MEMO

April 1, 2019

To: District Engineers

From: Graham Bettis, P.E.
Division Director, Bridge Division

Subject: New and Revised Miscellaneous Bridge Standard Drawings

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New and revised miscellaneous standard drawings, with issue date of April 2019, are posted on the TxDOT web site and available for immediate use.

In general, updates to these standards include updating reinforcement lap lengths; adhesive anchor notes; updating bolt callout to the current ASTM; and editorial revisions.

Notable revisions to standard drawings include:

- BAS-A and BAS-C now includes longitudinal joints at lane lines and shoulders, in order to alleviate cracking. In addition, the joint details were updated to provide more durable joints. Added clarification on the bond breaker by modifying it to a 1" stress relieving pad between the approach slab and cement stabilized backfill or cement treated base.
- BL and RW(LB) now include anchor bolt information, in order to resolve conflicts between the RIP and BL standards.
- BMCS was updated to make the hole in the L 3 x 3 slotted. The slot makes field assembly easier.
- BS-EJCP was updated to limit expansion plates to what is shown in the Approved Slip Resistant Plate table.
- CP now includes stinger details. If a stinger is required to be installed with piles, this needs to be included in foundation notes on the Bridge Layout, Foundation Plan, or in the General Notes. The CP standard was updated for deformed WWR instead of smooth WWR. Pile fabricators are now required to use deformed Welded Wire Reinforcing (WWR) after using up their existing stock of smooth WWR.
- CRR was updated to clarify the use of reinforcing steel going across construction joints.
- CSAB now includes notes to allow flowable backfill. If flowable backfill is desired, the requirement for flowable fill needs to be included on the Bridge Layout or in the General Notes Added clarification on the bond breaker by modifying it to a 1" stress relieving pad between the approach slab and cement stabilized backfill or cement treated base.
- FD was updated to add lap lengths for drilled shafts.
- PCP was updated to increased allowable bedding strip heights for I-Girders. Clarified panel joint placement gaps. Improved timber board material and how it is placed in Option 2.
- PCP-FAB was updated to chamfer the bottom edge of the panel on the beam side.
- PMDF was updated to add a note to reference back to IGMS for full depth slab details.
- SGEB was updated to clarify the reactions as unfactored.
- SGMD was updated to correct the angle size for XF3 and KF3.
- SRR was updated to include mounded toe and extended rock filled riprap toe options.

New standard drawing, **Shoulder Drain at End of Bridge Rail (SD-EBR)** provides details for putting shoulder drains in with respect to the various MBGF transitions

The bridge joint standards were significantly modified based on field performance. Please see the attached **Bridge Expansion Joints Guidance** document for information on the joints and when to use them. Due to the issuance of this guidance, much of the information about what joint to use has been removed from the Guide to Standard Drawings, which is updated with this release.

Notable revisions to standard drawings for joints include:

- **SEJ-A** is retired and withdrawn from the Bridge Standards webpage. It has been replaced by the SEJ-B and SEJ-M.
- **SEJ-B and SEJ-M** are new standard drawings. The old SEJ-A standard drawing was split into two new standard drawings, SEJ-B for bonded strip seal and SEJ-M for mechanically bonded.
- **AJ and SEJ-S(O)** were updated to change plate painting requirements, but otherwise not notably modified.

These revised standard drawings apply to construction projects beginning with the October 2019 letting. Use of new and revised standards prior to October 2019 is at the discretion of each District.

These and other bridge standard drawings are available on the Bridge Standards web page in MicroStation® "dgn" and Adobe® Acrobat® "pdf" formats. See http://www.dot.state.tx.us/business/standardplanfiles.htm.

For questions or comments concerning these standard drawings, please contact Taya A. Retterer, P.E. at 512/416-2719 or Jon T. Ries, at 512/416-2191.

Note: Original Signed By Graham Bettis

CC:
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BRIDGE EXPANSION JOINTS GUIDANCE

Material

Refer to TxDOT's Standard Specification for Construction and Maintenance of Highways, Streets, and Signs, Item 454, "Bridge Expansion Joints" for material requirements.

Geometric Constraints

- Bridge deck continuity by providing multi-span units is recommended in order to minimize the number of joints. Unit lengths of up to 350 feet are not uncommon.
- All expansion joints in de-icing zones should be sealed or drained. Stream crossing structures may have open joints in the salt-free zones.
- Joints for all grade separation structures should be sealed.

Design Criteria

Thermal Expansion

The total movement required through a bridge deck expansion joint should be based on a temperature range of 10 to 110 degrees for concrete bridges and 0 to 120 degrees for steel bridges. Alternatively, the temperature contour maps in AASHTO LRFD Bridge Design Specifications, Section 3.12.2 may be used.

The expansion length considered for sizing a joint can be assumed as one-half the unit length on one side of the joint plus one-half the unit length on the other side of the joint.

Use coefficients of expansion equal to 6.0×10^{-6} for concrete and 6.5×10^{-6} for steel.

When placed on a skew, sealed expansion joints (SEJ) have a reduced ability to accommodate longitudinal movement. Calculate reduced movement range by multiplying joint size by cosine (skew).

When integral or semi-integral bents are used, consider the effect column stiffness has on the distribution of thermal movement.

Available Joints for New Construction

Pourable Seal (TYPE A):

- Preferred joint for low traffic volume, off-system structure
- Used for spans or units no longer than 100 feet

Open Armor Joint (ARMOR JOINT):

- Not allowed on CIP slab spans, in de-icing zones, or over steel beams
- Min opening = 0-in.
- Max opening = 2-in.
- Total movement = 2-in.

Pourable Seal (Sealed Armor Joint (ARMOR JOINT)(SEALED)):

- Min opening = 0.75-in.
- Max opening = 2.25-in.
- Total movement = 1.5-in.

Sealed Expansion Joint (SEJ):

- Mechanically Bonded (SEJ-M and SEJ-S(0)) –
    - Preferred joint for freight corridors or other high truck volume roadways
    - SEJ-M - No overlay
    - SEJ-S(0) – With ±2" overlay
    - Minimum slab and overhang thickness = 6.5-in.[1]
    - Available in two sizes:
        - 4-in.
            Min opening = 0-in.
            Max opening = 4-in.
            Total movement = 4-in.
        - 5-in.
            Min opening = 0-in.
            Max opening = 5-in.
            Total movement = 5-in.

- Bonded Strip Seal (SEJ-B) –
    - No overlay
    - Minimum slab and overhang thickness = 6.5-in.[1]
    - Available in one size:
        - 4-in.
            Min opening = 0-in.
            Max opening = 4-in.
            Total movement = 4-in.

Note 1: Adjacent box beam and slab beams have 5" slab thickness. These beams have a required block out in the beam that allows an increased slab thickness for the AJ and SEJ joints.

Header Type Joints with Seal:
If there is a concern with snow plows or deicing, selecting an unarmored concrete header with seal, instead of an AJ or SEJ is recommended.

It is also recommended that header type joints with seals only be used when there is a thickened slab end. If there is no thickened slab end, consider the impact the encroachment of the header material has on the bridge slab. Alternately, use with ACP overlay to reduce the encroachment.

Set joint opening based on design requirements with the following limits:

- Minimum joint opening = 0.5-in.
- Maximum joint opening = 3-in.

The joint seal can accommodate +/- 50% movement. The joint opening shown on the plans at 70 degrees typically should not be less than 1-in. or greater than 2-inches. The minimum joint opening is to keep the sealant from squeezing upward and being abraded. The maximum joint opening is to limit the actual width to reduce the potential for impact loading at the span end, which could cause the header to fail.

Finger Joint and Modular Bridge Joint Systems (MBJS):
For expansion movements greater than 5-in., Finger Joints or Modular Joints may be used, but are not recommend. These systems tend to be high maintenance. Consult with the Bridge Division on the use of these joint types.

Detailing

Expansion joints are predesigned and shown on standard drawings except for Finger Joints and Modular Bridge Joint Systems (MBJS), which require project specific details.

Additional or supplemental joint details may be required for widenings or bridges constructed in phases.

For projects with inverted Tee bent caps use two joints (one at each face of the inverted T bent cap.)