SPECIAL NOTE FOR ASPHALT WATERPROOFING MIX FOR BRIDGE-DECK OVERLAYS AND ADJACENT APPROACHES

1. DESCRIPTION. Asphalt Waterproofing Mix (AWM) is a highly elastomeric, polymer-modified, impermeable asphalt mixture that is designed to be a one-step, waterproof, wearing course system for bridge-deck overlays and the adjacent approaches. Place AWM at a minimum thickness of 1.50 in. directly on the prepared surface using a conventional paver and rollers. Apply this material according to the lines, grades, and typical cross-sections in the plans or as established by the Engineer.

Unless otherwise noted, Section references herein are to the Department's Standard Specifications for Road and Bridge Construction, current edition. Conform to all requirements for CL3 ASPH SURF 0.38A unless specifically modified herein.

2. MATERIALS AND PERSONNEL.

2.1 Aggregate. Provide polish-resistant coarse and fine aggregate conforming to Subsection 403.03.03 for a Type A mixture. Do not use mineral aggregates that are inherently porous, such as blast-furnace slag, expanded shale, porous limestone, and lightweight aggregates, in this mixture.

2.2 AWM Binder. Provide a performance-graded (PG) binder which conforms to AASHTO M 320 with a high temperature of 76 °C or higher and a low temperature of -28 °C or lower. In addition, ensure that the AWM binder conforms to the following criteria:

Test	**Criteria**
Multiple Stress Creep Recovery (AASHTO TP70) (64 ^{o}C, 3.2 kPa)	75%

2.3 Edge Sealant. Provide a solvent-free material for edge sealant as recommended by the producer of the thermoplastic polymer modifier utilized in the AWM. Ensure the material is a highly thixotropic edge sealant that dries to a soft consistency and will not dry out, crack, or split under vibration or slight movement of opposing surfaces.

2.4 Adhesive Tack Coat. Provide a solvent-free material for adhesive tack coat as recommended by the producer of the thermoplastic polymer modifier utilized in the AWM.

2.5 Joint Sealant. Provide a solvent-free material for joint sealant as recommended by the AWM material supplier. Ensure the material is capable of bonding to metal, wood, masonry, plastics, and elastomers without the use of a primer.

2.6 AWM Representative. Ensure a technical representative from the material supplier for the AWM is present during the initial construction activities (trial demonstration and set-up period) and available upon the request of the Engineer.

3. CONSTRUCTION.

3.1 Preparation of Mixture. Ensure the AWM contains no reclaimed materials. Submit the AWM design and component material samples to the Division of Materials according to Subsection 402.03.

3.2 Job-Mix Formula (JMF). Contrary to Subsection 402.03, formulate and submit a JMF conforming to the material suppliers recommended gradation limits and the following total binder content.

% Total binder (including PG binder and thermoplastic polymer)	7.25-9.25	± 0.5

3.3 Mix Design Criteria. Contrary to Subsection 403.03, using a compaction effort of N_{des} = 50 gyrations and a compaction temperature recommended by the material supplier, perform and submit a laboratory mix design conforming to the following mixture specifications.

Test	Criteria
% Air Voids (AV) (AASHTO R 35)	1.0 ± 1.0
% Voids-in-Mineral Aggregate (VMA) (AASHTO R 35)	16.0 (min)
Permeability (ASTM D 5084)	<1 x 10^{-9} m/s
Flexural Beam Fatigue (ASTM D7460) (750 microstrains, 10Hz, 1.5 ± 0.5 %AV,15^{o}C)	250,000 cycles (min) (average of two samples)
APA @ 8,000 Loading Cycles (AASHTO TP 63)	<3 mm

The Department will not require AWM blends previously documented as satisfying the flexural beam fatigue specification to be tested again for flexural beam fatigue. Also, the Department will not require flexural beam fatigue testing for projects with a total AWM quantity of less than 1000 tons. Mix design criteria testing which cannot be performed by the department must be performed by a third party laboratory.

3.4 Surface Preparation. Prior to the project, review the existing bridge deck(s) and approach pavement with a technical representative from the material supplier for the AWM and Department personnel to develop a strategy for repairing distressed areas.

Prior to the placement of the AWM over the PCC bridge deck(s) and approach pavement and as directed by the Engineer, repair any moderately or highly "D-cracked" areas, high-severity "punch-outs," "blow-ups," and other severe distresses with a doweled, full-depth patch. Ensure the patching material satisfies the applicable requirements of Section 502.

Prior to the placement of the AWM over asphalt pavement and as directed by the Engineer, fill large surface deformities, greater than 3 in. deep and 4 ft in diameter, with an approved asphalt mixture.

Immediately prior to placing the AWM, thoroughly clean the surface of all vegetation, loose materials, dirt, mud, and objectionable materials. Ensure the surface is dry. During placement of the AWM, fill smaller pavement deformities in the underlying bridge deck(s) and approach pavement with the AWM.

3.5 Application of Edge Sealant. Apply edge sealant, at 4 to 6 in. wide and approximately 0.03 in. thick, before and after AWM application in accordance with the guidelines from the material supplier for the AWM. Apply the sealant to all perimeter surfaces adjacent to the AWM, such as curbs, parapet walls, headers, drains, scuppers, and joints, in order to reduce moisture infiltration into the AWM. Also apply edge sealant to all longitudinal or transverse joints in the AWM that have cooled below 150 °F. When practical, apply the edge sealant the day before or as early as possible on the day of paving to maximize drying time.

3.6 Application of Adhesive Tack Coat. Contrary to Subsection 406.03, cold-apply an adhesive tack coat to the existing pavement at a rate to achieve an undiluted residue of 0.10 to 0.15 gal/yd^2. For milled surfaces, apply the tack coat at a rate to achieve an undiluted residue of 0.15 gal/yd^2. For smaller projects as defined by the Engineer, cold-apply the tack coat by hand with a brush, roller, or hand-wand sprayer. Ensure the surface is free of all dust, dirt, oil, grease, and other contaminants. Allow the adhesive tack coat to cure for a period of at least 40 min, or until the tack coat is dry, depending on local conditions.

3.7 Application of Joint Sealant. For continuous paving operations over existing bridge/pavement joints, saw-cut a construction joint, 1.0 to 1.5 in. wide, in the AWM and fill the joint with joint sealant as directed by the technical representative from the material supplier for the AWM or by the Engineer. Ensure the surface is free of all dust, dirt, oil, grease, and other contaminants. Do not apply the sealant on a wet surface. Allow the joint sealant to cure for at least 12 h before opening to traffic.

3.8 Production, Transport, and Placement of AWM

Ensure the existing surface temperature is a minimum of 40 °F and rising at the time of AWM placement.

Contrary to Subsection 401.03, produce and place AWM at the temperature recommended by the material supplier.

3.9 Compaction of AWM.

3.9.1 Rollers. Contrary to Subsection 403.03, compact the AWM only with steel, double-drum drive rollers in the static mode. Provide breakdown rollers with a static weight of approximately eight tons. Provide finish rollers with a static weight of four to eight tons and a maximum drum width of 60 in. Also provide a small roller or vibratory plate to compact smaller areas such as headers, scuppers, expansion joints, etc. that cannot accommodate a full-size roller.

3.9.2 Opening to Traffic. Open lanes to traffic when the AWM pavement reaches 120 °F or a minimum of 1 h after compaction is completed.

3.10 Trial Demonstration(s). At least two days prior to beginning mainline paving, demonstrate that satisfactory production and placement of AWM is possible. Furnish at least 50 tons for the trial demonstration. The Engineer will determine the location, outside of the driving lanes, and exact quantity of the trial placement. Perform a minimum of one volumetric analysis (two gyratory specimens and two G_{mm} tests), one total binder content determination, and one gradation determination. Document that the AWM satisfies the applicable requirements of Sections 3.2 and 3.3 of this note for total binder content, gradation, AV, and VMA prior to beginning mainline paving.

Use the paver and rollers to be used on the project to construct the trial placement. Obtain and test a minimum of four roadway cores from the trial placement according to KM 64-442. Ensure the density of each core is within the range of 96.0 ± 2.0 percent of the theoretical maximum density prior to beginning mainline paving.

Furnish additional 50-ton production lots until achieving mixture properties that satisfy the requirements above. Construct additional trial sections until establishing a rolling pattern that provides the density specified above.

Also furnish an additional 50-ton production lot and construct a new trial placement whenever a change in the mix design, compaction method, or compaction equipment occurs. When directed by the Engineer, remove and replace trial sections with unacceptable results.

3.11 Acceptance Sampling and Testing. Contrary to Subsection 402.03.02, the Department will accept AWM as follows:

3.11.1 Definitions for Sublot, Lot, and Minimum Level of Testing. Contrary to Subsection 402.03.02, for projects with a total AWM quantity of less than 4000 tons, the Department will define a sublot as 250 tons and a lot as 1000 tons. For these projects, the Department will define the setup period as the first 250 tons of production. For projects with a total AWM quantity of 4000 tons or more, the Department will define a sublot, a lot, and the setup period according to

Subsection 402.03.02. In either case, perform a minimum of one complete set of acceptance tests, as defined by this note, each day that any AWM is produced.

3.11.2 Total Binder Content and Gradation. Perform one evaluation per sublot according to Subsection 402.03.02. By the end of the setup period, establish a JMF conforming to the total binder content and gradation limits from Section 3.2 of this note. The Department will allow the established JMF to vary within the production tolerances from Section 3.2 of this note provided the percent passing each sieve remains within the gradation limits and the total binder content remains within the specified range.

3.11.3 AV. Prepare and analyze one set of two gyratory specimens per sublot according to Subsection 402.03.02. By the end of the setup period, test the AWM to document that the average AV value of each set of specimens conforms to the limits from Section 3.3 of this note.

3.11.4 VMA. Prepare and analyze one set of two gyratory specimens per sublot according to Subsection 402.03.02. By the end of the setup period, test the AWM to document that the average VMA value of each set of specimens conforms to a minimum of 15.5 percent.

3.11.5 Density. For each sublot of production after the setup period, randomly select locations for four cores from the bridge approach areas, not the bridge deck itself, in order to preserve the integrity of the AWM over the bridge deck. Obtain and furnish the cores to the Engineer according to Subsection 402.03.02. The Department will test the cores to ensure the following criteria are satisfied:

- the density of each core is between 94.0 and 98.0 percent of the G_{mm} value for that sublot; and
- the average density of the four cores is a minimum of 96.0 percent of the G_{mm} value for that sublot.

3.11.6 Unsatisfactory Work Based on Laboratory Data. When the total binder content, gradation, AV, VMA, or density value from any test after the setup period fails to satisfy the applicable requirements of this note, cease all shipments to the project. Adjust procedures or mixture composition until all properties satisfy the applicable requirements of this note. Document acceptable materials and work before restarting operations.

3.12 Verification Sampling and Testing. Contrary to Subsection 402.03.03, the Department will verify AWM as follows. Using the definition for a lot from Section 3.11.1 of this note, the Department will perform a minimum of one verification test for total binder content, gradation, AV, and VMA for each lot according to Subsection 402.03.03. Provided the differences between the contractor's acceptance test and the Department's verification test are within the tolerances given in Subsection 402.03.03, the Department will accept the AWM for that lot.

When the differences between the contractor's acceptance test and the Department's verification test are not within the tolerances given in Subsection 402.03.03, cease all shipments to the project. Adjust procedures or mixture composition until the differences are within the tolerances given in Subsection 402.03.03. Document compliance with these tolerances before restarting operations.

4. MEASUREMENT.

4.1 Trial Demonstrations. The Department will measure up to 100 tons of AWM used in the trial demonstration. The Department will not measure quantities exceeding 100 tons for payment and will consider them incidental to the AWM.

4.2 AWM. The Department will measure the AWM in tons. The Department will not measure the surface preparation, edge sealant, adhesive tack coat, or joint sealant for payment and will consider them incidental to the AWM. The Department will not measure saw-cutting joints for payment and will consider that operation incidental to the AWM.

5. PAYMENT.

5.1 Trial Demonstrations. The Department will pay for the measured quantities at the Contract unit bid price for the AWM.

5.2 AWM. The Department will consider the unit bid price per ton to include all labor, materials, and equipment necessary to complete the work. The Department will make payment for the completed and accepted quantities according to the following:

Code	Pay Item	Pay Unit
21138ED	Asphalt Waterproofing Mix	Ton