

SPECIFICATIONS FOR BRIDGE CONSTRUCTION

SECTION 16

BRIDGE DECK WATERPROOFING

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16.1 General

This specification shall include the supply and installation of an approved waterproof asphaltic membrane. The area to be covered by the waterproofing shall be as shown on the site specific construction drawings. The work shall be completed in accordance with standard drawing S-1443 Deck Waterproofing System with 80 mm Two-Course Hot-Mix Asphalt Concrete Pavement.

16.2 Materials

All materials for this application shall be reviewed and accepted by the Consultant.

Tack Coat

The tack coat used in conjunction with the asphalt membrane shall be primer, cut back with an equal volume of gasoline type solvent, or an acceptable alternative cut-back asphalt product and be compatible with the asphalt membrane.

Asphalt Membrane

Asphalt membrane shall be hot applied rubberized asphalt and meet all requirements of the Ontario Ministry of Transportation's OPSS 1213 Specification. The asphalt membrane shall be supplied in cakes ready for melting and application.

Rubber Membrane

The rubber membrane shall be 1.2 mm thick butyl rubber.

Membrane Reinforcing Fabric

Membrane reinforcing fabric shall be 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. The performance of the material shall be unaffected by the heat generated by the waterproofing processes.

Wick Drain

Wick drain shall be composite polypropylene with a total thickness of 3.6 mm and supplied in 100 mm widths. The puncture strength shall be a minimum of 45 N measured in accordance with ASTM D4833. The performance of the material shall be unaffected by the heat generated by the waterproofing processes.

Waterproofing Protection Board

The protection board shall be a durable panel of 3 mm thickness specifically designed to provide a protective cushion between the hot mix asphaltic concrete pavement and the asphalt waterproofing membrane. It shall have a water absorption property of 5% or less and shall meet the Ontario Ministry of Transportation Specification OPSS 1215 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 of the double boiler oil transfer type with a built-in agitator and equipped with permanently installed dial type thermometers to measure the temperature of the melted compound and the oil.

16.4 Installation

16.4.1 Traffic Restrictions

Traffic restrictions apply to all traffic other than the construction equipment directly associated with the waterproofing operations and the paving operations that follow.

After sandblasting operations have commenced, construction traffic will not be allowed on the sandblasted area until the ACP has been placed and cooled to ambient temperature.

16.4.2 Procedure

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

16.4.3 Notice of Commencement of Waterproofing Operations

The Contractor shall give the Consultant 48 hours notice prior to commencing any waterproofing operations.

16.4.4 Surface Preparation

The deck concrete, including curbs, sidewalks and medians must be completely dry and cured at least 14 days before application of tack or membrane can proceed.

The existing surface of the concrete shall be completely sandblasted or shotblasted to expose sound, laitance-free concrete. All dirt and debris shall be removed and disposed of, leaving a prepared surface satisfactory for tack coating. Tack coating and waterproofing shall not commence until the Consultant has accepted all preparation work.

Immediately prior to the application of the tack coat, the concrete surface shall be air blasted to remove all dust and any other foreign material. The tack coat shall be cut back 50% with gasoline solvent. The application rate shall be such that the tack material will be absorbed into the concrete, resulting in a surface that is dull and black in appearance. The application of an excessive amount of tack as indicated by a shiny black surface shall be avoided. Tack coat material shall be applied with approved equipment which will provide uniform application at the required rate. The tack coat shall be applied only when the concrete is dry and clean, and when the air and concrete surface temperatures are above 5°C. 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

Special attention shall be paid to waterproofing over all construction joints, lift hook pockets, patches, and cracks.

Prior to the application of the hot asphalt membrane to the deck, a coat of hot asphalt membrane at least 4 mm thick and wide enough to extend 200 mm on either side of the joint or crack shall be applied in accordance with section 16.4.6, to the tack-coated concrete surface. A strip of membrane reinforcing fabric material wide enough to extend 150 mm on either side of the construction joint, lift hook pocket, patch or crack shall be applied while the asphalt membrane is still hot and tacky. Membrane reinforcing fabric shall be overlapped 100 mm when multiple strips are used.

Along all 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. The butyl rubber membrane shall extend 50 mm up the vertical face, 100 mm onto the deck surface, and overlapped 100 mm when multiple strips are used. The rubber membrane shall be applied while the asphalt membrane is still hot and tacky.

16.4.6 Application of Asphalt Membrane

Cakes of asphalt membrane shall be melted in the mechanically agitated heating and mixing unit specified. This unit shall keep the contents continuously agitated until the material can be drawn free flowing and lump-free from the mixing unit at a temperature not exceeding that recommended by the Manufacturer.

Membrane shall not be applied until the tack coat has cured completely. The asphalt membrane shall be applied within the temperature range recommended by the Manufacturer, to the clean, tack-coated concrete deck, to form a uniform film having a minimum thickness of 4 mm and a maximum thickness of 6 mm. The laying operation shall be such that discontinuities in the membrane are avoided and any joints lapped 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 hot mix surface course. Deck drains and drainage tubes shall not be plugged.

16.4.7 Installation of Wick Drain

Wick drains shall be placed along the full length of gutters and 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. Wick drain details shall be in conformance with standard drawing S-1443.

16.4.8 Application of Protection Board

The Contractor shall check and ensure that the asphalt membrane thickness conforms to the specified requirement, 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 minimum 12 mm to maximum of 25 mm both longitudinally and transversely. The protection board edge shall be within 5 mm of all curbs, drain verticals, and deck joint verticals.

Protection boards shall be placed such that the longitudinal (direction of traffic flow) joints are staggered at least 150 mm. It shall be rolled by means of a linoleum or lawn type roller while the membrane is still warm, in order 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. In instances where edges of the protection board curl up, the 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, by manufacture, storage, handling or exposure to weather, shall be rejected.

16.5 Sampling and Testing

The Consultant may require that sufficient quantities of the asphalt membrane, rubber membrane, membrane reinforcing fabric and protection board be supplied from the materials being used on the project for immediate analysis, flow tests, water absorption, or for other future testing purposes.

16.6 List of Approved Materials

16.6.1 Hot Applied Rubberized Asphalt Membrane

- "Bakor" 790-11
- "Beamalastic 1213 BDM"
- "Ultraseal 3750"

16.6.2 Rubber Membrane

- "Elastosheet 6147"
- "BP47 Elastometric Reinforcement"
- "Bakor 990-25"

16.6.3 Membrane Reinforcement

- "Remay 2016"
- "Bakor Polyester Fabric"

16.6.4 Wick Drain

- "Nilex MD/7407"
- "Amerdrain 407"

16.6.5 Waterproofing Protection Board

Test results and samples of proposed protection board shall be submitted to the Consultant for review. The Consultant may carry out additional testing to confirm test data provided.

Acceptable products of Protection Board shall consist of spun glass fibres and not cellulose reinforcing fibres. Products which currently meet the 5% or less water absorption requirement are:

- "Vibraflex MTO Protection Board"
- "Bakor Asphalt Protection Board"
- "IKO Protectboard"

16.7 Measurement and Payment

Payment for **Deck Waterproofing** will be made at the unit price bid per square metre of deck waterproofed, which price shall be full compensation for the cost of all labour, equipment and materials required for the preparation of the concrete deck surface including sandblasting, supply and application of the tack coat, asphalt membrane, rubber membrane and protection board, handling and controlling of traffic, and for all other items of work necessary for the satisfactory completion of the work.