



**SPECIAL PROVISIONS
FOR
MODULAR EXPANSION JOINT ASSEMBLY**

**Pottawattamie County
IM-029-3(80)52--13-78**

**Effective Date
January 19, 2011**

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

090104.01 DESCRIPTION.

This work shall consist of furnishing materials, services, labor, tools, equipment and incidentals necessary to design, fabricate, inspect, test, certify and install the Modular Expansion Joint Assembly as specified herein. Additionally, this work will consist of the design, detailing and submittal of calculations and drawings for reinforcing steel required in the modular joint blockout in the bridge abutment backwalls and bridge slab. Minimum reinforcing requirements are provided in the design plans. The contractor's engineer shall design and detail reinforcing meeting or exceeding these minimum requirements. The fabrication and installation of the galvanized barrier rail cover plates is also included herein. Contractor shall submit details of the barrier rail conduit expansion fitting in conjunction with the modular joint and barrier rail cover plate details for simultaneous review.

A. GENERAL REQUIREMENTS.

1. Contractor shall provide a Modular Expansion Joint Assembly (MEJA) to accommodate the design movements at North Abutment, Pier 6 and South Abutment. Contractor shall provide a MEJA that is either a single support bar system with sliding yokes or a welded multiple support bar system furnished by one of the following, listed in alphabetical order:
 - The D. S. Brown Company
PO Box 158
300 E. Cherry Street
North Baltimore, Ohio 45872-0158
419-257-3561
 - D. S. Techstar Inc.
1219 W. Main Cross St.
Findlay, OH 45840

419-424-0888

- Watson-Bowman
95 Pineview Drive
Amherst, NY 14228
716-691-7566

2. Contractor shall provide a MEJA with a single layer preformed elastomeric seal mechanically held in place by steel edge beams and center beams. Support the center beams on individual support bars for a welded multiple support bar system or on common support bars for a single support bar system. Allow for a maximum of 3 inches of movement in each elastomeric seal. Suspend the support bars over the joint opening using support boxes with internal sliding elastomeric bearings. For a welded multiple support bar system, a large support box to enclose the multiple support bars will be permitted. Control the joint opening with equidistant mechanisms that develop their maximum compressive force at the widest joint opening. In addition to any support of the joint from above prior to concreting, support the MEJA in the blockout from below with a positive support system at each support box designed to level the joint to the proper grade and slope.

B. DESIGN AND TESTING REQUIREMENTS.

1. The MEJA shall be designed in accordance with the AASHTO LRFD Bridge Design Specifications, 4th edition, series of 2007 plus current interims, including the modifications and exceptions noted herein.
2. Fabrication and construction shall be in accordance with the AASHTO LRFD Bridge Construction Specifications, 2nd edition, including the modifications and exceptions noted herein.
3. Prior to fabrication, submit complete details of the MEJA together with an installation and water tightness plan to the Engineer for approval. The following information shall be included in the submittal:
 - a. Complete reinforcing bar layout for the expansion joint blockouts based on the reinforcing layout and limitations provided in the plans. Integrate this layout with bars extending from the abutment backwall and deck slab. The minimum reinforcing steel in the top of the blockout is to be #4 bars at 12 inches or #5 bars at 18 inches on center, in both directions. Provide complete details of the blockout reinforcing on design and shop drawings.
 - b. Plan and section views of the MEJA showing dimensions and tolerances. Provide a minimum of 3/8 inch material thickness for all structural steel elements.
 - c. Provide support boxes with a minimum steel thickness for 3/8 inch. For support boxes wider than 16 inches, provide a width to thickness ratio not to exceed 45.
 - d. Design and detail support bar bearing locations to provide adequate bearing stress resistance and avoid excessive edge loading of the blockout concrete. Provide calculations detailing satisfaction of this requirement.
 - e. In addition to the design requirements of AASHTO LRFD 14.5.6.9.4, design the support boxes to transfer stresses from wheel loads applied to the top surface of the box in the blockout areas and transferred through the box to the supporting concrete. Use the AASHTO LRFD tandem axle loads for the Strength Limit State design. Fatigue loading is in accordance with AASHTO 14.5.6.9.4. For the distribution of wheel loads to the support boxes, perform design calculations using a contact area measuring 20" wide and 10" long in accordance with AASHTO LRFD 3.6.1.2.5. Do not assume any benefit to load distribution from the concrete cover. Apply impact as required for the Strength and Fatigue Limit States.
 - f. Design the joint at the Strength Limit State for effects of snowplow loading in accordance with the requirements of AASHTO LRFD 14.5.1.2.

- g. Detail all welded and bolted center beam or support bar joints and all shop or field splices.
 - h. When support bars are welded to center beams, use complete penetration groove welds and ultrasonically test 100% of the welds.
 - i. Provide complete details of all components and assemblies incorporated into the MEJA.
 - j. Provide all ASTM, AASHTO or other material designations.
 - k. Provide details of shipping, lifting, support and alignment details.
 - l. Provide temperature adjustment data in accordance with values shown in the plan drawings.
 - m. Provide a certificate of compliance with the AISC Quality Certification Program for Simple Steel Bridges for vendor-fabricated joints. Provide a certificate of compliance with the AISC Quality Certification Program for Major Steel Bridges for joints fabricated using third-party fabricators.
 - n. Provide certification that welding inspectors have current certification under AWS QC1, Standard for Qualification and Certification of Welding Inspectors.
 - o. Document that nondestructive test technicians are certified by ASNT.
 - p. Provide Manufacturer's certificate of compliance for PTFE sheet / fabric.
 - q. Provide sealed engineering drawings and calculations prepared by a Professional Engineer licensed in the State of Iowa for the proposed MEJA including designs for both the Fatigue and Strength Limit States as described by AASHTO LRFD Bridge Design Specifications, 4th Edition, Section 14.5.6.9 and referenced articles therein. At a minimum, all AASHTO requirements will be followed.
 - r. Provide test data and reports indicating the joint type, including all structural details, has been tested for compliance with NCHRP 402 – "Fatigue Design of Modular Bridge Expansion Joints." Provide certification that the design to be furnished has passed the requirements of the Opening Movement and Vibration Test (OMV), the Seal Push Out Test (SPO) and the Fatigue testing requirements of AASHTO LRFD Bridge Construction Specifications, 2nd Edition, Chapter 19, Appendix A, as verified by an independent testing agency.
 - s. Provide a manufacturer's recommended maintenance and repair plan for the MEJA for review and approval of the Engineer. The plan should include a detailed description of recommended and required maintenance activities including maintenance inspection requirements, wear tolerances, methods for determining wear or deterioration, and procedures for replacing worn parts.
 - t. Detail any temporary bridging that may be required to allow construction traffic to cross the joint prior to complete installation. If construction traffic will not be permitted to cross the joint, include this in the installation plan as a restriction on operations.
 - u. Provide final accepted versions of all of the above documents to the Contracting Authority on a CD-ROM in Adobe Acrobat PDF format at the completion of the project.
4. In addition to a required longitudinal movement range as specified in the plan drawings for each location, provide a joint having the additional movement capabilities:
- Transverse movement, 1.0 inch
 - Vertical movement, 1.0 inch
 - Rotation about longitudinal axis, 1 degree
 - Rotation about transverse axis, 1 degree
 - Rotation about vertical axis, 1/2 degree

090104.02 MATERIALS.

Furnish materials new and without defects. Remove defective materials from the jobsite at no additional cost. Materials for MEJA shall consist of the following:

- A. Blockout Concrete, High Performance Structural Concrete, per Developmental Specification for High Performance Concrete for Structures – Council Bluffs System.

- B. Reinforcing Steel, Epoxy Coated, Section 4151.
- C. Preformed Neoprene Strip Seal and Lubricant Adhesive, Section 4136 and AASHTO M220.
- D. Structural Steel, Section 4152, hot dip galvanized per AASHTO M111.
- E. Stainless Steel, ASTM A240 Type 304, with 2B finish.
- F. Stainless Steel Mating Surfaces, ASTM A 240/A 240M Type 304. Minimum No. 8 mirror finish for mating surface. Minimum 16 gauge thickness for the stainless steel plate.
- G. PTFE, 100% virgin Teflon, woven PTFE fabric or dimpled PTFE, AASHTO Section 18.8, Division II.
- H. Bolts, Nuts, Washers and other hardware shall conform to the requirements of AASHTO M 164 and shall be galvanized in accordance with AASHTO M 298.
- I. Urethane Foam, ASTM D3574.
- J. Springs, bearings, and equidistant devices to be the same material composition and formulation, Manufacturer, fabrication procedure, and configuration as those used in the prequalification tests.

090104.03 CONSTRUCTION REQUIREMENTS.

The following construction procedure shall be used:

- A. Fabricate the modular expansion joint assembly at facilities owned and operated by the manufacturer that is responsible for the design of the joint assembly. The facility must have a current AISC Simple Steel Bridge Certification. Alternately, provide a joint fabricated by an AISC Major Steel Bridge Certified fabricator with experience in fabricating MEJA's. Provide written certification of the fabricators experience. Provide welding conforming to ANSI/AASHTO/AWS Bridge Welding Code D1.5-2008.
- B. Fabricator shall thoroughly clean and remove excess galvanizing material from interior portions of steel extrusions prior to installing elastomeric seals.
- C. Remove all debris from the concrete blockout prior to placing the concrete. Protect the joint blockout and MEJA from damage during all phases of construction. Use bridging to span the joint blockout during construction. Submit details of the bridging to the Engineer for approval.
- D. Damage to the joint system during shipping, handling or installation shall be cause for rejection of the system.
- E. Repair damage to the corrosion protection system to the satisfaction of the Engineer.
- F. Design the MEJA, fabricate and deliver to the job site as a continuous unit. Field welding of the MEJA is not permitted.
- G. Provide single piece seals. Seals will be installed in the shop, except when indicated otherwise. No splices are permitted. Joint seals are not permitted to extend above the joint. Design and detail the joint to allow for seal removal and replacement with a minimum of 1.25 inch space between adjacent center beams.
- H. Provide edge beams and center beams machined or extruded to form the required profile. Multiple pieces welded to form the profile or bent / crimped to form the required profile are not permitted.

- I. Coordinate upturns at the exterior gutter lines with the barrier rail cover plate and conduit expansion and fitting details.
- J. Provide a minimum of 3 inches of concrete cover above the top of the joint support boxes. As a minimum, install rebar in the blockout as directed on the plans. Provide a minimum of 2 inches of concrete under the support boxes. Provide a minimum of 2 inch clear cover to support boxes and anchor studs to the vertical face of the blockouts. Coordinate these requirements with the design and detailing of the blockouts and girder end copes. Blockout dimensions shall be reduced or enlarged as necessary to accommodate a particular joint design. Modify abutment backwall and girder design accordingly if blockout dimensions and support slab details are to be changed. Submit calculations and drawings documenting all proposed changes from the as-designed drawings. Calculations and drawings shall be sealed by a Professional Engineer licensed in the State of Iowa.
- K. Furnish a joint such that the bearings and slide assemblies are removable and replaceable.
- L. Install the joint system in strict accordance to the Manufacturers recommendations. A minimum of two weeks preceding installation of the first joint, furnish to the Representative, three copies of a detailed installation plan and instructions.
- M. Arrange for an employee of the joint manufacturer to be present during installation of the joint to assist with any technical or construction issues. Adhere to all recommendations made by the manufacturer representative made both on site and off site. Arrange for the Manufacturer's representative to certify to the Owner in writing that the installation adheres to the Manufacturers recommended installation procedures.
- N. Furnish a system to expand or compress the joint system evenly to the desired joint opening for given installation temperatures. Temperatures correspond to structure temperature, not air temperature. Final adjustment of the joint opening shall be based on the Manufacturer's recommendation immediately prior to placing the blockout concrete. Use a temperature sensing device to measure the slab temperature on the lower surface of the slab at both ends of the blockout. Use an average of these readings to determine the structure temperature at time of installation. Adjust the joint based on these structure temperature readings.
- O. Align the joint to the roadway grade and cross-section. Install the joint flush with the top of deck.
- P. Provide a level top of joint allowing no more than 1/8 inch differential elevation between any center beams and the edge beams measured using a straight edge between the two edge beams.
- Q. Provide uniform gaps for all joint seals. The allowable difference in gaps at either end of a joint seal is 1/2 inch maximum.
- R. To reduce corrosion potential, electrically isolate the MEJA by not connecting the bridge deck reinforcement to the MEJA.
- S. Place High Performance Structural Concrete to completely fill the blockout. Thoroughly consolidate the concrete under the support boxes to completely fill the area. Do not use vibrators to move concrete. Prevent concrete from entering inside the support boxes or otherwise interfering with the proper operation of the joint system. Prior to placing the blockout concrete, coat all existing concrete with an approved bonding compound.
- T. Do not allow construction vehicles to apply live load to the joint for a period of 72 hours. Use bridging to allow for passage of construction vehicles.

- U. Following joint installation, flood the joint to a minimum depth of three inches for one hour. Monitor the MEJA for leaks and repair all leaks. Retest the system following repairs. Perform an additional leak test immediately preceding the final inspection of the bridge.

090104.04 METHOD OF MEASUREMENT.

Modular Expansion Joint Assembly will be paid for in linear feet at the quantity shown in the contract documents. Modular Expansion Joint Assembly Leak Testing will be paid for by count at the quantity shown in the contract documents.

090104.05 BASIS OF PAYMENT.

- A. The quantities accepted for payment will be paid for at the contract unit prices for the following items:

Pay Item	Unit
Modular Expansion Joint Assembly	L.F.
Modular Expansion Joint Assembly Leak Testing	Each

- B. The contract unit price for the Modular Expansion Joint Assembly will be full and complete payment for all materials, labor, tools, equipment, inspection, services, and incidentals necessary to furnish and install the modular expansion joint assemblies as specified and at the locations shown in the plans. Also included are the design, detailing and construction of the MEJA blockout including required submissions to the Engineer as well as fabrication and installation of the galvanized barrier rail cover plates.
- C. The contract unit price for Modular Expansion Joint Leak Testing will be full and complete payment for all labor, tools, equipment, services, and incidentals necessary to test each modular expansion joint, perform repairs if needed, retest following any repairs, and performing an additional leak test immediately preceding the final inspection of the bridge.