TENDER DOCUMENTS

SUBSECTION 6.63
DECK JOINTS

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SUBSECTION 6.63 DECK JOINTS

6.63.1 GENERAL

6.63.1.1 This subsection describes the requirements relating to the installation or replacement of deck joints under this Contract.

6.63.1.2 Any specific requirements pertaining to the installation or replacement of deck joints under this Contract are set out on the drawings and in Section 4 *Specific Technical Conditions*.

6.63.1.3 The requirements relating to demolition work are described in subsection 6.21 *Demolition and Removal.*

6.63.1.4 The requirements relating to reinforcing steel are described in subsection 6.31 *Reinforcing Steel for Concrete*.

6.63.1.5 The requirements relating to formwork are described in subsection 6.32 *Formwork*.

6.63.1.6 The requirements relating to concrete placement are described in subsection 6.33 *Cast-in-Place Concrete*.

6.63.1.7 The requirements relating to steelwork are described in subsection 6.41 *Steelwork*.

6.63.1.8 The requirements relating to waterproofing membranes are described in subsection 6.64 *Waterproofing Membrane.*

6.63.1.9 The requirements relating to asphalt are described in subsection 6.82 *Hot-Mix Pavement.*

6.63.2 MEASUREMENT UNITS

6.63.2.1 The measurement units and respective symbols thereof used in this subsection are described as follows:

Measurement Unit	Designation	Symbol
length	millimeter	mm
stress, pressure	kilopascal	kPa
stress, pressure	megapascal	MPa

6.63.3 REFERENCE STANDARDS

6.63.3.1 The **Contractor** shall perform all deck joint work in accordance with the requirements of the following standards and documents to which the provisions of this Contract are added:

6.63.3.1.1 (ASTM) ASTM International:

- ASTM D5973 *Standard Specification for Elastomeric Strip Seals with Steel Locking Edge Rails Used in Expansion Joint Sealing*;
- ASTM F835 *Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws*.

6.63.3.1.2 CSA Group (Canadian Standards Association):

- CAN/CSA S6-06 *Canadian Highway Bridge Design Code*.

6.63.3.1.3 (MTQ) Ministère des Transports du Québec:

- MTQ – *Cahier des charges et devis généraux (CCDG)*.

6.63.4 MATERIALS

6.63.4.1 GENERAL

6.63.4.1.1 The **Contractor** is responsible for choosing the manufacturers of the products used and for the performance of those products once they are in place.

6.63.4.1.2 The Engineer may reject any material of the same type that failed to meet the technical requirements under previous projects of the **Owner**.

6.63.4.1.3 The design and manufacturing of the expansion joints shall comply with standard CAN/CSA S6. The installation of the expansion joints shall comply with the manufacturer's recommendations.

6.63.4.1.4 The expansion joints shall be designed and dimensioned so as to meet the load, movement and space requirements indicated on the drawings.

6.63.4.1.5 The shop drawings shall be signed and sealed by an engineer who is a member of the *Ordre des ingénieurs du Québec* (OIQ) and has at least ten (10) years of relevant experience in work of similar nature.

6.63.4.2 SINGLE SEAL JOINTS

6.63.4.2.1 The single seal deck joint shall meet, without however being limited to, the following requirements:

6.63.4.2.1.1 the deck joint seal shall be held in place by a clamping plate device;

6.63.4.2.1.1.1 the clamping plates shall be secured to the protection angles with countersunk head bolts;

6.63.4.2.1.1.2 the clamping bolts shall be Grade 8 with zinc phosphate anti-friction treatment compliant with standard ASTM F835;

6.63.4.2.1.2 the expansion joint shall be protected against impacts by concrete shoulders having a minimum width of 275 mm;

6.63.4.2.1.2.1 the concrete shoulders shall be confined within an angle set integrated into the seal structure.

6.63.4.2.1.3 the joint seal shall be "V"-shaped, made of high-strength neoprene and comply with standard ASTM D5973;

6.63.4.2.1.4 the expansion joint shall have a system to anchor the joint to the concrete to enable it to withstand the stresses induced by traffic and by snow removal vehicle blades;

6.63.4.2.1.5 the expansion joint shall have a pre-concreting adjustment system which shall rest on the formwork and not on the reinforcing bars;

6.63.4.2.1.6 the expansion joint shall be fitted with a closing plate, welded to the seal tightening angle clip, which shall extend beyond the slab formwork and will serve as formwork at the joint;

6.63.4.2.1.7 the expansion joint shall be fitted with a gutter at the extremities of the closing plates;

6.63.4.2.1.8 the expansion joint shall be fitted with an injection tubing system under the assembly angles for filling voids and sealing the shoulder concrete shrinkage cracks by injecting epoxy resin.

6.63.4.2.2 The *Goodflex Series 1100* deck joint manufactured by Goodco Z-Tech is one type of joint that meets the requirements of paragraph 6.63.4.2.1.

6.63.4.3 MULTIPLE SEAL JOINTS

6.63.4.3.1 The multiple seal joint shall be designed so as to take the movements indicated on the drawings.

6.63.4.3.2 The multiple seal deck joint shall meet, without however being limited to, the following requirements:

6.63.4.3.2.1 the joint seal shall be held in place by a device that allows the interlock thereof;

6.63.4.3.2.2 the joint shall be protected against impacts by a steel edge member;

6.63.4.3.2.3 the joint seal shall be "V"-shaped, made of high-strength neoprene and comply with standard ASTM D5973;

6.63.4.3.2.4 the joint modules shall be supported by a sufficient number of steel girders capable of withstanding the traffic loads;

6.63.4.3.2.5 the joint shall be designed so as to allow an unrestricted but controlled movement of the modules on the support girders;

6.63.4.3.2.6 the expansion joint shall, where applicable, have a system to anchor the joint to the concrete to enable it to withstand traffic-induced stresses.

6.63.4.3.3 The Series *MEJS 2000 Series* deck joint manufactured by Goodco Z-Tech is one type of joint that meets the requirements of paragraph 6.63.4.3.2.

6.63.5 EXECUTION OF WORK

6.63.5.1 PLANNING

6.63.5.1.1 Before preparing its shop drawings, the **Contractor** shall conduct a complete and detailed site survey of all existing elements in order to determine their exact dimensions and confirm the dimensions and the location of the assembly holes indicated on the drawings. The **Contractor** shall conduct such a survey wherever a given detail applies.

6.63.5.1.2 At least fourteen (14) days prior to ordering any materials and fabricating any components, the **Contractor** shall submit to the Engineer, for review, the shop drawings, technical data sheets and samples for each material to be used under this Contract, notably all steel components of the joint and the seal.

6.63.5.1.3 The **Contractor** may not make any changes to the materials or construction details indicated on the shop drawings that have been reviewed by the Engineer without first obtaining his written authorization.

6.63.5.1.4 If the dimensions obtained in the course of the detailed survey of the elements differ from those indicated on the drawings or if the actual conditions make it impossible to perform the work as indicated on the drawings, the **Contractor** shall notify the Engineer in writing and follow his instructions.

6.63.5.1.5 The **Contractor** shall provide the Engineer, for review, with a detailed working method that includes the sequence of operations and the deadlines for each operation.

6.63.5.1.6 The fact that the documents or components referred to in the preceding paragraphs are reviewed by the Engineer does not relieve the **Contractor** of its responsibility under the Contract, including, without limitation, its responsibility for supplying appropriate materials and equipment, adopting suitable working methods, ensuring good workmanship and implementing proper safety measures.

6.63.5.2 MAINTENANCE OF TRAFFIC

6.63.5.2.1 Unless otherwise indicated on the drawings, the **Contractor** shall carry out the work according to the phasing indicated on the drawings and in accordance with the subsection 6.14 *Traffic Control and Temporary Signage.*

6.63.5.2.2 When the sequence of work calls for lanes to be re-opened between the different work phases, the **Contractor** shall maintain the road suitable for vehicles by installing, above the joint to be replaced, steel plates that shall be embedded in the first layer of asphalt concrete and fastened to the deck with steel bolts, in accordance with the drawings.

6.63.5.2.3 The **Contractor** shall eliminate any transverse and longitudinal unevenness between travel lanes by constructing asphalt concrete tapers whose transition slope shall be 1.25% (1:80) or less in order to minimize users discomfort and allow traffic to move safely.

6.63.5.2.4 The **Contractor** shall also install traffic signs indicating the presence of grade changes and transitions slopes on the driving surface.

6.63.5.2.5 The **Contractor** shall inspect the condition of the transition slopes and steel plates on a daily basis and make the necessary corrections in the shortest possible time, while complying with the subsection 6.14 *Traffic Control and Temporary Signage,* at no additional cost to the **Owner**.

6.63.5.2.6 The **Contractor** shall ensure that a work crew is available twenty-four (24) hours a day, at no additional cost to the **Owner**, to repair any damage to transition slopes or steel plates in case of failure. The site intervention shall be initiated within sixty (60) minutes from the call, or within any other timeframe agreed to by the **Contractor** and the Engineer.

6.63.5.2.7 If the **Contractor** fails to initiate the site intervention within the prescribed period, the **Owner** reserves the right to perform, at the **Contractor**'s expense, the work required to correct the failure.

6.63.5.2.8 In case of accidental breakage caused by a third party, such as breakage caused by a snow plow, the **Owner** and the **Contractor** may agree on the actions to be taken and procedures for the repairs required.

6.63.5.2.9 The road surface shall be cleaned by means of a mechanical vacuum sweeper after each intervention, prior to re-opening the lanes to traffic.

6.63.5.3 REMOVAL, DEMOLITION AND DISMANTLING OF EXISTING ELEMENTS

6.63.5.3.1 The removal of the existing asphalt concrete, demolition of the concrete and of the existing joint, as well as dismantling of the steel, electrical, telecommunications or other equipment shall comply with subsection 6.21 *Demolition and Removal* and comply with the indications on the drawings.

6.63.5.3.2 The **Contractor** shall use screens to protect vehicles moving in the vicinity of the demolition work, to the satisfaction of the Engineer.

6.63.5.3.3 The **Contractor** shall take such measures as are necessary to ensure that the deck slab is not damaged beyond the limits indicated on the drawings.

6.63.5.3.4 The **Contractor** shall take such measures as are necessary to ensure that the existing reinforcing bars to be preserved are not damaged.

6.63.5.4 DECK JOINT IMPLEMENTATION

6.63.5.4.1 The fabrication and implementation of the steel components of the joints shall comply with subsection 6.41 *Steelwork* and comply with the indications on the Contract drawings and shop drawings.

6.63.5.4.2 The implementation of the deck joint shall comply with standard CAN/CSA S6 and with the drawings and shall comply with the manufacturer's recommendations, with the following clarifications:

6.63.5.4.2.1 the concrete shoulder transverse and longitudinal slopes shall match any profiles prescribed for the asphalt on both sides of the joint;

6.63.5.4.2.2 a joint opening made in a single section shall be adjusted to the opening indicated on the drawings, according to the temperature of the ambient air that was measured under the bridge, at the location of the joint, at the time the joint was fixed;

6.63.5.4.2.3 the opening of a joint made in two (2) or more sections following work carried out in phases shall be adjusted taking the following requirements into account:

6.63.5.4.2.3.1 for the first section, the installation of the joint shall be made at the opening indicated on the drawings, according to the temperature of the ambient air that was measured under the bridge, at the location of the joint, at the time the joint was fixed;

6.63.5.4.2.3.2 for the remaining sections, the joint shall be installed at the same opening as that of the first joint section.

6.63.5.4.2.4 The temporary deck joint assembly devices shall be removed after the concrete is placed and before it has completely set.

6.63.5.4.2.5 No loads shall be imposed on the new concrete shoulders before the strength has reached 25 MPa.

6.63.5.5 INJECTION OF EPOXY RESIN

6.63.5.5.1 Unless otherwise indicated on the drawings, the injection of epoxy resin shall be carried out seven (7) days after the joint was concreted.

6.63.5.5.2 The injection of epoxy resin shall be carried out by the joint manufacturer or by the **Contractor**, under the supervision of the joint manufacturer.

6.63.5.5.2.1 The choice of the epoxy resin and of the injection procedure are the responsibility of the deck joint manufacturer.

6.63.5.5.3 The deck slab formwork under the joint shoulders shall be in place during the injection of the epoxy resin.

6.63.5.5.4 The injection of the epoxy resin is considered complete when the representative of the joint manufacturer authorizes stopping the injection.

6.63.5.6 IMPLEMENTATION OF THE SEAL

6.63.5.6.1 The implementation of the elastomeric seal, including tightening of the compression bolts, shall be performed by the deck joint manufacturer.

6.63.5.6.2 The seal shall be placed in a single piece over the entire length of the deck joint and after concreting of the shoulders.

6.63.5.6.3 The **Contractor** shall replace, at its expense, any seal that is damaged, torn, cracked, warped, or other as a result of mishandling during the implementation process.

6.63.5.6.4 The seal shall be implemented before the lanes are re-opened to traffic.

6.63.6 QUALITY CONTROL

6.63.6.1 Once in place, deck joints with a high-strength neoprene seal shall be watertight.

6.63.6.2 The **Contractor** shall, in the presence of the Engineer, conduct a leak test on the deck joint using a direct stream of water with a diameter of 20 mm at the nozzle outlet and a minimum pressure of 700 kPa.

6.63.6.3 The water stream shall be maintained above the joint with a back and forth motion for a minimum period of thirty (30) minutes.

6.63.6.4 The **Contractor** shall ensure that the Engineer has access underneath the joint during the conduct of the leak test.

6.63.6.5 Any joint that is not watertight shall be repaired and shall undergo a new leak test to the satisfaction of the Engineer.

6.63.6.6 A deck joint is considered watertight when the seal and shoulders do not show any leakage.

6.63.6.7 In the case of a deck joint whose gutter is made of an ethylene propylene diene monomer (EPDM) sheet, the gutter shall be placed after the leak test.

6.63.6.8 The **Contractor** shall ensure quality control during the shaping and welding of the deck joint components at the factory.

END OF SUBSECTION