

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
MODULAR BRIDGE JOINT SYSTEM

STR:MJF

1 of 4

APPR:POJ:JAB:04-28-20
FHWA:APPR:05-06-20

a. Description. This work consists of designing, testing, fabricating, and installing a modular bridge joint system (MBJS) of the size and type at the locations shown on the plans. Ensure this work is in accordance with *Section 19 of the AASHTO LRFD Bridge Construction Specifications, 4th Edition, 2017* (hereafter referred to as *AASHTO*), except as modified herein.

A MBJS generally consists of, but is not limited to the following components: edgebeams, centerbeam(s), support bar(s), joint seals, bearings, springs, equidistant devices, and sliding steel plate systems at sidewalks, concrete median barriers, and concrete parapet joints. It must be continuous across the full width of the roadway and beneath the median barriers and parapet joints without field splices (except as allowed herein) and match the finished roadway profile and grade. The MBJS must seal the roadway deck surface, gutters, curbs and parapet walls and provide longitudinal and transverse movement capacity to meet the movement indicated on the plans and as required by design in accordance with this special provision. Any seeping or leaking of water through the joint system will be cause for rejection.

b. Submittals. The MBJS manufacturer must submit details of the MBJS and installation and waterproofing plans to the Engineer for approval prior to fabrication of the MBJS in accordance with *article 19.2.2 of AASHTO* and section 707 of the Standard Specifications for Construction.

The Contractor must submit test reports and certificates for the Engineer to review and approve in accordance with *article 19.2.2 of AASHTO* and section 707 of the Standard Specifications for Construction. Do not incorporate materials into the work until all tests have been performed and the materials are found to be acceptable. Ensure tests are performed only by a nationally accredited testing laboratory and the test results are notarized and submitted to the Engineer for review in accordance with the standard specifications.

c. Materials. The MBJS must meet the material requirements shown in *article 19.3.2 of AASHTO* with the following exceptions:

1. Design the MBJS for HL-93 loading and dynamic impact per *AASHTO* and capable of accommodating the joint movements indicated on the plans.
2. Include bosses used in single-support-bar (SSB) type MBJS in the fatigue testing of the MBJS.
3. Ensure centerbeam(s) and edgebeams are monolithic (non-welded) and machined or extruded solid steel sections received from the mill. Rolled sections with bent or welded seal retainer clips are prohibited.

4. Ensure preformed elastomeric joint seals are strip seals (multiple-web design seals are prohibited) and mechanically held in place by machined or extruded steel edgebeams and centerbeams. Seals and the design of the MBJS must promote self-removal of foreign material during normal joint operation.
5. Provide structural steel in accordance with *AASHTO M270M/M270 Grade 50 or 50W*, except the silicon content must be less than 0.06 percent or between 0.15 through 0.25 percent.
6. Charpy V-Notch toughness for the center beam and support bar must meet 20 foot-pounds at 40 degrees Fahrenheit (F).
7. Hot-dip galvanize all carbon steel after fabrication in accordance with *AASHTO M111M/M111*. Repair galvanizing in accordance with *ASTM A780/A780M* using the zinc-based soldering method (hot-stick).
8. Provide shear connector studs in accordance with section 906 of the Standard Specifications for Construction.
9. Provide high strength bolts, nuts, and washers in accordance with section 906 of the Standard Specifications for Construction.

The following manufacturers have a MBJS approved by MDOT, but other MBJS that meet these specifications would also be acceptable:

- D. S. Brown Company, North Baltimore, OH.
- Watson Bowman ACME, Amherst, N.Y.

The fabricated MBJS will be accepted based on "Fabrication Inspection" in accordance with MDOT's Materials Quality Assurance Procedures manual.

d. Manufacture and Fabrication. The MBJS must meet the manufacturing and fabrication requirements shown in *article 19.4.3 of AASHTO* and section 707 of the Standard Specifications for Construction with the following exceptions:

1. One field splice is permitted when the plans specify part-width construction or the MBJS length exceeds 72 feet.
2. Provide a continuous elastomeric sealing element with a maximum of 3 inches of movement per seal.
3. Ensure support bars are solid steel sections.
4. Fillet welds are required on both sides of all attachments.
5. Bolted field splices are prohibited.
6. Edgebeam horizontal elements are prohibited.
7. The minimum thickness of any steel component must not be less than 3/8 inch.

8. Submit heat straightening procedures (if required) to the Engineer for approval prior to straightening.

9. Pretension bolted SSB type support bar and equidistant devices using MDOTs turn-of-nut method specified in section 707 of the Standard Specifications for Construction.

10. Welding the outer surface of the nut to the exposed threads of the bolt is prohibited as a locking technique to prevent bolt loosening.

11. Ultrasonic test (UT) 100 percent of complete joint penetration groove welds on centerbeam(s).

12. Ensure seals are not field spliced. If part-width construction results in field splices of the MBJS then install the seal in the first joint with enough remaining seal to complete the remaining stages.

13. Ensure the expansion joint device at sidewalks, concrete median barriers, and concrete parapet joints has a sliding steel plate fabricated and installed in accordance with the plans.

e. Construction Requirements. The MBJS must meet the installation requirements shown in *article 19.5 of AASHTO* and section 707 of the Standard Specifications for Construction with the following exceptions:

1. Provide factory prefabricated assemblies of the MBJS that have a provision for field adjustment to the ambient temperature at the time of installation. Preset the joint opening as indicated on the plans.

2. The manufacturer of the MBJS must have a qualified technical service representative on the project to supervise the entire installation and water tightness test.

3. Anchor the MBJS as shown on the plans. Anchor slider plates to the concrete with cast-in-place inserts. Accurately set and securely support the expansion joint system at the correct grade and elevation and the correct joint opening as shown on the plans and on the shop drawings.

4. Measure the structure temperature by recording the temperature of the underside of the concrete slab at each end of the superstructure element adjacent to the expansion joint. Take the average of the readings to use with the temperature correction factor shown on the plans. Install the MBJS at the proper gap opening and immediately remove the opening devices on the MBJS after the concrete is poured.

5. Place and finish the surrounding concrete, after the MBJS has been set to its final line and grade in accordance with section 706 of the Standard Specifications for Construction. Prime all existing concrete surfaces before placing the concrete using an approved concrete bonding agent. Finish the uppermost surface of the concrete placement as directed by the Engineer.

6. Perform a water tightness test per *AASHTO* with the following exceptions:

A. Test the entire (full length) joint system for watertight integrity at least 48 hours after the MBJS has been installed and completed.

B. Inspect the concrete surfaces under the joint during the entire test duration and for a minimum of 1 hour after the supply of water has been stopped, for any evidence of dripping water or moisture.

C. Water tightness is interpreted to be no free dripping water from any surface on the underside of the joint. Patches of moisture will not be cause for repair.

f. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	Pay Unit
Modular Bridge Joint System, __ inch.....	Foot

Modular Bridge Joint System, __ inch will be measured in place by the foot along the centerline of the joint from edge to edge (face of parapet to face of parapet) of the MBJS approved by the Engineer. All sliding plate assemblies at the sidewalks, parapets, and median barriers will not be measured for payment.

Modular Bridge Joint System, __ inch includes furnishing, delivering and installing the MBJS; furnishing and installing hardware and other accessories; development of shop drawings, working drawings and design calculations; testing; sampling; on site supervision by and expenses for the manufacturers technical representative; and providing all non-destructive testing, and all other appurtenant and collateral work necessary to construct the MBJS as shown on the plans and as specified herein.

The contract unit price will also include field welding, field coating touch-up, furnishing and installing all sliding plate assemblies at the parapets and median barriers, steel brackets at steel stringers and grouting as indicated on the plans and in this special provision.