The following Supplemental Specification supersedes, in its entirety, the version contained in the Specifications for Bridge Construction - 2010.

SECTION 16 BRIDGE DECK WATERPROOFING

16.1 General

This specification is for the supply and installation of bridge deck waterproofing.

Bridge deck waterproofing shall be carried out in accordance with the following Specifications; as shown on the site specific Contract Drawings and Standard Drawing S 1443; and as directed by the Consultant.

16.2 Material

16.2.1 General

The materials supplied shall be able to withstand the heat generated during the waterproofing processes without affecting the performance of the material.

16.2.2 Submittals

The Contractor shall submit documentation indicating specification compliance of his proposed materials to the Consultant for review and acceptance a minimum of two weeks prior to the commencement of waterproofing installation operations.

16.2.3 Sampling and Testing

The Contractor is advised that the Consultant may carry out additional material testing to confirm compliance.

If requested by the Consultant or the Department, the Contractor shall provide sufficient additional quantities of the asphalt membrane, rubber membrane, membrane reinforcing fabric and/or protection board from the materials being used on the project.

16.2.4 Materials

Tack Coat

The tack coat shall be a primer type meeting the requirements of CAN/CGSB 37 GP 9MA.

Asphalt Membrane

Asphalt membrane materials shall be supplied in cakes that are sealed and labeled by the manufacturer.

Material for the asphalt membrane shall be hot applied rubberized asphalt meeting the requirements of the Ontario Ministry of Transportation’s OPSS 1213 Specification.

Rubber Membrane

Rubber membrane shall consist of 1.2 mm thick butyl and ethylene propylene diene monomer (EPDM) rubber. The membrane shall meet the requirements of CAN/CGSB 37.52M.
Membrane Reinforcing Fabric

Membrane reinforcing fabric shall consist of spun bonded sheet structure composed of 100% continuous filament polyester fibres bonded together at their crossover points. The membrane shall be supplied in minimum widths of 300 mm.

Wick Drain

Wick drain shall consist of composite polypropylene with a total thickness of 3.6 mm, supplied in 100 mm widths. The puncture strength shall be a minimum of 45 N measured in accordance with ASTM D4833.

Waterproofing Protection Board

Waterproofing protection board shall consist of durable panels designed to provide a protective cushion between the hot mix asphaltic concrete pavement and the asphalt membrane.

The waterproofing protection board shall meet the requirements of the Ontario Ministry of Transportation's OPSS 1215 Specification for Protection Board.

16.3 Equipment

An approved heating and mixing kettle shall be used to heat the hot applied rubberized asphalt membrane. The kettle shall be a double boiler oil transfer type with a built in agitator, and shall be equipped with permanently installed dial type thermometers with an accuracy of ± 2 °C to measure the temperature of the melted compound and oil. A separate calibrated thermometer with an accuracy of ± 2 °C shall be available on site to verify material temperatures.

The unit shall be capable of keeping the contents continuously agitated, free flowing and lump free until the material is drawn for application.

16.4 Installation

16.4.1 General

The Contractor shall provide the Consultant with 48 hours advance notice prior to commencing any waterproofing operations.

The Contractor shall carry out the operations involved in waterproofing in sequential order, and in such a manner that there are no delays between individual operations except those necessary to meet the requirements of these specifications.

Waterproofing operations shall only be carried out when the air and concrete surface temperature are 5 °C or higher.

16.4.2 Traffic Restriction

Once surface preparation operations have commenced the Contractor shall restrict all traffic other than the construction equipment directly associated with waterproofing and bridge paving operations from traveling over the prepared areas.

These restrictions shall remain in place until such time that the asphalt concrete pavement has been placed and cooled to ambient temperature.
16.4.3 Surface Preparation

16.4.3.1 Grout Tubes

Grout tubes shall be cut flush with the concrete deck surface prior to surface preparation. If grout tubes project above the concrete after surface preparation, they shall be re cut flush with the concrete deck surface. A 450 mm by 450 mm piece of membrane reinforcing fabric, centered on the tube, shall be installed as described in Section 16.4.5, Waterproofing of Joints and Cracks.

16.4.3.2 New Bridge Construction

Concrete surfaces to receive waterproofing shall be cured a minimum of 14 days and then allowed to dry a minimum of 3 days. Concrete surfaces shall be completely dry prior to commencing waterproofing operations. Drying of concrete surfaces by the use of torches or other means that, in the opinion of the Consultant, may be potentially harmful will not be permitted.

Once the concrete surfaces are completely dry, they shall be prepared for waterproofing installation by sandblasting or shotblasting to expose sound, laitance free concrete for the entire installation area. All dirt and debris shall be removed and disposed of leaving a prepared surface satisfactory for tack coating.

16.4.3.3 Bridge Rehabilitation

Concrete surfaces to receive waterproofing shall be ground, scabbled, or bush hammered to achieve a surface texture of 3 mm or less prior to sandblasting or shotblasting. Concrete surfaces shall also meet the requirements of Section 16.4.3.2, New Bridge Construction, prior to waterproofing installation.

New concrete overlays or concrete patches that are to receive waterproofing shall be cured for a minimum of 7 days unless otherwise specified. New concrete overlays shall meet the surface tolerance requirements of Section 4.16.7, Surface Defects and Tolerances, prior to waterproofing.

16.4.4 Tack Coating

Tack coat shall be applied wherever waterproofing membrane is required. Tack coating and waterproofing installation shall not commence until the Consultant has inspected and accepted the surface preparation work.

Immediately prior to the application of the tack coat, the concrete surface shall be blown clean with oil and water free compressed air to remove all dust and other foreign material. The tack coat shall be cut back with an equal volume of gasoline type solvent or an alternative cut back asphalt product compatible with the asphalt membrane.

The tack coat application shall be such that the tack material will be absorbed into the concrete, resulting in a surface that is dull and black in appearance. Excess application of tack coat, indicated by a shiny black surface, shall be avoided. Tack coat material shall be applied at an approximate rate of 0.25 Rm2.

Waterproofing equipment or material shall not be permitted on the tack coat until it has fully cured and is completely tack free.

16.4.5 Waterproofing of Joints and Cracks

The Contractor shall pay particular attention to waterproofing installation over construction joints, lift hook pockets, grout tubes, patches and cracks.

After tack coat application and prior to application of the primary hot asphalt membrane, a coat of
hot asphalt membrane 3 mm to 4 mm thick and wide enough to extend 200 mm on either side of each joint or crack shall be applied in accordance with Section 16.4.6, Application of Asphalt Membrane. A strip of membrane reinforcing fabric material wide enough to extend 150 mm on either side of the construction joint, lift hook pocket, grout tubes, patch or crack shall be applied while the asphalt membrane is still hot and tacky. The membrane reinforcing fabric shall then be covered with an additional layer of water proofing 2 mm to 3 mm thick. Membrane reinforcing fabric shall be overlapped for a minimum of 100 mm when multiple strips are used.

For areas along curbs, barrier walls, and deck drains, the hot asphalt membrane shall be applied to the height of the top of the hot mix ACP surface course and 150 mm onto the deck. Rubber membrane shall be applied into the first coat of asphalt membrane while it is still hot and tacky. The rubber membrane shall extend 50 mm up the vertical face and 100 mm onto the deck surface. Rubber membrane shall be overlapped for a minimum of 100 mm where multiple strips are used. A second coat of asphalt membrane shall then be applied to fully cover the rubber membrane.

16.4.6 Application of Asphalt Membrane

Cakes of asphalt membrane shall be melted in the heating and mixing kettle to a temperature not exceeding that recommended by the membrane Manufacturer.

The asphalt membrane shall not be applied until the tack coat has cured completely.

The application temperature of asphalt membrane shall be within the range recommended by the Manufacturer. The membrane shall be applied in a uniform film having a minimum thickness of 4 mm and a maximum thickness of 6 mm.

Application of the asphalt membrane shall be carried out in a continuous manner to the extent practicable. Where joints are unavoidable, they shall be overlapped by a minimum of 150 mm. The membrane shall be applied over all waterproofed joints and cracks, and shall extend up the face of curbs, barrier walls, and deck drains, to the height of the top of the design hot mix asphalt surface course.

The Contractor shall conduct his operations in such a manner that plugging of deck drains and/or drainage tubes is avoided. Plugged deck drains or drainage tubes shall be cleaned out by the Contractor at his expense.

16.4.7 Wick Drain Installation

Wick drains shall be installed along the full lengths of the gutters, and shall be installed when the asphalt membrane is still hot and tacky. Special attention shall be given to waterproofing and wick drain modifications at deck drain pipe locations. Tack coat shall not be applied to wick drains.

16.4.8 Protection Board Installation

The Contractor shall ensure that the asphalt membrane thickness meets the specified requirements prior to placing the protection board. Protection boards shall be laid on the asphalt membrane while the membrane is still hot, with the length of the board running transversely on the deck. The protection boards shall be placed with edges overlapping a minimum 12 mm and a maximum of 25 mm, both longitudinally and transversely. The protection board edge shall be within 5 mm of all wick drains, vertical faces of drains, and vertical faces of expansion joints.

Protection board shall be lapped to produce a shingling effect in both the longitudinal and transverse directions. Protection boards shall be placed such that the longitudinal (direction of traffic flow) joints are staggered a minimum of 150 mm. Boards shall be rolled using a linoleum or lawn type roller while the membrane is still warm to ensure good contact with the membrane. Holes shall be cut through the protection board to allow water to drain freely through the drainage tubes. At locations where the edges of the protection board have curled-up, the curled-up edges
shall be cemented down using hot membrane material to the satisfaction of the Consultant.

Protection boards that are warped, distorted or damaged in any way, whether by manufacture, storage, handling or exposure to the elements shall be replaced with new material.

16.5 **Measurement and Payment**

Measurement for payment of deck waterproofing will be by the square metre of waterproofing acceptably installed.

Payment will be made at the unit price bid for "Deck Waterproofing", and will be full compensation for traffic control; preparation of the concrete deck surface, including sandblasting and/or shotblasting; the supply and application of the tack coat; the supply and installation of asphalt membrane, membrane reinforcing fabric, rubber membrane, wick drain, protection board; and all labour, equipment, tools and incidentals necessary to complete the Work to the satisfaction of the Consultant.