Concrete Bridge Approach Pavements:
A Survey of State Practices

Prepared for
Wisconsin Highway Research Program
Rigid Pavements Technical Oversight Committee

Prepared by
CTC & Associates LLC
WisDOT Research & Library Unit
January 15, 2010

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Request for Report

Many state DOTs use concrete slabs to connect the decks of bridges with adjoining roadways. These approaches are meant to provide a smooth transition from roadway to deck. However, the settlement of embankments supporting these slabs can lead to their cracking, as well as the failure of the expansion joints connecting them to roadway pavements.

The Rigid Pavements Technical Oversight Committee of the Wisconsin Highway Research Program is interested in other states’ experiences with cracking and expansion joint failure in concrete bridge approach pavements.

Summary

We conducted a brief survey of state DOTs consisting of the following questions:

1. What problems has your state experienced with cracking of concrete approach slabs adjacent to skewed bridge decks?
2. Have you had instances of expansion joint failure at concrete approach slabs, and if so, to what extent?
3. Could you please attach or provide a link to your agency’s designs or specifications on concrete bridge approach pavements?
4. What is the name, phone number and e-mail address of the appropriate person in your agency to talk to about this topic?

Eighteen state DOTs responded to the survey. See Survey Results beginning on page 2 of this report for the full text of these survey responses. State specifications provided by survey respondents are included in Appendices A through K.
Key findings from the survey follow.

- Of 18 respondents, 17 use concrete approach slabs and one (Maryland) does not.
- Of those agencies using approach slabs, 14 (82 percent) reported problems with cracking, two (12 percent) had no problems, and one (6 percent) could not say because of difficulties with inspection.
- Of 14 agencies reporting cracking, eight (57 percent) reported problems in the acute corners of skewed approach slabs, and six (43 percent) said the cracking problem was the same for skewed and nonskewed bridges. Three of 14 agencies (21 percent) said that cracking was a minor problem, and five (36 percent) reported settling or erosion of underlying subgrade soils beneath slabs as a possible cause of cracking.
- Of 17 agencies using approach slabs, 13 (76 percent) use expansion joints. For those agencies using expansion joints, 12 (92 percent) had a problem with joint failure and one (8 percent) did not. For the 12 agencies with expansion joint problems, three (25 percent) reported this failure as uncommon and two (17 percent) as not attributable to approach slabs specifically.

Survey Results
The full text of each survey response is provided below. For reference, we have included an abbreviated version of each question before the response; for the full question text, please see the Summary on page 1 of this report.

Alaska
Contact: Design: Elmer Marx, Alaska Department of Transportation and Public Facilities, (907) 465-6941, elmer.marx@alaska.gov; Inspection: Drew Sielbach, Alaska Department of Transportation and Public Facilities, (907) 465-6942, drew.sielbach@alaska.gov.

1. Problems with cracking: Alaska typically overlays the approach slabs with asphalt, making a direct visual observation impossible. Cracking of asphalt in the acute areas has been observed at several locations.

2. Expansion joint failure:

   In-House Design Practices
   - Alaska rigidly attaches the approach slab to the abutment backwall with no expansion joint present.
   - Alaska uses flexible pavements on the approach roadway. No expansion joint is provided at the interface of the flexible pavement with the approach slab. The asphalt at this location typically cracks.

   Contractor Design/Build
   Several bridges were designed attaching the approach slab to the abutment backwall with a dowel, which allowed 3/4" movement. The compression seals installed at this location are loose, with some sections missing.

3. Designs or specifications: See Appendix A.

Arkansas
Contact: Glenn Cheatham, Arkansas State Highway and Transportation Department, (501) 569-2466, Glenn.Cheatham@arkansashighways.com.

1. Problems with cracking: The concrete approach slab used for transitioning from roadway to bridge has always been a problem in AR. Whether from poor compaction at the bridge end or from material washing out from under the slab, our slabs are typically cracked or settled. Many have asphalt overlays placed to repair the bump at the end of the roadway. Similar problems occur whether square or skewed. I have not noticed skewed being any worse than square. See pictures of a typical problem in AR in Appendix B.

2. Expansion joint failure: Yes. The expansion joint material does not last very long. Incompressibles get in the joints, causing edge spalls and cracks in the approach slabs.
3. Designs or specifications: A List of Standard Bridge Drawings, including approach slabs and gutters, can be viewed at http://www.arkansashighways.com/bridge_division/list_standard_drawings.aspx.

Colorado

1. Problems with cracking: We have experienced cracking with skewed and nonskewed bridge decks. This may be caused by the materials, construction or approach slab design. The cracking of skewed concrete approach slabs is also caused by:
   - Thermal load—the load will result in a gap at the corner having an obtuse angle with the approach slab and acute angle with the bridge deck. Water flowing through this gap causes settlement of the approach slab.
   - The skew angle of the approach slab, which results in an uneven distribution of slab moment due to live load.

2. Expansion joint failure: Yes. There are many instances of failure for 0-4" expansion joints. The main cause is the lack of consolidation of concrete behind the expansion joints. We have also had failures due to snowplows catching the edge of expansion joints and ripping them out, because the contractor didn’t follow directions and recessed the expansion joint 1/8" below the deck surface. Failures have also been noted for 0-2" asphaltic plug joints when they have been used in curved bridges, steep inclines or poor installations.

3. Designs or specifications: See Appendix C.

Florida
Contact: Andre Pavlov, Florida DOT, (850) 921-7111, Andre.Pavlov@dot.state.fl.us.

1. Problems with cracking: No problems.

2. Expansion joint failure: No failures.

3. Designs or specifications: See Appendix D.

Indiana
Contact: David Andrews, Indiana DOT, (317) 232-5452, dandrews@indot.in.gov.

1. Problems with cracking: We have seen cracking in the corners of approach slabs.

2. Expansion joint failure: Occasionally we have seen expansion joint failure at the approach slabs but it has not normally been attributed to the approach slab condition.

3. Designs or specifications: See Appendix E.

Iowa
Contact: Scott Neubauer, Iowa DOT, (515) 239-1290, scott.neubauer@dot.iowa.gov.

1. Problems with cracking: We have not documented approach issues with relation to skew. We do not see obvious issues related to skew. We have cracking in the bridge approach slabs due to settlement. It is common for a dip to develop about 20' to 30' from the abutment. We have recently used flooding during placement of the granular fill behind abutments to try to reduce the settlement.

2. Expansion joint failure: We have approach slabs that have dropped because the abutment paving notch/corbel failed or there was fill material on the paving notch/corbel when the approach was placed and the fill washed away, allowing the slab to drop. We recently updated our approach standard to address these issues. I am unclear as to what you are calling joint failure.

**Kansas**
Contact: Andrew Gisi, Kansas DOT, (785) 291-3856, andrew.gisi@ksdot.org.

1. **Problems with cracking:** We experience cracking in the bridge approach slabs regardless of the angle of the bridge end to the roadway. The reason for the cracking is loss of support under the approach slab due either to erosion or settlement of subgrade soil. Our bridges are founded on rock or piles, which makes them a fixed object. Our pavements are founded on compressible soil, which makes them a movable object. The result is settlement in the embankment soils and a void created below the pavement. This causes the approach slab to crack.

2. **Expansion joint failure:** The 4" joint approximately 30' from the EWS will generally close up and maintenance forces will have to reconstruct.

3. **Designs or specifications:** [http://kart.ksdot.org/](http://kart.ksdot.org/); click on “KDOT Standard Drawings” and look at RD 711-715. [A free account is required to view the standards.]

**Kentucky**
Contact: Jamie Bewley Byrd, State Highway Engineer’s Office, (502) 564-3730 ext. 3128, Jamie.Bewley@ky.gov.

1. **Problems with cracking:** We have gone to using buried approach slabs to allow for easier wedging of pavements at bridge ends. Inspections for cracking would be difficult.

2. **Expansion joint failure:** We generally use integral end bents with buried approach slabs, and so expansion joint devices are not used.

3. **Designs or specifications:** See [Appendix F](#).

**Louisiana**
Contact: Jenan Nakhleh, Louisiana Department of Transportation & Development, (225) 379-1061, Jenan.Nakhleh@la.gov.

1. **Problems with cracking:** Some problems we have had with skewed approach slabs would be cracking near the sharp corners of the slab.

2. **Expansion joint failure:** We have had the usual joint failure due to pavement growth. That is a continuous maintenance issue.

3. **Designs or specifications:** Our current detail for a skewed approach slab is to have the far end normal to the center line of the bridge with the shorter side not less than 12 feet long.

**Maryland**
Contact: Jeff Robert, Maryland State Highway Administration, (410) 545-8327, jrobert@sha.state.md.us.

1. **Problems with cracking:** The Maryland State Highway Administration does not use concrete approach slabs.

2. **Expansion joint failure:** N/A.

3. **Designs or specifications:** N/A.
Minnesota
Contact: Paul Rowekamp, Minnesota DOT, (651) 366-4484, Paul.rowekamp@state.mn.us.

1. **Problems with cracking:** Cracking in the acute corner of the adjoining approach slab.
2. **Expansion joint failure:** Yes, especially since we’ve built more integral abutment bridges. Our existing joint sealers aren’t performing well with the wide openings we have at the end of integral abutment bridges with the approach panels tied to the bridge.
3. **Designs or specifications:** See Appendix G.

Mississippi
Contact: John Vance, Mississippi DOT, (601) 359-7111, jvance@mdot.state.ms.us.

1. **Problems with cracking:** The problems that we are having include hard-to-get compaction and the slabs tending to drop when the material underneath settles; we do have cracking in many approach slabs but not associated with skewed bridges (acute angle breaks).
2. **Expansion joint failure:** We have experienced joint failures causing undermining of the slab. This does not happen on what I would call a common basis. The approach slab joints (on paving brackets) are generally not a big problem. The approach slabs have on several occasions tended to migrate away from the end walls. We have a much bigger problem with the joints between the end walls and bridge decks.
3. **Designs or specifications:** See Appendix H.

Missouri
Contact: Gregory Sanders, Missouri DOT, (573) 526-0245, gregory.sanders@modot.mo.gov.

1. **Problems with cracking:** Our reinforced bridge approach slabs are tied to the abutments with reinforcement in the middle of our 12" min slab. We don’t see much cracking in the slabs except for slight cracking in the top at the end that is tied to our reinforcement detail where high steel permits movement.
2. **Expansion joint failure:** Our bridge approach is seated on an approach notch, poured flush with the abutment face on one end and tied, and rests on a sleeper slab on the other end where a 3/4" expansion (filled) joint is used. These joints are easily replaced. Additionally, there is a 2" filled expansion joint at the end of our 15’ concrete approach pavement that abuts the bridge approach slab and sits on a concrete sill.
3. **Designs or specifications:**
   


New Mexico
Contact: Ray M. Trujillo, New Mexico DOT, (505) 827-5448, Raymond.Trujillo@state.nm.us.

1. **Problems with cracking:** Have had cracking at acute corners of concrete approach slabs. This usually occurs when skew angles are greater than 30°.
2. **Expansion joint failure:** Very few. Cause of failure for the few we have had was due to approaches settling considerably.
3. **Designs or specifications:** See Appendix I.
**New York**
Contact: Arthur P. Yannotti, New York State DOT, (518) 457-4453, ayannotti@dot.state.ny.us.

1. **Problems with cracking**: The approach slab frequently cracks perpendicular to the abutment on skewed bridges. This occurs much more often when there is no expansion joint at the abutment.
2. **Expansion joint failure**: Yes. Almost all expansion joints leak in time.
3. **Designs or specifications**:

   A3. Bridge Manual:

   BD Sheet:

**North Dakota**
Contact: Tim Schwagler, North Dakota DOT, (701) 328-4421, tschwagl@nd.gov.

1. **Problems with cracking**: North Dakota has not experienced cracking of approach slabs adjacent to skewed bridge decks.
2. **Expansion joint failure**: Expansion joints are not next to approach slabs.
3. **Designs or specifications**: See Appendix J.

**Texas**
Contact: Brian Merrill, Texas DOT, (512) 416-2232, bmerrill@dot.state.tx.us.

1. **Problems with cracking**: We do get cracks in concrete approach slabs that are perpendicular to the expansion joint on skewed bridges. There seem to be few negative consequences from these cracks.
2. **Expansion joint failure**: Expansion joint failure occurs with and without the presence of a concrete approach slab. We have seen no correlation between joint failures and approach slabs.
3. **Designs or specifications**: TxDOT’s standard drawings for approach slabs, BAS-A and BAS-C, can be found at [http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/bridge-e.htm#Miscellaneous](http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/bridge-e.htm#Miscellaneous); or see Appendix K.

**Washington**
Contact: Bruce Thill, Washington State DOT, (360) 705-7393, Thillb@wsdot.wa.gov.

1. **Problems with cracking**: Cracking of the approach slabs is generally the same in nature as that of the bridge deck, but less frequent.
2. **Expansion joint failure**: Joint failure of the approach slabs is of the same nature, but less frequent due to smaller joints. Large expansion movements are located at bridge joints. Generally, the smaller the joint gap, the less impact and the lower the risk of deterioration.
3. **Designs or specifications**:
ALL EDGES OF APPROACH SLAB SHALL HAVE 13" RADIUS.
NOTES:
Concrete class d (Bridge) shall be used for approach slabs.
Approach slab concrete shall be cured in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.
The top surface of the post-tensioning block, if any, shall be covered with 1" of low density polystyrene foam. See Dwg. No. B______.
1/2" expansion joint material shall meet AASHTO Spec. M213.

Designer: Use #9 for approach slabs greater than 20' and less than 31' long.

Approach Slab Details:

- #4 @ 1'-6"
- #5 @ 1'-0"
- #6 @ 6"
- 20 gauge galv. sheet metal (To be included in the work)
- #5 (6 Tot.)

Colorado Department of Transportation
4201 East Arkansas Avenue
Room 303
Denver, CO 80222-3400
Phone: 303-757-9352 FAX: 303-757-9197

Staff Bridge Branch Initials
Approach slab concrete shall be cured in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

Concrete Class B (Bridge) shall be used for approach slabs.

1/2" expansion joint material shall meet AASHTO Spec. M213.

For expansion device details see Dwg. No. B____.

For curb and rail details see Dwg. No. B____.

Approach slab concrete shall be cured in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

The top surface of the post-tensioning block, if any, shall be covered with 1" of low density polystyrene foam. See Dwg. No. B____.
**NOTES:**

Concrete Class D (Bridge) shall be used for approach slabs.

1/2" expansion joint material shall meet AASHTO Spec. M213.

For expansion device details see Dwg. No. B___.

For curb and rail details see Dwg. No. B___.

Approach slab concrete shall be cured in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

The top surface of the post-tensioning block, if any, shall be covered with 1" of low density polystyrene foam. See Dwg. No. B___.

1/2" Expansion Joint Mat'l.

#5 @ 1'-0"

Approach Slab concrete shall be post-tensioned in accordance with 103-70 concrete in Subsection 503.

Approach Slab concrete shall be post-tensioned in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

The top surface of the post-tensioning block, if any, shall be covered with 1/2" of low density polystyrene foam. See Dwg. No. B___.

Expansion Joint Mat'l.

#5 @ 1'-0"

Approach Slab concrete shall be post-tensioned in accordance with 103-70 concrete in Subsection 503.

Approach Slab concrete shall be post-tensioned in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

The top surface of the post-tensioning block, if any, shall be covered with 1/2" of low density polystyrene foam. See Dwg. No. B___.

Expansion Joint Mat'l.

#5 @ 1'-0"

Approach Slab concrete shall be post-tensioned in accordance with 103-70 concrete in Subsection 503.

Approach Slab concrete shall be post-tensioned in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

The top surface of the post-tensioning block, if any, shall be covered with 1/2" of low density polystyrene foam. See Dwg. No. B___.

Expansion Joint Mat'l.

#5 @ 1'-0"

Approach Slab concrete shall be post-tensioned in accordance with 103-70 concrete in Subsection 503.

Approach Slab concrete shall be post-tensioned in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

The top surface of the post-tensioning block, if any, shall be covered with 1/2" of low density polystyrene foam. See Dwg. No. B___.
#5 @ 1'-0"

Sleeper Slab

Bridge rail

Approach Slab

NOTES:
- Concrete Class D (Bridge) shall be used for approach slabs.
- 1/2" expansion joint material shall meet AASHTO Spec. M213.
- For expansion device details see Dwg. No. B___.
- Approach slab concrete shall be cured in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

Approach slab concrete shall be cured in accordance with the Specifications for Bridge Deck Concrete in Subsection 601.

The top surface of the post-tensioning block, if any, shall be covered with 1" of low density polyethylene foam. See Dwg. No. B___.

Polysulfide or silicone sealant. Extend 6" up face of curb or bridge rail.

#5 total 2

2 - 8" x 2" x 20 gage galvanized sheet metal (to be included in the work)

1/2" Expansion Joint Mat'l.

Slope for drainage 0.02 ft/ft min.

Polysulfide or silicone sealant. Extend 6" up face of curb or bridge rail.

Approach Slab

Approach rail

Foundation

Detail "B"

Top of slab 1'-0"

#4 @ 1'-6"

#5 @ 1'-0"

Contractor may use 1'-0" 6" #5 @ 1'-0"

For transition see M-606-13 sheet 2, or M-606-11 sheet 2, or M-606-1 sheet 10.

(Use with appropriate expansion device sheets)

Colorado Department of Transportation

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Staff Bridge Branch

Initials

Design

Checked

As Constructed

APPRAOCH SLAB DETAILS

Project No./Code

B-601-1EC

Paper Size: 1224.0 x 792.0

Sheet Revisions

Sheet B-601-1EC.dgn

Revision Dates

(10/29/2007)

Print Date: 10/29/2007

Unit Information

Design: XXXXXXXX

Drawn By: XXXXXXXX

Reviewed By: XXXXXXXX

Print: X-XX-XX

Sheet No: 3

As Noted

Horizontal Scale: 1:1

Unit Leader Initials

Vertical Scale: As Noted

NOTE:

The top surface of the post-tensioning block, if any, shall be covered with 1" of low density polyethylene foam. See Dwg. No. B___.

Designer: Use #9 for approach slabs greater than 20' and less than 31' long.

Polysulfide or silicone sealant. Extend 6" up face of curb or bridge rail.

Approach Slab

Approach rail

Foundation

Detail "B"

Top of slab 1'-0"

#4 @ 1'-6"

#5 @ 1'-0"

Contractor may use 1'-0" 6" #5 @ 1'-0"

For transition see M-606-13 sheet 2, or M-606-11 sheet 2, or M-606-1 sheet 10.

(Use with appropriate expansion device sheets)

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Sheet B-601-1EC.dgn

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Print: X-XX-XX

Sheet No: 3

As Noted

Horizontal Scale: 1:1

Unit Leader Initials

Vertical Scale: As Noted

NOTE:

The top surface of the post-tensioning block, if any, shall be covered with 1" of low density polyethylene foam. See Dwg. No. B___.

Designer: Use #9 for approach slabs greater than 20' and less than 31' long.

Polysulfide or silicone sealant. Extend 6" up face of curb or bridge rail.

Approach Slab

Approach rail

Foundation

Detail "B"

Top of slab 1'-0"

#4 @ 1'-6"

#5 @ 1'-0"

Contractor may use 1'-0" 6" #5 @ 1'-0"

For transition see M-606-13 sheet 2, or M-606-11 sheet 2, or M-606-1 sheet 10.

(Use with appropriate expansion device sheets)
GENERAL NOTES

1. SURFACE TREATMENT: As an option to Class 4 Floor Finish (Bridge Floor Grooving) per Section 400 a hand tied or heavy broomed finish may be permitted on the concrete portion of the riding surface. Sidewalk areas shall receive a broomed finish. The top surface of the concrete beneath the asphalt overlay shall be raked.

2. UTILITIES: It is required to show Structures Plans, Utility Conduit Details for details.

3. When a longitudinal construction joint is necessary or allowed by the Engineer, the transverse steel strips extended as shown in the Longitudinal Construction Joint Details.

4. The plan view for CASE 2 applies when the skew angle (β) is 0°. Relevant details also apply to CASE 2.

5. The plan view for CASE 2 applies when the skew angle (β) is > 0°. The slab shown represents a skew to the right for an approach slab at begin bridge: approach slab at end of bridge or a left skew shall be treated similarly.

6. Railings, parapets and traffic separators shall be provided as shown in Structures Plans. Payment for these items shall be included in the pay item for the required item. The remainder shall be as provided as shown in the Structures Plans. Payment shall be included in the pay item for approach slab and reinforcement. Welded Wire Reinforcement for the edge of Approach Slab on retaining wall not included in the estimated quantity for reinforcing steel is considered incidental to the work. Welded Wire Reinforcement shall conform to ASTM A80.

7. ASPHALT SEVILLI: Payment for asphalt overlay item is included in the Structures Plans. Continue the asphalt pavement over the approach slab and match the friction course type used on the roadway. For FC-5, place the final structure course 1.0" thick and the friction course 0.75" thick. For FC-9.5, place the final structure course 0.75" thick and the friction course 1.0" thick. For FC-12.5, place the friction course in one layer 1.75" thick.

8. Approach slabs shown in Plan View Cases 1 and 2 represent a typical approach slab with edge barriers and no sidewalks. See additional approach slab sheets for sidewalks and other pertinent details.

9. CONCRETE: Provide Class II (Bridge Deck) concrete for approach slabs.

CROSS REFERENCES:

For Section 9-3, Longitudinal Construction Joint Detail and Approach Slab Details see Sheet 2.

For Estimated Quantities see Structures Plans.

INSTRUCTIONS TO DESIGNER:

These Indexes shall be supplemented in Structures Plans with additional sheets showing a minimum a Plan View with geometry and pertinent information not covered by these Indexes e.g. Survey Lines, PCL, Direction of Stationing, Phase Construction, Ramps, Sidewalks and other information necessary to accurately complete detailing of the Approach Slabs. Approach Slab Finish Grade Elevations shall be included with the Bridge Finish Grade Elevations in the Structures Plans.

All reinforcing bars are to be shown in the Reinforcing Steel List as straight bars (Types 1 and 2). Bars 6C are 5-30" long.

SECTION A-A
GENERAL NOTES

1. SURFACE TREATMENT: Apply a Class 4 Floor Finish (Grooved) to the rising surface from begin or end approach slab joint to begin or end bridge. See Mid Item Notes. Apply a broomed finish to sidewalk areas.

2. UTILITIES: If required, see Structures Plans, Utility Conduit Detail Sheet for details.

3. When a longitudinal construction joint is necessary or allowed by the Engineer, the transverse steel shall be extended as shown in the Longitudinal Construction Joint Detail.

4. The plan view for CASE 1 applies when the skew angle (γ) = 0°. Relevant details also apply to CASE 2.

5. The plan view for CASE 2 applies when the skew angle (γ) > 0°. The slab shown represents a skew to the right for an approach slab at begin bridge; approach slab at the end of bridge or a left skew shown treated similarly. The shown reinforcement shall be utilized, and Dowels shall be provided in accordance with Pages Nos. 305 and 306.

6. Railings, parapets and traffic separators shall be provided as shown in Structures Plans. Payment for these items shall be included in the pay item for the required item. Open-sided sidewalks shall be provided as shown in Structures Plans. Payment shall be included in the pay items for approach slab concrete and reinforcement. Welded Wire Reinforcement for the edge of Approach Slabs or retaining walls not included in the estimated quantity for reinforcing steel considered incidental to the work. Welded Wire Reinforcement shall conform to ASTM A485.

7. PROFESSIONAL: If profile requirements apply, planning may be required. The permitted construction joint shown in Section A-A will facilitate the placement of the expansion joint.

8. Approach slabs shown in Plan View Cases 1 and 2 represent a typical approach slab with edge barriers and no sidewalks. See additional approach slab sheets for sidewalk and other pertinent details.

9. CONCRETE: Provide Class II (Bridge Deck) concrete for approach slabs.

CROSS REFERENCES

For Section B-8, Longitudinal Construction Joint Detail and Approach Slab Details see Index No. 20910, Sheet 2.

For Estimated Quantities see Structures Plans.

INSTRUCTIONS TO DESIGNER:

These Indexes shall be supplemented in Structures Plans with additional sheets showing on a minimum a Plan View with geometry and pertinent information not covered by these Indexes e.g., Survey Lines, PGL, Direction of Skewing, Phase Construction Joints, Raised Sidewalks and any other information necessary to accurately complete detailing of the Approach Slabs. Approach Slab Finish Grade Elevations shall be included with the Bridge Finish Grade Elevations in the Structures Plans.

Reinforcing bars are to be shown in the Reinforcing Steel List as straight bars (Types 1 and 2). Bars SCI are 6-20" long.

SECTION A-A

PLAN VIEW (CASE 1)

PLAN VIEW (CASE 2)

APPENDIX 2 (RIGID PAVEMENT APPROACHES)
NOTES
1. For reinforcement details, see Standard Drawing E 009-RCBA-03 for square RCBA and Standard Drawing E 009-RCBA-04 for skewed RCBA.

2. 10" if design year AADT < 1000
   12" if design year AADT ≥ 1000

3. All reinforcing bars shall be epoxy coated.

TERMINAL JOINT FOR PCCP AT BRIDGE STRUCTURE

Width of PCCP or RCBA, whichever is less

HMA Surface, Type B

Sleeper slab

HMA Intermediate, Type B

Top of subgrade

SECTION A-A
NOTE
2. All reinforcing bars shall be epoxy coated.

REINFORCEMENT DETAIL FOR SQUARE APPROACH

X - SECTION THROUGH APPROACH
(One Layer of Steel Shown)
REINFORCEMENT DETAIL FOR SKEWED APPROACH

NOTES
1. Area A includes all bars of equal length.
2. Area B includes all bars of unequal length.
4. All reinforcing bars shall be epoxy coated.

X - SECTION THROUGH APPROACH
(One Layer of Steel Shown)

491 x 20'-8"
591 x 20'-9"
**BILL OF MATERIALS**

**SQUARE STRUCTURES - ONE SLAB**

<table>
<thead>
<tr>
<th>BRIDGE APPROACH WIDTH</th>
<th>EPOXY COATED REINFORCING BARS</th>
<th>REINFORCED CONCRETE BRIDGE APPROACH AREA SQ. YDS.</th>
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<td>LONGIT. BARS</td>
<td>TRANSV. BARS</td>
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<tr>
<td>24'-0</td>
<td>24 491</td>
<td>21 #4 x 23'-6</td>
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<td>25'-0</td>
<td>48 491</td>
<td>11 #5 x 23'-6</td>
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<td>33'-0</td>
<td>34 491</td>
<td>21 #4 x 25'-0</td>
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<td>21 #4 x 25'-0</td>
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<tr>
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</tr>
<tr>
<td>44'-0</td>
<td>83 591</td>
<td>22 #6 x 27'-0</td>
</tr>
</tbody>
</table>

* Bars lapped 1'-7 at centerline of roadway.  ** Bars lapped 2'-0 at centerline of roadway.

**NOTES**

1. The Bill of Materials shall be used to determine the bar lengths, total mass of steel, and bridge approach area for square structures.

2. For details, see Standard Drawing E 609-RCBA-03.
### Bill of Materials

**Skewed Structures - One Slab**

<table>
<thead>
<tr>
<th>Bridge Approach Width</th>
<th>Epoxy Coated Reinforcing Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Longit. Bars, Area A</td>
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<tr>
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<td>43-0</td>
<td>41</td>
</tr>
<tr>
<td>44-0</td>
<td>81</td>
</tr>
</tbody>
</table>

* Bars lapped 1'-7 at centerline of roadway if bar exceeds 40'-0.
** Bars lapped 2'-0 at centerline of roadway if bar exceeds 40'-0.

### Notes

1. The Bill of Materials shall be used to determine the longitudinal bar requirements in Area A shown on Standard Drawing E 606-RC0A-04 for skewed structures.
2. See the plans for longitudinal bars required in Area B, all transverse bars, total mass of steel and bridge approach area for skewed structures.
3. All reinforcing bars shall be epoxy coated.
PAVEMENT LEDGE DETAIL

NOTES:

1. See Standard Drawing E-609-BRJT-01 for Type 1A joint details.

2. 10" if design year AADT < 1000
   12" if design year AADT ≥ 1000
   or match thickness of concrete approach pavement if thicker than 12"

3. Flowable backfill if slab bridge.

LEGEND

- 13 mm Expanded Polystyrene
PLAN

SECTION A-A

Bridge End of Slab

25'-0'

GENERAL NOTES

CROWN: Crown shall conform to the rate of crown at the approach pavement and bridge deck. If the rate of crown at the bridge deck differs from that of approach pavement, a smooth transition shall be provided within the limits of the approach slab.

CONCRETE: Concrete shall be Class "AA".

REINFORCEMENT: All steel reinforcement shall be Grade 60 and epoxy coated.

PAYMENT: Include the cost of Class "AA" Concrete, epoxy-coated steel reinforcement, and all labor and materials required to construct the approach slab in the bid item for Approach Slab.

TYPICAL SECTION @ BRIDGE END

SECTION B-B

25'-0' Approach Slab

1/8" Neoprene Pad

1/8" Dowel, Included in Integral End Bents

Filter Fabric

Typical Aggregate Select Granular Material

KENTUCKY
DEPARTMENT OF HIGHWAYS

APPROACH SLAB

STANDARD DRAWING NO. BDX-017
NOTES:
1. SEE STANDARD PLAN 5-297.223 FOR DRAINAGE DETAILS AND ADDITIONAL REQUIREMENTS.
2. 4 INCH CURB DESIGN IS USED FOR ANY CURB OFF THE APPROACH PANELS. SEE STANDARD PLANS FOR 6 IN CURB.
3. E8H QUANTITY SHALL BE PAID FOR SEPARATELY, MEASURED FROM BACK OF CURB TO BACK OF CURB.
4. SEE BRIDGE PLAN FOR PAY ITEM AND DETAILS.
5. EDGE OF PANEL PERPENDICULAR TO GUTTER FOR SKEWS OVER 45° (TYP).

GENERAL NOTES:
SECTION A-A IS SHOWN ON STANDARD PLAN 5-297.227, SECTIONS B-B AND C-C ARE SHOWN ON STANDARD 5-297.225 AND SHOW THE STATION AND ELEVATION AT END LOCATIONS ON THE APPROACH PANEL. A CONCRETE SILL IS REQUIRED BENEATH EXPANSION JOINT TYPES E8H AND STRIP SEALS. EXTEND THE EXPANSION JOINT AND THE SILL ALONG THE FULL WIDTH OF THE TRAFFIC LINES, SHOULDERS AND CURB. CONCRETE SILL AND CURBING, IF REQUIRED, ARE INCLUDED IN THE APPROACH PANEL PAY ITEM.

SEE THE SPECIAL PROVISIONS FOR APPROACH PANEL PAYMENT INFORMATION.

AT THE END OF THE CONCRETE BARRIER, TRANSITION FACE OF 4 INCH CURB INTO PROFILE OF CONCRETE BARRIER. SEE CURB TRANSITION DETAILS ON STANDARD PLAN 5-297.227. IF THERE IS NO ROADWAY CURB AT THE END OF THE APPROACH PANEL, TRANSITION THE APPROACH PANEL CURB SLIGHTLY FROM 4 INCH TO 0 INCH IN THE LAST 3'-0" SECTION (1:10 OR FLATTER SLOPE).

GENERAL DRAINAGE DETAILS ARE SHOWN ON BRIDGE APPROACH PANEL DRAINAGE DETAILS, STANDARD PLAN 5-297.228. ADDITIONAL REQUIREMENTS ARE SHOWN ON DRAINAGE PLAN SHEETS.

CONCRETE MIX SHALL BE 3A42 FOR APPROACH PANEL AND SILL.

CONCRETE SILL AND CURBING, IF REQUIRED, ARE INCLUDED IN THE APPROACH PANEL PAY ITEM.

SEE THE SPECIAL PROVISIONS FOR APPROACH PANEL PAYMENT INFORMATION.

AT THE END OF THE CONCRETE BARRIER, TRANSITION FACE OF 4 INCH CURB INTO PROFILE OF CONCRETE BARRIER. SEE CURB TRANSITION DETAILS ON STANDARD PLAN 5-297.227. IF THERE IS NO ROADWAY CURB AT THE END OF THE APPROACH PANEL, TRANSITION THE APPROACH PANEL CURB SLIGHTLY FROM 4 INCH TO 0 INCH IN THE LAST 3'-0" SECTION (1:10 OR FLATTER SLOPE).

GENERAL DRAINAGE DETAILS ARE SHOWN ON BRIDGE APPROACH PANEL DRAINAGE DETAILS, STANDARD PLAN 5-297.228. ADDITIONAL REQUIREMENTS ARE SHOWN ON DRAINAGE PLAN SHEETS.

CONCRETE MIX SHALL BE 3A42 FOR APPROACH PANEL AND SILL.
NOTES:
1. See Standard Plan 5-297.231 for drainage details and additional requirements.
2. A 10-inch curb design is used for any curb on the approach panels. See standard plans for BA-Curb.
3. EBm quantity shall be paid for separately, measured from back of curb to back of curb.
4. See Bridge Plan for pay item and details.
5. For parapets, note that the barrier must extend out to at least the end of the roadway. Refer to Bridge Plan for barrier reinforcement and paving.

GENERAL NOTES:
Section 14.4 is shown on Standard Plan 5-297.270. Sections A-B and C-C are shown on Standard Plan 5-297.225 and show the station and elevation at end locations on the approach panel.

A concrete sill is required beneath Expansion joint types EBm and EBm-seals. Extend the expansion joint and EBm-seal along the full width of the traffic lanes, shoulders, and curb. Concrete sill and curbing, if required, are included on the approach panel, pay item.

See the special provisions for approach panel payment information.

At the end of the concrete barrier, transition face of 4-inch curb into a face of concrete barrier. See curb transition details on standard plans for details on parapets. At the end of the approach panel, approach panel curb width from 4-inch to 0-inch in the last 5'-4" section on flatter slopes.

Panel size and requirements for transverse and longitudinal joints are shown on Standard Plans 5-297.220 and 5-297.225.

General drainage details are shown on Bridge Approach Panel Plan. Drainage details, Standard Plan 5-297.231. Additional catch basin details are shown on drainage Plan sheets.

Concrete mix shall be 3A42 for approach panel and sill.

DESIGNER NOTE: Remove prior to plotting final plans. Place an "X" on the appropriate box to indicate the Expansion joint type.

CORNER DETAIL "D" (PLAN VIEW)

CONCRETE BARRIER

END OF BRIDGE CONCRETE BARRIER

EDGE OF DECK OR APPROACH PANEL

CURB TRANSITION

0'-0"

4'-0"

0'-0"

5'-0"

1'-0"

4'-0"

5'-0"

1'-0"

4'-0"

5'-0"

1'-0"

4'-0"

5'-0"
3'-9" SHOULDER 2'-0"

CONSTRUCTION JOINT
GUTTERLINE LOCATION SHAPE
FROM BACK SIDE OF CURB TO GUTTERLINE 6'-9"

LANES 3" (TYP.) 4

SILL & CONCRETE MAINLINE 3" CLR. (TYP.)

CONTRACTION Joint
GUTTERLINE 3" (TYP.)

GUTTERLINE LOCATION

CONSTRUCTION JOINT

BITUMINOUS ROADWAY

SILL ELEVATION
(Reinforcement & Pavement Not Shown)

GUTTER LINE 1/2" X 12" BIT. FELT JOINT

SILL & CONCRETE MAINLINE

SILL & BITUMINOUS MAINLINE

BILL OF REINFORCEMENT
FOR CONCRETE SILL

BILL OF REINFORCEMENT
FOR CURB TRANSITION

LONGITUDINAL SECTION A-A

DETAIL "A"

CONSTRUCTION JOINT IF BITUMINOUS ROADWAY.

CONCRETE END BLOCK

GUTTER LINE

ISOMETRIC VIEW

CURB TRANSITION DETAILS
FOR H-BEAM GUARDRAIL TO F-SHAPE SAFETY RAIL

FOR F-SHAPE SAFETY BARRIER OPTION

NOTES:

AS PER MNDOT 13301 USE EPOXY COATED GRADE 60 REINFORCEMENT BARS.

1. APPROACH SLAB THICKNESS SHOWN INCLUDES CONCRETE WEARING COURSE THAT MAY BE REQUIRED. CHECK BRIDGE PLANS FOR CONCRETE WEARING COURSE. CONCRETE WEARING COURSE IS INCLUDED IN BRIDGE PLAN QUANTITIES.

2. PLACE PLASTIC SHEETING (MNDOT 3756) AS APPROVED BY THE ENGINEER TO BREAK BOND. COVER AREA SHOWN IN DETAIL. IS INCLUDED IN BRIDGE PLAN QUANTITIES.

3. PROVIDE 2" MINIMUM LAP IF TWO BARS REQUIRED.

4. EXPANSION JOINT TYPE STRIP SEAL ARE SHOWN ON BRIDGE PLAN. DETAILS OF EXPANSION JOINT TYPE E8H, SEE STANDARD PLANS 5-297.222 & 5-297.224 FOR TYPE OF EXPANSION JOINT. DETAILS OF EXPANSION JOINT TYPE E8H, SEE STANDARD PLANS 5-297.229. DETAILS OF EXPANSION JOINT TYPE NONE, SEE STANDARD PLATE FOR INCIDENTAL TO THE APPROACH PANEL PAY ITEM)

ENGINEER TO BREAK BOND. COVER AREA SHOWN IN DETAIL. IS INCLUDED IN BRIDGE PLAN QUANTITIES.

CONTRACTOR IS REQUIRED TO COMPLETE THE BILL OF REINFORCEMENT TABLE, AND PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE PROJECT ENGINEER AT LEAST 3 WEEKS BEFORE REBAR FABRICATION.

BILL OF REINFORCEMENT
FOR CURB TRANSITION

CONSTRUCTION JOINT
GUTTERLINE 3" (TYP.)

SILL VERTICAL

SILL TIE

CONTRACTOR IS REQUIRED TO COMPLETE THE BILL OF REINFORCEMENT TABLE, AND PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE PROJECT ENGINEER AT LEAST 3 WEEKS BEFORE REBAR FABRICATION.

NOTE:

1. APPROACH SLAB THICKNESS SHOWN INCLUDES 2 INCH CONCRETE WEARING COURSE THAT MAY BE REQUIRED. CHECK BRIDGE PLANS FOR CONCRETE WEARING COURSE. CONCRETE WEARING COURSE IS INCLUDED IN BRIDGE PLAN QUANTITIES.

2. PLACE PLASTIC SHEETING (MNDOT 3756) AS APPROVED BY THE ENGINEER TO BREAK BOND. COVER AREA SHOWN IN DETAIL. IS INCLUDED IN BRIDGE PLAN QUANTITIES.

3. PROVIDE 2" MINIMUM LAP IF TWO BARS REQUIRED.

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ENGINEER TO BREAK BOND. COVER AREA SHOWN IN DETAIL. IS INCLUDED IN BRIDGE PLAN QUANTITIES.

CONTRACTOR IS REQUIRED TO COMPLETE THE BILL OF REINFORCEMENT TABLE, AND PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE PROJECT ENGINEER AT LEAST 3 WEEKS BEFORE REBAR FABRICATION.

BILL OF REINFORCEMENT
FOR CONCRETE SILL

CONSTRUCTION JOINT
GUTTERLINE 3" (TYP.)

SILL VERTICAL

SILL TIE

CONTRACTOR IS REQUIRED TO COMPLETE THE BILL OF REINFORCEMENT TABLE, AND PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE PROJECT ENGINEER AT LEAST 3 WEEKS BEFORE REBAR FABRICATION.

NOTE:

1. APPROACH SLAB THICKNESS SHOWN INCLUDES 2 INCH CONCRETE WEARING COURSE THAT MAY BE REQUIRED. CHECK BRIDGE PLANS FOR CONCRETE WEARING COURSE. CONCRETE WEARING COURSE IS INCLUDED IN BRIDGE PLAN QUANTITIES.

2. PLACE PLASTIC SHEETING (MNDOT 3756) AS APPROVED BY THE ENGINEER TO BREAK BOND. COVER AREA SHOWN IN DETAIL. IS INCLUDED IN BRIDGE PLAN QUANTITIES.

3. PROVIDE 2" MINIMUM LAP IF TWO BARS REQUIRED.

4. EXPANSION JOINT TYPE STRIP SEAL ARE SHOWN ON BRIDGE PLAN. DETAILS OF EXPANSION JOINT TYPE E8H, SEE STANDARD PLANS 5-297.222 & 5-297.224 FOR TYPE OF EXPANSION JOINT. DETAILS OF EXPANSION JOINT TYPE E8H, SEE STANDARD PLANS 5-297.229. DETAILS OF EXPANSION JOINT TYPE NONE, SEE STANDARD PLATE FOR INCIDENTAL TO THE APPROACH PANEL PAY ITEM.

ENGINEER TO BREAK BOND. COVER AREA SHOWN IN DETAIL. IS INCLUDED IN BRIDGE PLAN QUANTITIES.
**EXPANSION JOINT NOTES:**

2. Place plastic sheeting, Spec. 3756 as approved by the engineer to break bond. Cover area shown in detail. See sill details on standard plan 5-297.227.
3. The joint faces shall be cleaned and dried by sandblasting prior to sealing the joint.
4. Hot pour joint sealer, Spec. 3726, top of sealer flush to 1/8 inch below top of pavement surface. Make top of sealer for curb section E8H joints flush with surface ± 1/8 inch or -1/8 inch.

**JOINT NOTES:**

1. Permissible construction joint. Apishe bars at 12 inch spacing at mid-depth of slab, parallel to the centerline of the roadway. Apishe bars are 5'-0" long. Place the bar with 2'-0" on one side of the joint and 3'-0" on the opposite side of the joint. Alternate the 2'-0" and 3'-0" dimension as shown on the plan.
2. Clean and dry joint faces by sandblasting prior to sealing the joint.
3. When constructing a L1TH joint under staged construction extend No. 13 bars 7'-0" and No. 16 bars 2'-0" past the edge of the first concrete pour. Construct L1TH joint according to detail shown after adjacent pour is complete.

**EBH PRESSURE RELIEF JOINT MATERIAL INSTALLATION INSTRUCTIONS:**

- See approved/qualified products list at [http://www.dot.state.mn.us/products](http://www.dot.state.mn.us/products) for all products used.
- Install joint material in accordance with the manufacturer's recommendations and the following:
  1. **Expansion Joint Filler Material** used for a 4 inch pressure relief joint consists of a preformed foam product having minimum dimensions of 4.5 inches in width, 1/2 inch thick, and 8 inches in depth, and a compressive strength not less than 75 psi. The foam shall be compatible with the material in the vicinity of the joint and all the joint material shall be compression with a lubricant adhesive applied to the concrete contact surfaces.
  2. Saw or form the joint 4 inches wide by the full-depth of the panel. Inspect to assure that the inside walls of the joint have been sandblasted, are dry, smooth, and free of debris and loose particles. Apply 1/8" thick to the top 1 inch of the inside walls to prevent the lubrication adhesive from contaminating the concrete bonding surfaces of the subsequently placed hot pour joint sealer.
  3. Paint the inside walls of the joint with lubricant adhesive at the rate of 1 gallon per 50 linear feet of joint.
  4. Pinch the bottom of the material together and push it down into the joint. Install the material into the joint with a sledgehammer and a 2' x 4' if necessary. Apply lubricant adhesive to the edges of the preformed foam material when buttting two pieces together.
  5. Install the foam joint material to a depth of approximately 1/2 inch below the finished concrete surface. After installation, remove the tape and fill the void with top of the joint material with approximately 1/2" of hot pour joint sealer (MNDOT 3725 or 3725b) and a 2' x 4' if necessary. Apply lubricant adhesive to the edges of the preformed foam material. The hot pour joint sealer should only slightly melt into the foam joint material to prevent excessive melting of the joint material, place the hot pour sealer at the lower end of the temperature specifications, check for correct temperature by placing hot pour sealer on a sample of waste foam material.

**INSTALLATION INSTRUCTIONS:**

EBH Pressure Relief Joint Material

- The joint faces shall be cleaned and dried by sandblasting prior to sealing the joint.
- Place the joint material under compression with a lubricant adhesive applied to the concrete contact surfaces.
- Clean and dry joint faces by sandblasting prior to sealing the joint.
- When constructing a L1TH joint under staged construction extend No. 13 bars 7'-0" and No. 16 bars 2'-0" past the edge of the first concrete pour. Construct L1TH joint according to detail shown after adjacent pour is complete.
- Permissible construction joint. Apishe bars at 12 inch spacing at mid-depth of slab, parallel to the centerline of the roadway. Apishe bars are 5'-0" long. Place the bar with 2'-0" on one side of the joint and 3'-0" on the opposite side of the joint. Alternate the 2'-0" and 3'-0" dimension as shown on the plan.

**REFERENCE DATE:**
11-09-09

**STATE PROJ. NO.:**

**TH SHEET NO.:** OF **SHEETS**
APPROACH PANEL JOINT LAYOUT NOTES:

1. LIHT - LONGITUDINAL JOINT. SEE STANDARD PLANS 5-297.229 FOR SECTIONS OF ENLARGED JOINT LENGTH REQUIREMENTS FOR STAGED CONSTRUCTION.

2. PERMISSIBLE CONSTRUCTION JOINT. USE JOINT TYPE C2H WITH AP1916E BARS AT 12 INCH SPACING AT MID DEPTH OF THE SLAB. PANELS TO THE CENTERLINE OF THE ROADWAY. APPLIES TO JOINTS 5'-0" LONG. PLACE THE BAR WITH 2'-0" ON ONE SIDE OF THE JOINT AND 3'-0" ON THE OPPOSITE SIDE OF THE JOINT. USE JOINT TYPE 1:6 (AS SHOWN ON THE PLAN) THE C2H JOINT AND AP1916E BARS ARE REQUIRED ON ALL PANELS WITH A SKEW OVER 10 DEGREES.

3. C2H CONSTRUCTION JOINT.

4. MAXIMUM PANEL LENGTH OF 20'-0" FOR UP TO 40° SKEWS, 15'-0" FOR SKEWS OVER 40°.

5. ALL JOINTS SHALL BE SAWCUT. SAWCUTS SHALL BE MADE WHILE THE CONCRETE IS STILL GREEN. WHEN A CONCRETE WEARING COURSE IS SPECIFIED, THE JOINTS SHALL BE SAWN THROUGH BOTH THE WEARING COURSE AND THE UNDERLYING APPROACH SLAB IN A SINGLE OPERATION.

6. EBH JOINT REQUIRED IN CURB ADJACENT TO LIHT JOINT. EBH JOINTS SHALL BE PAIRED SEPARATELY MEASURED FROM BACK OF CURB TO BACK OF CURB.

7. SEE STANDARD PLANS 5-297.222 OR 5-297.224 FOR TYPE OF EXPANSION JOINT.

8. SEE STANDARD PLANS 5-297.229 OR 5-297.231 FOR JOINT DETAIL FOR CONCRETE BARRIER ON WINGWALL.

APPROACH PANELS - SQUARE TO 10° SKEWS

APPROACH PANELS - OVER 10° SKEWS

DESIGNER NOTE
I REMIND PLOT 10 PLOTTING FINAL PLAN.
THIS SHEET IS INTENDED AS A Template FOR APPROACH PANEL JOINT LAYOUT. DESIGNERS SHOULD MAKE CHANGES AS NEEDED TO MATCH THE SPECIFIED DIMENSIONS OF A PARTICULAR BRIDGE.
THE MAXIMUM JOINT DETAILS SHOWN ON THIS SHEET SHOULD OR BE REDUCED TO MATCH THE JOINT DETAILS SHOWN ON JOINT LAYOUTS FOR WIDE BRIDGES OR BRIDGES WITH LARGE SKEWS.

STAGGER DIAGRAM

C2H JOINT
AP1916E STAGGER AS SHOWN (TYP)
SECTION 502 - PORTLAND CEMENT CONCRETE
BRIDGE END PAVEMENT

502.01—Description. This work consists of bridge end pavement of portland cement concrete with reinforcement as shown on the plans, constructed in one course on a prepared base in accordance with these specifications, and in reasonably close conformity with the lines, grades, thickness, and cross section shown on the plans or as directed.

502.02—Materials. On bituminous paving contracts, concrete for this work may be Class "B" Structural Concrete meeting the applicable requirements of Subsection 804.02. Sampling and testing of concrete for acceptance and control purposes shall be in accordance with Subsection 804.02.3.

Reinforcing steel shall meet the requirements of Subsection 711.02.

502.03—Construction Requirements.

502.03.1—General. The requirements specified for concrete pavement in Section 501, shall apply in all respects to bridge end pavement except where otherwise indicated in the specific requirements below, or on the plans.

When the plans specify a certain thickness of hot mix asphalt under the bridge end pavement, the Contractor may substitute Class "B" Structural Concrete base in lieu of the hot mix asphalt. The concrete base shall be constructed in one course on a prepared base in accordance with these specifications, and in reasonably close conformity with the lines, grades, thickness, and typical cross-sections as shown on the plans or as directed. The concrete base will be allowed to cure 24 hours prior to placement of the bridge end pavement. A one-inch premolded expansion joint will be required along the face of the paving bracket. See Section 403 for measurement and payment of substituted concrete base material.

502.03.2—Specific Requirements.

502.03.2.1—Final Screeding and Finishing. The final screeding shall be performed by hand methods. The concrete shall be screeded longitudinally using the bridge floor for a gauge on one end, and a temporary bulkhead cut and securely installed true to crown and grade on the other end. In the event the concrete pavement, adjacent to the bridge end pavement, has been previously poured, the end of the pavement shall be used as a gauge in lieu of the temporary bulkhead. The final finish of the bridge end pavement shall be that designated on the plans. If a finish is not designed, the finish shall be transverse tined finish.

502.03.2.2—Joints. Concrete bridge end pavement shall be constructed monolithically, unless construction joints are specifically indicated on the plans.

502.04—Method of Measurement. Portland cement concrete bridge end pavement, complete in place and accepted, will be measured as specified in Subsection 501.04.
502.05—Basis of Payment. Portland cement concrete bridge end pavement will be paid for at the contract unit price per square yard in accordance with the methods as provided in Subsection 501.05. The prices thus paid shall be full compensation for completing the work.

Payment will be made under:

502-A: Reinforced Cement Concrete Bridge End Pavement- per square yard
### BARRIER DETAILS

**Approach Slab Joint Detail**

- The estimated material quantities shown are for informational purposes only. All materials, including reinforcing, higher-than listed permiscous, rehrough joint filler, polystyrene, and all labor required to build the approach slab and barriers shall be included in the pay item "Pile Supported Approach Slab." The approach slab shall be designed in accordance with and meet the specifications and requirements of AASHTO M-171.

**Concrete**
- The concrete shall be Class AE-3 and the reinforcing steel shall be Grade 60. The polyethylene membrane shall meet the requirements of AASHTO M-171.

**NOTES:**
- Surface Finish "D" shall be required on the inside and top surfaces of the approach slab barriers and curbs. See note 602 SURFACE FINISH "D" for colors.

**Connection Plate Details**
- The bar marks beginning with an "X" indicate an epoxy coated bar.

**Bent Bar Details**
- The bar marks beginning with an "X" indicate an epoxy coated bar.

**Estimated Material Quantities**
- The estimated material quantities shown are for informational purposes only. All materials, including reinforcing, higher-than listed permiscous, rehrough joint filler, polystyrene, and all labor required to build the approach slab and barriers shall be included in the pay item "Pile Supported Approach Slab." The approach slab shall be designed in accordance with and meet the specifications and requirements of AASHTO M-171.

**Concrete**
- The concrete shall be Class AE-3 and the reinforcing steel shall be Grade 60. The polyethylene membrane shall meet the requirements of AASHTO M-171.

**NOTES:**
- Surface Finish "D" shall be required on the inside and top surfaces of the approach slab barriers and curbs. See note 602 SURFACE FINISH "D" for colors.

**Connection Plate Details**
- The bar marks beginning with an "X" indicate an epoxy coated bar.

**Bent Bar Details**
- The bar marks beginning with an "X" indicate an epoxy coated bar.
**Approximate Quantities**

- Reinforcement weight = 8.5 lbs/ft
- Area of Approach Slab = 20.6 ft²
- S = N/A
- X = N/A

**General Notes**

- Approach slab in accordance with Item 420.
- Concrete shall be Class S with a minimum compressive strength of 4,000 psi.
- All reinforcing steel shall be Grade 60.
- Flowable fill shall be C150. For the concrete pad, the flowable fill shall be placed after the concrete slab is placed.
- Concrete shall be placed after bars are installed, unless otherwise indicated.
- Compact and finish the subgrade or foundation for the approach slab to the top of the subgrade to the typical cross-section and to the lines and grades shown on the plans.
- Concrete shall be protected from exposure to rainwater or sprinkling water for 48 hours.
- Reinforcement for the approach slab shall be in accordance with Item 420.
- Sealant, bond coat, and prefibrous bituminous material shall be in accordance with Item 420.
- Prefibrous bituminous concrete pavement or asphalt stabilized base shall be placed between the approach slab and the subgrade, or on top of the stabilized base.
- Reinforcement bars may be used if approved by the Engineer.

**Section B-B**

- Approximate Concrete

**Section C-C**

- Approach Slab

**Section D-D**

- Asphalitic Concrete Pavement

**General Notes**

- Approach slab in accordance with Item 420.
- Concrete shall be Class S with a minimum compressive strength of 4,000 psi.
- All reinforcing steel shall be Grade 60.
- Flowable fill shall be C150. For the concrete pad, the flowable fill shall be placed after the concrete slab is placed.
- Concrete shall be placed after bars are installed, unless otherwise indicated.
- Compact and finish the subgrade or foundation for the approach slab to the top of the subgrade to the typical cross-section and to the lines and grades shown on the plans.
- Concrete shall be protected from exposure to rainwater or sprinkling water for 48 hours.
- Reinforcement for the approach slab shall be in accordance with Item 420.
- Sealant, bond coat, and prefibrous bituminous material shall be in accordance with Item 420.
- Prefibrous bituminous concrete pavement or asphalt stabilized base shall be placed between the approach slab and the subgrade, or on top of the stabilized base.
- Reinforcement bars may be used if approved by the Engineer.

**Texas Department of Transportation**

**Bridge Division**

**Bridge Approach Slab**

**Asphalitic Concrete Pavement**

**BAS-A**