec 758.

- All ASTM A307 bolts and their accompanying hex nuts and washers shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.
- All bolts shall be ASTM F3125 Grade A325 Type 3, except as noted.
Steel bridge flooring shall be Foster 5-Inch RB/8.2M open steel bridge flooring or equivalent. Trim bars will be required at the sides and ends of each 23'-10" unit.

Cross bars of steel grid floor are not shown for clarity.

Note: This drawing is not to scale. Follow dimensions.
State: Missouri

Department of Transportation

July 2020

Effective: July 2020

Supersedes: March 2018

ETM4 Rail Sht

General Notes:


Guardrail delimiters shall be attached to the top of the guardrail and shall be the same design as the Missouri Guardrail Post and Plate, except the Missouri Guardrail Post shall be modified to accept the rail using galvanized construction and Missouri Guardrail Post shall be required to be used. Standard Missouri Guardrail Post options will be provided. The plates shall be fastened to the rail with two 5/8-inch bolts on both sides. All bolts must be galvanized. The plates shall be considered completely covered by the contract unit price for other items.

- All bolts, nuts, washers and plates will be considered completely covered by the contract unit price for other items.
- All steel connecting bolts and fasteners for posts and railing will be considered completely covered by the contract unit price for other items.
- Protective coating and material requirement of steel railing shall be in accordance with Section 509.36.
- Rail posts shall be set perpendicular to roadway profile grade vertically in centerline as shown.
- The plate shall be placed on the post at the point of installation. The plate shall be placed at the top of the post, per plan. The plate shall be verified by the contractor before final adjustment. The plate shall be set at the required position and will be considered completely covered by the contract unit price for other items.

- At the expansion slots in the thrie beam and channels, the bolts shall be tightened and backed off one half turn and the threads shall be purged.
- At the thrie beam connection to posts on wings, the bolts shall be tightened and backed off one half turn and the threads shall be purged.
- Minimum length of thrie beam sections is equal to one post space.
- Thrie beam guardrail on the bridge shall be 12 gage steel.
- Posts, top plates, base plates, channels and channel splice plates shall be fabricated from 5160 steel and galvanized.
- A 5/8-inch diameter button head, oval shoulder bolt with a minimum 3/4-inch thick nut shall be used at all post bolts between the post and the thrie beam rail.
- Flare washers shall be 5/16 x 1/4 x 1-inch minimum, shall be used at all post bolts between the bolt head and beam. The washers shall be placed at any slot or when necessary of such design as to fit the thrie beam rail.
- Slotted holes shall be used at all post bolts between the bolt head and beam. The washers shall be placed at any slot or when necessary of such design as to fit the thrie beam rail.
- All bolts, nuts, washers and plates will be considered completely covered by the contract unit price for other items.
- Fabrication of structural steel shall be in accordance with Section 1080.

- Slotted holes shall be used at all post bolts between the bolt head and beam. The washers shall be placed at any slot or when necessary of such design as to fit the thrie beam rail.
- All bolts, nuts, washers and plates will be considered completely covered by the contract unit price for other items.
- Fabrication of structural steel shall be in accordance with Section 1080.

Note: This drawing is not to scale, follow dimensions.
**Cap Rail Angle**

**Splice Plate**

**Cap Rail**

**W6x20 Post**

**ELEVATION OF TYPICAL SPLICE**

**ELEVATION OF RAIL POST CONNECTION**

**ELEVATION OF EXPANSION SPLICE**

**PLAN OF TYPICAL SPLICE**

**PLAN OF RAIL POST CONNECTION**

**PLAN OF EXPANSION SPLICE**

**PLAN A-A**

**CAP RAIL ANGLE**

**SPLICE PLATE**

**EXPANSION SPLICE PLATE**

**OPTIONAL SPLICE**

One shop or field splice per panel may be provided at any location.

Note: This drawing is not to scale. Follow dimensions.
THREE BEAM RAIL SPlice

 expansion spacings in the three beam rail shall be made at either the first or second post on either side of the joint and on the ends of the thrie beam rail. Expansion spacings in the cap rail shall be provided in the three beam rail for connection to the thrie beam rail for movement.

In addition to the expansion provisions at the expansion joint, expansion splices in the thrie beam rail and the channel shall be provided at all post locations so that the maximum length without expansion provisions goes beyond six feet at any location. Shims plates 6 x 6 x 1/2-inch may be used between the top of the post and the channel member as required for vertical alignment.

Shim plates shall be galvanized after fabrication.

Contractor shall verify all dimensions in field before ordering materials.

Outline of existing work is indicated by light dashed lines. Major lines include new work.
Standard Drawing Guidance (do not show on plans):

This system meets NCHRP 350 TL-3 bridge railing requirements.

Max. post spacing = 6' 3"

Design weight of 12-gauge thrie beam bridge rail equals 35 lb/lf.

1 For 22 thru 31-inch voided slab depth, use 10 inches from top of original slab plus overlay depth. For 20-inch voided slab depth, reduce to 8 inches plus overlay depth.

2 Remove and show total of 2' 6 5/8" plus overlay depth; give total depth of slab plus overlay depth.
The drawing shows the details for the installation of thrie beam guardrail on a bridge. It includes information on the connection between the thrie beams, the posts, and the rails. The drawing specifies the use of high-visibility paint, retroreflective sheeting, and the type of bolts and washers to be used. It also notes that the guardrail shall be galvanized after fabrication and protected against corrosion. The drawing provides dimensions and notes on the installation process, including the alignment and adjustment of the posts and rails.
POST-TO-BENT PLATE CONNECTION

1. 2" Ø Holes in both upper post flanges
2. 1/8" Hole in washer plate, inside lower post flange and both bent plates
3. One shop or field splice per panel may be provided at any location.

SECTION C-C

ELEVATION OF TYPICAL SPLICE

ELEVATION OF RAIL POST CONNECTION

PLAN OF RAIL POST CONNECTION

OPTIONAL SPLICE

Expansion slots shall be on the same side of post as the expansion joint.

PLAN OF EXPANSION SPLICE

Shim plates 6 x 3 x 3/16-inch may be used between the W6x20 post and 1/2-inch bent plate connection as required for horizontal alignment. Shim plates may vary in thickness from 1/16-inch to the thickness required, and may be used in multiples. Shim plates shall be galvanized after fabrication.

EXPANSION SPLICE PLATE

DISTRICT

MISSOURI HIGHWAYS AND TRANSPORTATION

ROUTE

10/17/2023

DATE PREPARED

PROJECT NO.

BRIDGE NO.

SHEET NO.

1-888-ASK-MODOT (1-888-275-6636)
GENERAL NOTES:

- Design Specifications: 2002 ASHRAE LFD (17th Ed.)
- Standard Specifications

Guardrail delineators shall be attached to the top of the guardrail and the thrie beam at the bridge ends and each 6 to 8 foot section. The delineator body shall be to the top of the guardrail and the thrie beam and within 2 to 4 inches of the guardrail.

The Missouri Standard Plan 606.00 delineators in bridge guardrails shall be used. See Missouri Standard Plan 606.00 for design and production specs of delineator.

Contractor shall verify all dimensions in field before ordering materials.

Shim plates shall be galvanized after fabrication.

All steel connecting bolts and fasteners for posts and channels, bent plates, blockouts, rail, and railing shall be galvanized. See Missouri Standard Plan 606.00 for details not shown.

See Missouri Standard Plan 604.00 for details not shown.

General Notes:

- Design Specifications: 2002 ASHRAE LFD (17th Ed.)
- Standard Specifications

Guardrail delineators shall be attached to the top of the guardrail and the thrie beam at the bridge ends and each 6 to 8 foot section. The delineator body shall be to the top of the guardrail and the thrie beam and within 2 to 4 inches of the guardrail.

The Missouri Standard Plan 606.00 delineators in bridge guardrails shall be used. See Missouri Standard Plan 606.00 for design and production specs of delineator.

Contractor shall verify all dimensions in field before ordering materials.

Shim plates shall be galvanized after fabrication.

All steel connecting bolts and fasteners for posts and channels, bent plates, blockouts, rail, and railing shall be galvanized. See Missouri Standard Plan 606.00 for details not shown.

See Missouri Standard Plan 604.00 for details not shown.
Standard Drawing Guidance (do not show on plans):

This system meets NCHRP 350 TL-3 bridge railing requirements.

Max. post spacing = 6'-3"

If slab cantilever length exceeds 6", consideration shall be given to:
(with the result that anchorage into slab lies in the cantilever part of slab)

(1) Anchorage into cantilever portion of slab provided original slab thickness allows for min. embedment & 1" cover (check negative moment in cantilever).

(2) Extending bent plate (within reason).

(3) Alternating method of attachment, i.e. System 1 or System 3 types and variations thereof, Consult Structural Project Manager.
THRIE4b_system4_details  Guidance

Standard Drawing Guidance (do not show on plans):
1. Remove these details when this sheet is used in combination with drawing THRIE 4D, and use 15/16" for diameter of the bottom two holes in the Details of Post.

2. Replace with below notes when this sheet is used in combination with drawing THRIE 4D.

- 1"Ø ASTM F3125 Grade A325 Type 1 Bolts with hex nuts and hardened loc washers
- 1 1/8"Ø Drilled Holes in slab
- 1 1/4"Ø Holes in bent plate and bearing plate
Standard Drawing Guidance (do not show on plans):

When a latex, low slump or silica fume concrete overlay is used, add these details.
Standard Drawing Guidance (do not show on plans):

1. Modify as required.

TL-4 (NCHRP 350) bridge rail is typically used on spread box beam bridges and may be used on adjacent box beam bridges where reinforcement is embedded in the beam.

Use only in certain applications because of cost. Acceptable for use when roadway width or site distance is a concern. Curb shall be used to prevent drainage over deck.
### Bridge Anchor Section

- **Effective:** July 2020
- **Supersedes:** Feb. 2014

**Plan:**
- **First Post for Bridge Anchor Section:**
  - 3'-0" (Max.)

**Detail A**
- **Part Elevation of Bridge Anchor Section**
- **Slotted Holes:**
  - 4" x 12"

**Connection Angle Details**
- Install angles to rail caps using 7/8" Ø washers and self-locking nuts or nuts and jam nuts.
- Drill and tap 3 holes for 7/8" Ø ASTM F3125 Grade A325 Type 1 bolts and nuts.
- Four 1" Ø holes for 7/8" Ø ASTM F3125 Grade A325 Type 1 bolts and nuts.

**Guardrail Connection Plate Assembly Details**
- Drill and tap 3 holes for 7/8" Ø ASTM F3125 Grade A325 Type 1 bolts.
- Four 1" Ø holes for 7/8" Ø ASTM F3125 Grade A325 Type 1 bolts and nuts.

**TERMINAL CONNECTOR**
- 1 1/2" long post bolt 5 bolts

**Note:** This drawing is not to scale, follow dimensions.

**Schematic Diagrams:**
- **Section A-A**
  - Section thru Slat Showing Left Bridge Rail
- **Section B-B**
  - Terminal Connection
- **Section C-C**
  - Transition Plate
- **Section Thru Thrie Beam Rail**
- **Part Section Thru Slab Showing Left Bridge Rail**
  - Right Bridge Rail Similar

**Key Points:**
- Bridge anchor section shall be in accordance with Missouri Standard Plan 65C 32 except bearing plate and connector plate will not be required.

**Scale:**
- This drawing is not to scale, follow dimensions.

**Date Prepared:** 10/17/2023

**Contact:**
- MO DOT
- Contract No.
- Sheet No.
- Job No.
- County
- District
- Sheet No. of

**Additional Information:**
- Made by:
- Made on:
- Sheet No.:
- Part No.
- Job No.
- District
- County
- Description
- Date Prepared
- Project No.
- Bridge No.
- Project No.
- Contract ID.
- Date Prepared
- Title
- MO DOT: 1-888-ASK-MODOT (1-888-275-6636)
TL-4 (NCHRP 350) bridge rail is typically used on spread box beam bridges and may be used on adjacent box beam bridges where reinforcement is embedded in the beam.

Use only in certain applications because of cost. Acceptable for use when roadway width or site distance is a concern. Curb shall be used to prevent drainage over deck.
Note: This drawing is not to scale. Follow dimensions.
Bridge Rail Notes:
- Rail posts shall be set perpendicular to roadway profile grade, vertically in cross section and aligned in accordance with Sec 112, except that the rail posts shall be aligned by the use of 6 1/2 x 2 1/2-inch shims such that the post deviates not more than 1/16 inch from true horizontal alignment after final adjustment. The thickness of the shims shall be determined by the contractor and verified by the engineer before ordering material for this work.
- Rail posts shall be set plumb and aligned in accordance with Sec 112.
- Payment for furnishing all materials and labor necessary to install bridge rail, completely in place, will be considered completely covered by the contract unit price for Bridge Rail (Two Tube Structural Steel) per linear foot.

Guardrail delineators shall be attached to the top of the guardrail post using galvanized anchorages as shown on Missouri Standard Plan 606.50 and in accordance with Sec 606. Delimiters on bridge decks with two lanes, two-way traffic shall be mounted in the middle. Delimiters will be considered completely covered by the contract unit price for Bridge Rail (Two Tube Structural Steel).

HSS = Hollow Structural Section

Dimensions of bridge rails are measured horizontally. Bridge rails will be measured to the nearest linear foot for each structure measured from end of wing to end of wing.

Fabrication of structural steel shall be in accordance with Sec 1000.


dont know the end of the text
PART PLAN SHOWING
JOINT LOCATION

(For skewed structures only)
Modify Elevation below as necessary. Elevation shown is scaled down 0.25 from full size.

ELEVATION OF LEFT CURB AND RAIL

Bridge Approach Transition not shown for clarity (Roadway item)

PART ELEVATION SHOWING END OF RAIL ON WING

Roadway Approach Transition not shown for clarity (Roadway item)

PART PLAN OF LEFT CURB AT END BENTS SHOWING REINFORCEMENT

Roadway Approach Transition not shown for clarity

38-INCH TWO-TUBE RAIL

Note: Work this sheet with Sheet No. 8.
TTR05 Guidance & Alternate Details

Standard Drawing Guidance (Do not show on plans)

- Large skew may require additional R1 bars.
- 6' min., 12' max. to avoid anchor bolts by 1' min.

Use for shallow superstructure where 27' embedment is not possible. (Shape 6 with E=12')

Post spacing guidance:

<table>
<thead>
<tr>
<th></th>
<th>3' (Min.)</th>
<th>6' (Typ.)</th>
<th>12' (Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT END BENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End of Wing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION A-A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Copy and paste this detail to Bridge Approach Slab sheet to replace Section Between Curb and Barrier. This detail is scaled to match the scale of the MAJOR Bridge Approach Slab sheets.

SECTION BETWEEN CURBS

Copy and paste this detail to Bridge Approach Slab sheet to replace Section Between Curb and Barrier. This detail is scaled to match the scale of the MINOR Bridge Approach Slab sheet.
Standard Drawing Guidance

(Do not show on plans)

Remove details that do not apply.

Revising for skewed end bent is not necessary or required unless unusual details of drainage need to be shown.

For end bents with intermediate wing, see Bridge Standard Drawing sheet DRAIN03.

Several solutions:

A. Provide a drain flume consistent with 609.40.

B. Extend the drain to the toe of slope using the following note (or similar) added to the general notes:

The unperforated drain pipe shall be extended parallel to the slope at a depth of 30 inches until the drain discharges onto rock blanket or the ditch line.

C. Add a detail showing the drain extension.

General Notes:

All drain pipe shall be sloped 1 to 2 percent.

Drain pipe may be either 6-inch diameter corrugated metallic-coated steel pipe, 4-inch diameter perforated chlorinated polyvinyl chloride (CPVC) drain pipe, or 4-inch diameter corrugated polyethylene (PE) drain pipe.

Drain pipe shall be placed at fill face of end bent and inside face of wings. The pipe shall be placed at least six inches below the bottom of the bent.

Perforated pipe shall be placed at fill face side and inside face of wings at the bottom of end bent and pipe shall extend the horizontal length to ensure that the vertical drain ends to the exit at ground line.

Detailed

Checked

Note: This drawing is not to scale. Follow dimensions.

Sheet No.

000

V(DRA01_i)

Effective: Apr. 2020

Supersedes: Aug. 2016 (DRAIN01)
Standard Drawing Guidance

(Do not show on plans)

Remove details that do not apply.

Revising for skewed end bent is not necessary nor required unless unusual details of drainage need to be shown.

If the drain pipe discharges onto soil, front or side slope (Case 3 and Case 4), standard plan 609.40, and discharges at greater than 20 feet above the toe of slope, the possible erosion of the slope should be considered, and prevention coordinated with the district.

Possible solutions:

A. Provide a drain flume consistent with 609.40.
B. Extend the drain to the toe of slope using the following note (or similar) added to the general notes:

The unperforated drain pipe shall be extended parallel to the slope at a depth of 30 inches until the drain discharges into rock blanket or ditch flowline.
C. Add a detail showing the drain extension.

General Notes:

All drain pipe shall be sloped 1 to 2 percent.

Drain pipe may be either 6 inch diameter corrugated metallic-coated steel pipe underdrain, 4 inch diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4 inch diameter corrugated polyethylene (PE) drain pipe.

Drain pipe shall be placed in fill face of end bent and inside face of wings. The pipe shall discharge onto rock blanket or the ditch flowline. The pipe shall not discharge on or near the lower beam of end bent by a minimum of 1 1/2 inches.

Perforated pipe shall be placed at fill face side and inside face of wings at the bottom of end bent, and plain pipe shall be used where the vertical drain ends to the exit at ground line.
Alternate Details

USE FOR TYPE H OR B (SBC)

USE FOR TYPE B BARRIER (SBC)
**Standard Drawing Guidance**

(Do not show on plans)

Remove details that do not apply.

Revising for skewed end bent is not necessary or required unless unusual details of drainage need to be shown.

If the drain pipe discharges onto soil, front or side slope (Case 3 and 4 of Standard Plan 609.40), and discharges at greater than 20 feet above the toe of slope, then the possible erosion of the slope should be considered and prevention coordinated with the district.

Possible solutions:

A. Provide a drain flume consistent with 609.40.
B. Extend the drain to the toe of slope using the following note (or similar) added to the general notes:
   - The unperforated drain pipe shall be extended parallel to the side at a depth of 30 inches until the drain discharges onto rock blanket or the ditch flowline.
C. Add a detail showing the drain extension.

**General Notes:**

All drain pipe shall be sloped 1 to 2 percent.

Drain pipe may be any 12-inch diameter corrugated metallic-coated steel pipe, 6-inch diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4-inch diameter corrugated polyethylene (PE) drain pipe.

Drain pipe shall be placed at fill face of end bent and inside face of wing. This pipe shall also exist the lower beam of end bent by a minimum of 3 1/2 inches.

Perforated pipe shall be placed at fill face side and inside face of wing at the bottom of end bent and pipe pipe shall be used where the vertical drain end to the exit at ground line.

**ELEVATION OF WING**

**ELEVATION OF END BENT**

**PART SECTION A-A**

**PART PLAN**

**OPTIONAL TURNED DRAIN**

(Use only when straight drain is not practical.)

**DETAIL A**

**VERTICAL DRAIN AT END BENTS**

(Section thru wing similar)
**ELEVATION OF WING**

**USE FOR TYPE H OR B (SBC)**

- Ground Line
- Lower Beam
- Cut coupler flush with ground line
- Cap
- Detail A
- Vertical Drain Core
- Ground Line
- Elbow

**ELEVATION OF END BENT**

**USE FOR TYPE B BARRIER (SBC)**

- 3" Joint Filler
- Vertical Drain Core (Along wing) (Typ.)
- Unperforated Drain Pipe
- Perforated Drain Pipe

**USE FOR TYPE H OR B (SBC)**

- USE FOR TYPE H OR B (SBC)