SECTIONS 566 & 567 - BRIDGE DECK JOINT SYSTEMS

Description

There are various types of bridge deck expansion joint systems. The current systems are:

- 566-00 armored joint with compression seal,
- 566-00 armored joint with preformed elastic strip seal
- 567-00 modular joint systems.

The type and locations are shown on the Contract Plans.

Armored joints with compression seal consist of angles and a preformed compression seal and are supplied with different size seals. The system is installed into a blockout formed in the concrete structural deck.

Armored joints with preformed elastic strip seal consist of a steel extrusion and a molded gland and are used with concrete and asphalt overlays. On concrete overlays the joint is installed first and then the overlay is placed. On asphalt overlays the asphalt is placed first and compacted. The asphalt is then saw cut and removed to form a recess and the joint installed. The void between the steel extrusion and the cut asphalt is filled with elastomeric concrete.

Modular joints are manufactured in various sizes and are supplied with a series of steel separator beams and hollow type seals. The system is usually installed in a large blockout formed in the structural deck.

Inspection

Joint systems are shop assembled and delivered to the work site ready for installation. They are accepted based on manufacturers certification that all materials and fabricating procedures used are in accordance with the requirements of the approved Shop Drawings and Specifications.

Field inspection shall include inspection for proper alignment with no bends or kinks, spacing and soundness of studs, and complete bond between the seal and the steel. A seal that is not completely bonded to the steel shall be rebonded with adhesive meeting the requirements of Section 567-2.02A6 of the Standard Specifications (a).

Shop Drawings

Shop Drawings are required for any joint system supplied and shall meet the various applicable requirements of Section 566-2.02 and 567-2.04 of the Standard Specifications (a) and the NYS Steel Construction Manual (b).

Approved Shop Drawings shall include a detailed installation procedure recommended by the manufacturer. E.I.C.’s and inspectors should familiarize themselves with the procedures for the particular type of joint being installed to ensure that all requirements are met.

Construction Details

Close adherence to the installation procedure provided by the manufacturer is essential to ensure a properly performing and watertight joint. The following operations are of particular concern:

Concrete Deck:

1. Dimensions of the blockout area should be checked against the dimensions shown in the Contract Plans and Shop Drawings.

2. Once installed in the blockout, the armored joint system should be adjusted to the temperature for the opening and grade, such that the top of the angles are
approximately level with the surface of the surrounding deck. Joints set too high can result in the angles being clipped by the snowplows and damaged, so it is preferable to set the joints slightly low (0 to 3mm) rather than slightly high.

3. Before pouring the concrete header, all surfaces of the recess must be thoroughly cleaned by sandblasting around the joint and debris removed by subsequent air blasting with oil-free compressed air or vacuuming. Just prior to pouring, the surfaces of the recess shall be thoroughly coated with Material Section 721-03 Epoxy Polysulfide Grout or Standard Specification Material Section 705-22 Portland Cement Mortar Bonding Grout (a). No tape, placed on the angles for protection, shall cover the vent holes.

4. Slump and air tests shall be run on the header concrete, and close attention should be paid to placement, vibration, finishing, and curing. Header concrete is prone to developing shrinkage cracks because of the long length of concrete placed and the fact it is placed on dry concrete which will extract the design mix water from the concrete. Good construction practice would involve prewetting the area for a minimum of 12 hours prior to placement. As with all small placements, special care must be taken to avoid overworking the concrete. Concrete must be thoroughly worked under the angles with shovels or hoes not with vibrators. Vibration should be stopped as soon as the vent holes in the angles are completely filled with concrete. Hand finishing should be kept to a minimum, just enough to secure a smooth surface within tolerances, and the finishers should be watched carefully to insure they do not add water.

5. Curing the header concrete must be in accordance with Section 555-3.09 of the Standard Specifications (a).

6. Watertight Integrity Test shall be in accordance with Section 567-3.01H if required, see Standard Specification (a).

Asphalt Overlay with Elastomeric Concrete

1. Place asphalt on the entire structural deck including the joint area and compact to the specification.

2. Saw cut and remove asphalt to form a recess as indicated on the Contract Plans.

3. Set joint in recess. The steel extrusion opening should be adjusted to temperature at the time of installation and grade such that the top of the extrusions are level with the surface of the surrounding asphalt. Joints set too high can result in the steel extrusion being hit by a snowplow and damaged, so it is preferable to set the steel slightly low (0 to 3mm) rather than slightly high.

4. Before placing elastomeric concrete around the joint, all metal surfaces shall be abrasive blast cleaned to SSPC SP-6 Commercial Blast Cleaning (c). No visible rust will be permitted. All other surfaces coming in contact with the elastomeric concrete shall be abrasive blasted. The recess shall be vacuum or air-blown with oil-free compressed air.

5. Mix and place elastomeric concrete in accordance with the manufacturer’s instructions, the specification, and insure the material is on the Departments “Approved List” (d). The two part elastomeric concrete liquids, part A (resin) and part B (hardener), must be thoroughly mixed to ensure proper hardening. The mixing ratio shall be in accordance with that shown in the approved material detail sheets supplied with the material.
6. After the elastomeric concrete has been installed, cured and exposed to normal traffic for a minimum of five days, a Watertightness Integrity Test shall be performed in accordance with Section 567-3.01H of the Standard Specifications (a).

Stage Construction
Installation procedures are the same for concrete and asphalt overlays, the only difference with stage construction is the seals or rubber is installed in one piece or spliced at the stage line for the particular joint system being installed.

Splicing of the steel extrusion of modular expansion joint system shall be in accordance with the approved Shop Drawings.

The following operation shall be performed with “field installation” of the seal or rubber:

1. All cutting and bending of the seals shall be performed as shown on the approved shop drawings.

2. Field splicing of the seal or rubber shall be performed by a factory representative.

3. Sandblast the area in contact with the seal or rubber and remove all debris by subsequent air blasting with oil-free compressed air or vacuuming.

4. Apply adhesive to steel surfaces and install seal or rubber. Care shall be exercised as not to damage the seal or rubber. Damage to the seal or rubber is grounds for rejection.

5. Watertight Integrity Test shall be in accordance with Section 567-3.01H if required, see Standard Specifications (a).

References
(a) New York State Standard Specifications.
(b) New York State Steel Construction Manual, Section 2-Drawings and Section 7-Welding.
(c) Steel Structures Painting Council, SSPC-VIS 1-89, Visual Standard for Abrasive Blast Cleaned Steel.
(d) Current Materials Bureau’s “Approved List” (Material and Equipment for use on NYSDOT Projects). This list can also be found on the DOT Web Site.