

# INDIANA DEPARTMENT OF TRANSPORTATION



INTER-DEPARTMENT COMMUNICATION

*Standards Section – Room N642*



*Writer's Direct Line  
232-6775*

November 6, 2006

## DESIGN MEMORANDUM No. 06-14 TECHNICAL ADVISORY

**TO:** All Design, Operations, District Personnel, and Consultants

**FROM:** /s/ Anthony L. Uremovich  
Anthony L. Uremovich  
Design Resources Engineer  
Production Management Division

**SUBJECT:** Structural Expansion Joints

**EFFECTIVE:** February 7, 2007, Letting

New contract requirements for structural expansion joints have been approved by the INDOT Standards Committee.

Revised Recurring Special Provision 724-B-046 dated 10-19-06 should be called for if 724-series structural expansion joint pay items are to be incorporated into the Estimate of Quantities. The provision is attached herewith.

The provision should be called for beginning with the February 7, 2007, letting, and through the August 22, 2007, letting. Beginning with the September 6, 2007, letting, the recurring special provision will be incorporated into the INDOT *Standard Specifications*. The provision will then no longer be required to be called for in specific contracts.

alu  
Attachment

## MODULAR EXPANSION JOINTS

The Standard Specifications are revised as follows:

SECTION 724, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

**SECTION 724 – STRUCTURAL EXPANSION JOINTS**

**724.01 Description**

**(a) Structural Expansion Joint**

This work shall consist of furnishing and placing, for new construction, structural expansion joints of the type specified, in accordance with ~~the plans and these requirements~~ 105.03.

**(b) Replacement of Existing Structural Expansion Joint**

This work shall consist of the removal and replacement of an existing structural expansion joint with a joint of the type ~~shown on the plans and~~ *specified*, in accordance with ~~these requirements~~ 105.03.

**(c) Replacement of Existing Structural Expansion Joint Seal**

This work shall consist of the replacement of the joint seal in an existing structural expansion joint of the type ~~shown on the plans~~ *specified*.

***MATERIALS***

**724.02 Materials**

Materials shall be in accordance with the following:

Expansion Joint BS.....	906.07(b)
Concrete, Class C.....	702
Expansion Joint M.....	906.07(c)
Expansion Joint SS.....	906.07(a)
Inorganic Zinc Primer.....	909.02(a)1
Structural Steel.....	910.02

*The joint manufacturer shall prepare and submit four sets of shop drawings showing details of the assembly, manufacturer's specifications, and joint setting data, for approval, prior to manufacture of the joints.*

**(a) Expansion Joint SS**

~~The sliding cover plate required over that portion of expansion joint SS located in a sidewalk shall be the same material as the extrusion and shall be galvanized in accordance with ASTM A 123.~~

*The joint assembly shall consist of one of the allowable alternates for this type of joint as shown on the plans. The strip seal shall be sized to accommodate a minimum of 4 in. (100 mm) of movement. The strip seal shall be furnished in one continuous length*

*for the entire limits of the installed joint. Field splicing of the strip seal will not be allowed.*

### **(b) Expansion Joint M**

~~This joint shall consist of prefabricated, multiple elastomeric seals, separator beams, and support bars. The structural design of expansion joint M shall be in accordance with the current AASHTO Standard Specifications for Highway Bridges and shall be for the same design loading as the bridge structure at which it is installed, but in no case less than HS 20—44 truck loading and impact. The joint shall be designed to accommodate the movement shown on the plans. The sliding cover plate required over that portion of expansion joint M located in a sidewalk or concrete rail shall be the same material as the extrusion and shall be galvanized in accordance with ASTM A 123.~~

*The joint assembly shall be manufactured in accordance with the details shown on the shop drawings as prepared by the manufacturer of the joint assembly. The strip seals shall be furnished in one continuous length for the entire limits of the installed joint. Field splicing of the strip seals will not be allowed.*

## **CONSTRUCTION REQUIREMENTS**

### **724.03 General Requirements**

~~The manufacturer shall prepare and submit four sets of detailed shop drawings for approval, prior to the manufacture of joint assemblies SS and M. The shop drawings shall be a minimum of 22 in. by 34 in. (560 mm by 860 mm) in overall size. Expansion joints SS and M shall not be fabricated until the shop drawings are approved. Joint installation and the replacement of existing joints shall be in accordance with the manufacturer's recommendations, the plans, and the approved shop drawings. If there is a dispute between the plans and the approved shop drawings, the approved shop drawings shall govern. The Contractor shall submit, for approval, the manufacturer's ~~shall furnish a copy of the~~ installation instructions prior to the placement of these joints. *The instructions must be approved before installation begins.*~~

~~The fabrication and installation of the joint assembly, where changes in joint direction are required, shall be in accordance with the plans and the approved shop drawings. All welding shall be in accordance with 711.32. All splice welds shall develop full strength. All welds which come in contact with the seals shall be ground smooth. All metal surfaces in direct contact with the seal shall be cleaned and properly treated in accordance with the manufacturer's recommendations. ~~All exposed structural steel surfaces, except for polytetrafluoroethylene coated surfaces and stainless steel, shall be shop painted in accordance with 619.11.~~ Lubricants and adhesives shall be used in accordance with the joint manufacturer's recommendations. All excess lubricant and adhesive shall be removed before it has set.~~

*Final adjustment of the assembly shall be made as directed at the time of installation. All movements due to such factors as shrinkage, creep, and midslab deflection shall be accounted for prior to this final adjustment.*

SECTION 724, DELETE LINES 66 THROUGH 114

SECTION 724, BEGIN LINE 116, DELETE AND INSERT AS FOLLOWS:

**(d) (a) Replacement of Existing Structural Expansion Joint**

The existing joint and adjacent concrete shall be removed to the limits shown on the plans. Additional removal, as directed, may be required to encounter sound concrete adjacent to the joint area. The replacement joint shall be in accordance with the requirements contained herein for the specified type. *Concrete shall be class C in accordance with 702.*

**(e) (b) Replacement of Existing Structural Expansion Joint Seal**

The existing seal shall be removed in its entirety. The new seal shall be installed in accordance with the requirements contained herein for the specified joint type.

**724.04 Method of Measurement**

Structural expansion joints will be measured by the linear foot (meter) along and parallel to the plane of the finished joint surface. Replacement of existing structural expansion joints will be measured by the linear foot (meter) along and parallel to the plane of the finished joint surface. Concrete removal and new concrete required for the replacement of existing structural expansion joints will not be measured for payment. Sliding cover plates will not be measured for payment. Replacement of existing structural expansion joint seals will be measured by the linear foot (meter) along and parallel to the plane of the finished seal installation.

**724.05 Basis of Payment**

Structural expansion joint will be paid for at the contract unit price per linear foot (meter) of the type specified, complete in place. Replacement of existing structural expansion joint will be paid for at the contract unit price per linear foot (meter) for structural expansion joint, of the type specified, replace, complete in place. Replacement of existing structural expansion joint seals will be paid for at the contract unit price per linear foot (meter) for structural expansion joint seal, of the joint type specified, replace.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit Symbol</b>
Structural Expansion Joint, _____ type	LFT (m)
Structural Expansion Joint, _____, Replace type	LFT (m)
Structural Expansion Joint Seal, _____, Replace..... type	LFT (m)

The cost of sliding cover plates shall be included in the cost of structural expansion joint or structural expansion joint, replace, as applicable. The cost of *reinforcing steel*, concrete removal and ~~new~~ *class C* concrete for the replacement of

existing structural expansion joint shall be included in the cost of structural expansion joint, replace.

SECTION 906, BEGIN LINE 173, DELETE AND INSERT AS FOLLOWS:

**906.07 Bridge Expansion Joints**

*Joints, including anchor assemblies, shall be shop fabricated, delivered and installed as a continuous unit for lengths up to 46 ft (14 m). Joints longer than 46 ft (14 m) shall be furnished in continuous units or in appropriate shorter sections as shown on the shop drawings and approved by the Engineer. Joints used in stage construction shall be furnished in sections appropriate to accommodate the work. All joints furnished in sections shall be spliced with welds, with ends prepared for welding in the shop. All welds shall be in accordance with 711.32.*

*The profile of the joint in the roadway area shall conform to the roadway cross section. Where changes in direction are required, such as at curbs or concrete rails, the sections shall be cut to the bevel required to produce the same cross section on each piece being joined. Slider plates shall be provided at curbs, walkways, and concrete rails as part of the completed joint assembly. The slider plate shall be the same material as the extrusion and shall be galvanized in accordance with ASTM A 123.*

*All welds in contact with the elastomeric seals shall be ground smooth. Metal surfaces in direct contact with the elastomeric seal shall be cleaned and treated in accordance with the manufacturer's recommendations to provide a high strength bond between the elastomeric seal and mating metal surfaces. The elastomeric seals shall be clean and free of foreign materials. All exposed structural steel surfaces, except stainless steel or polytetrafluoroethylene coated, shall be shop painted in accordance with 619.*

**(a) Type SS**

Structural steel shall be in accordance with ASTM A 36 (A 36M), A 588 (A 588M), A 570 (A 570M), A 242 (A 242M), or Merchant Quality 1010, 1020.

Sealant and grouts shall be in accordance with ~~Federal Specifications TT-S-00230~~ or as recommended by the manufacturer's recommendations.

The elastomer shall be neoprene in accordance with ASTM D 5973 except that the physical requirements in Table 1 for low temperature recovery, high temperature recovery, and compression-deflection properties will not apply.

*The strip seal shall be furnished in one continuous length for the entire limits of the installed joint. Field splicing of the strip seal will not be permitted. Miter cut, vulcanized shop splices will be required in the strip seal. The shop vulcanization of the strip seal splice may be either a hot or cold process so long as the process produces a splice of equal or greater strength than the elastomer.*

The structural steel and polyurethane sealant shall be covered by a type C certification, and the elastomer shall be covered by a type B certification, both in accordance with 916.

SECTION 906, DELETE LINES 189 THROUGH 199

SECTION 906, BEGIN LINE 201, DELETE AND INSERT AS FOLLOWS:

**(e) (b) Type M**

*This joint shall consist of prefabricated multiple elastomeric seals, separator beams, and support bars. The structural design of the joint shall be in accordance with AASHTO Standard Specifications for Highway Bridges and shall be for the same design loading as the bridge structure at which it is to be installed, but not less than HS 20-44 truck loading and impact. The joint shall be designed to accommodate the movement shown on the plans.*

*The joint assembly shall be preset by the manufacturer in accordance with the approved shop drawings, joint setting data and specifications. The assembly shall be properly secured for shipping and contain provision for final field adjustment at the time of installation. The manufacturer shall furnish a copy of the installation instructions prior to the placement of these joints.*

Structural steel shall be in accordance with ASTM A 36 (A 36M), A 570 (A 570M), A 242 (A 242M), A 588 (A 588M), or Merchant Quality 1010, 1020 in accordance with ASTM A 576.

Sealant and grout shall be in accordance with ~~Federal Specification TT-00230 or as recommended by the joint manufacturer's recommendation.~~

Elastomer shall be neoprene in accordance with ASTM D 3542.

The structural steel and sealant shall be covered by a type C certification and the elastomer by a type B certification, both in accordance with 916.

Bearings above and below the support bar shall be a nylon or urethane compound with polytetrafluorethylene riding surfaces. All components of the system shall be accessible to periodic inspection and component replacement if necessary.

The elastomer seals shall be in accordance with the requirements as follows:

1. *be held in place by compressive forces throughout the normal limits of joint movement,*
- ~~1.~~ 2. *be supplied and installed in one piece;*
- ~~2.~~ 3. *have corner locked edges for a watertight fit;*
- ~~3.~~ 4. *not be any part of the load bearing riding surface;*
- ~~4.~~ 5. *be installed using seal lubricant-adhesive or be mechanically clamped in position to produce a watertight seal;*

5. 6. have a shape which promotes self removal of foreign material during normal joint operation;
6. 7. be recessed 1/2 in. (13 mm) below the riding surface throughout the normal limits of joint movement;
7. 8. be held in position by the separator beams;
8. 9. have a hollow box shape for joints utilizing urethane equilibrium control spacers or a strip seal configuration for joints using a mechanical linkage to maintain equidistant separator beam spacing. *The joint shall have a maximum opening of 3 in. (75 mm) per seal.*

The separator beams shall be in accordance with the requirements as follows:

1. provide the riding surface across the joint;
2. have an extruded or machined shape suitable to hold the seals;
3. be stable against tipping, tilting, or lifting during application of traffic loads by use of a suitable shape and connection to the support bar;
4. be supported individually on their own independent support bars;
5. maintain equidistant spacing through use of suitable urethane equilibrium type control spacers to *counter the compressive forces of the seals* or through a positive horizontal mechanical linkage or proportioning bar.

The support bars shall be in accordance with the requirements as follows:

1. incorporate stainless *steel* sliding surfaces to minimize resistance to joint movements;
2. be supported above, below, and laterally as required to prevent lifting, to transmit bearing loads, and to maintain positioning of the bar.

All support bar boxes and joint housings shall have top, bottom, and sides made of steel plate with 1/2 in. (13 mm) minimum thickness. Anchorages shall consist of looped No. 5 reinforcing bars welded to 1/2 in. (13 mm) steel plates spaced at 9 in. (230 mm) centers. ~~No unwelded~~ *Non-welded* steel to steel contact will *not* be permitted.

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