4-07 Asphalt Treated Permeable Base (ATPB)

4-07.1 Description

Asphalt treated permeable base (ATPB) consists of a compacted course of base material which has been weatherproofed and stabilized by treatment with an asphalt binder. ATPB shall be composed of asphalt binder and mineral materials as may be required, mixed in the proportions specified to provide a homogeneous, stable, and workable mixture in compliance with these Specifications.

This work consists of constructing one or more courses of asphalt treated permeable base (ATPB) upon a prepared foundation or base in accordance with these Specifications and in conformity with the lines, grades, thicknesses, and typical cross-sections shown in the Plans or as established by the Engineer. All work related to the construction of the ATPB shall be completed in accordance with Section 4-07 of the APWA General Special Provisions.

The manufacture of ATPB may include warm mix asphalt (WMA) processes in accordance with these Specifications. WMA processes include organic additives, chemical additives, and foaming that allow for lower mixing and placement temperatures without impacting the final ATPB pavement properties.

4-07.2 Materials

Materials shall meet the requirements of the following sections:

- Asphalt       9-02.1
- Anti-Stripping Additive     4-07.3(8)
- Aggregates      9-03.7(A)

The grade of paving asphalt binder shall be PG70-22ER unless otherwise specified by the Contract item for ATPB.

4-07.3 Construction Requirements

4-07.3(1) Asphalt Mixing Plant

Asphalt mixing plants for ATPB shall meet the following requirements:

**Heating**

The plant shall be capable of heating the aggregates to the required temperature.

**Proportioning**

The mixing plant shall be capable of proportioning: the aggregates to meet the Specifications, and the asphalt binder at the rate specified in the approved job mix formula (JMF). If the aggregates are supplied in two or more sizes, means shall be provided for proportioning or blending the different sizes of aggregates to produce material meeting the Specification requirements.

**Mixing**

The mixer shall be capable of producing a uniform mixture of uniformly coated aggregates meeting the requirements of these Specifications.
Surge and Storage Systems

The storage time for PHMA mixtures not hauled immediately to the project shall be no more than four (4) hours for non-insulated silos or eight (8) hours for insulated silos. Placement temperature specifications shall still be met regardless of silo storage time.

4-07.3(2) Preparation of Aggregates

Aggregates for ATPB shall be stockpiled before use in accordance with the requirements of Section 3-02. The aggregates shall be heated in the Asphalt Mixing Plant in compliance with the JMF and related temperature viscosity curves for the asphalt binder grade specified.

4-07.3(2)A Mix Design

The asphalt binder for ATPB shall be PG 70-22ER polymer modified or higher grade unless otherwise stated. Binder content shall be between 3.0% and 4.5% by total weight of the mix, and will be the highest percentage that passes void requirements test at $N_{\text{design}} = 75$ gyrations. The binder content tolerance shall be ± 0.3% during production/placement of the ATPB. The Contractor shall adjust the aggregate to meet the targeted void space specification.

Target void space shall be approximately 30% per ASTM D3203.

The Contractor shall include a mix design submittal documenting the ATPB mix design test results presented alongside the mix design specification criteria included in this Specification and related Specification 9-03.6, along with the submittal temperature-viscosity curves from the polymer-modified asphalt binder supplier showing the recommended mixing and compaction temperatures developed for dense graded HMA applications.

The anti-stripping evaluation, per section 4-06.3(8) shall be submitted with the mix design.

4-07.3(4) Mixing

The asphalt treated permeable base shall be mixed in accordance with the requirements of Section 5-04.3(8).

4-07.3(5) Hauling Equipment

Hauling equipment for asphalt treated permeable base shall conform to the requirements of Section 5-04.3(2).

4-07.3(6) Spreading and Finishing

Asphalt treated permeable base shall be spread with a spreading machine equipped with a stationary, vibratory, or oscillating screed or cut-off device, subject to the approval of the Engineer. Approval of the equipment shall be based on a test section demonstrating that the finished product will meet all requirements of the Specifications. Automatic controls will not be required.
The internal temperature of the ATPB mixture at the time final rolling and targeted consolidation is achieved shall be a minimum of 185°F. Rollers shall only be operated in the static mode when the internal temperature of the ATPB is less than 175°F.

Unless otherwise directed by the Engineer the nominal compacted depth for any layer of asphalt treated permeable base shall not exceed 0.40 feet. A light tack coat (approximately 0.02 gallons/square yard residual asphalt) shall be applied in compliance with Section 5-04.3(5)A between lifts of ATPB. A tack coat shall also be applied between the ATPB surface and the subsequent asphalt paving lifts when cleaning of the ATPB surface is necessary.

4-07.3(6)A Subgrade Protection Course

Unless otherwise specified by the Engineer, the Contractor shall place the asphalt treated permeable base as a protection for the prepared foundation or base on all sections of individual Roadways which are to receive ATPB as soon as 10,000 square yards of prepared foundation or base is completed. This requirement shall not be limited to contiguous areas on the project.

The surface of the prepared foundation or base protection layer when constructed on a grading project shall conform to grade and smoothness requirements that apply to the prepared foundation or base upon which it is placed.

4-07.3(6)B Finish Course

The final surface course of the ATPB, excluding shoulders, shall not deviate at any point more than ⅜ inch from the bottom of a 10-foot straightedge laid in any direction on the surface on either side of the Roadway crown. Failure to meet this requirement shall necessitate sufficient surface correction to achieve the required tolerance, as approved by the Engineer, at no expense to the Contracting Agency.

When portland cement concrete pavement is placed on an asphalt base, the surface tolerance of the asphalt base shall be such that no elevation lies more than 0.05 feet below nor 0.00 feet above the plan grade minus the specified plan depth of portland cement concrete pavement. Prior to placing the portland cement concrete pavement, any such irregularities shall be brought to the required tolerance by grinding or other means approved by the Engineer, at no expense to the Contracting Agency.

4-07.3(7) Density & Infiltration Testing for Acceptance

The asphalt treated permeable base shall be consolidated to a firm and unyielding state. The Contractor will develop a roller pattern that will initially consolidate the pavement structure and then use static rolling only thereafter. Density testing targeting 15 to 20% final air voids (80% to 85% of maximum theoretical (Rice) density) in the ATPB will be performed by the Contractor to monitor the consolidation effort and to avoid over compaction. The frequency of these tests shall be at the discretion of the Engineer. The use of equipment which results in damage to the materials, over consolidates the ATPB or produces substandard workmanship will not be permitted.

Pneumatic tire rollers shall not be used.

The Contractor shall conduct infiltration tests on the finished ATPB per ASTM C1701 at locations chosen by the Engineer. Newly-placed ATPB shall accommodate a minimum infiltration rate of 150 inches/hour.
It is anticipated that infiltration tests be completed every 150 linear feet of roadway and conducted in accordance with ASTM C1701. Target density may be adjusted and used for acceptance, at the discretion of the Engineer, if the ATPB is consistently meeting the 150 inches/hour acceptance standard.

If the measured infiltration rate is less than 150 inches/hour, the Contractor shall conduct four additional tests as follows in line with the paver direction of travel. Two tests upstream and two tests downstream of the initial test locations shall be taken at distances of 20 feet and 40 feet. Results of the additional tests will be averaged. The Contractor shall conduct additional testing upstream and downstream to identify areas to be removed. If the average infiltration rate is less than required the Contractor shall remove and replace the failing ATPB areas at the direction of the Engineer and at no cost to the Contracting Agency.

4-07.3(8) Anti-Stripping Additive

The Contractor shall determine anti-strip requirements for ATPB and provide data for anti-strip dosage as part of the mix design approval process. The ATPB mix shall be tested for its resistance to stripping by water in accordance with ASTM D-3625. If the estimated coating area is not above 95 percent, A Qualified Products List (QPL) anti-stripping agent shall be added to the ATPB to a level that achieves 95 percent plus asphalt binder retention using ASTM D-3625. The Contractor shall be responsible for conducting the anti-stripping evaluation and providing a report to the Engineer. A documented anti-stripping evaluation (either AASHTO T324 or WSDOT TM T718) of an existing dense graded hot mix asphalt (HMA) from the same aggregate source and binder supplier as the proposed ATPB may be used to document acceptable anti-strip dosage rates in lieu of ASTM D-3625 testing.

4-07.4 Measurement

"Asphalt Treated Permeable Base PG70-22ER" including paving asphalt will be measured by the ton. It is the Contractor’s responsibility to ensure that the aggregate base over which the ATPB is being placed is graded to the proper elevations to avoid exceeding the compacted thickness shown in the Plans. If necessary, the Contractor will static roll the aggregate base immediately in front of the paver to minimize excessive paving depths due to haul truck wheel rutting of the aggregate base.

No deductions will be made for the weight of asphalt binder, anti-stripping additive, tack coating between lifts or any other component of the mixture.

ATPB will be measured by the ton in accordance with Section 1-09.2, based on certified truck tickets collected on the day of paving.

4-07.5 Payment

Payment will be made in accordance with Section 1-04.1, for each of the following Bid items that are included in the Proposal:

- “Asphalt Treated Permeable Base, PGXX-XXER”, per ton.
- “Anti-Stripping Additive”, if required by one of the evaluation methods allowed in Section 4-07.3(8), shall be added and included in the unit contract price for ATPB, PGXX-XXER, per ton. There will be no separate additional payments for the required anti-stripping additive.
The unit contract price per ton for ATPB, PGXX-XXER shall be full pay for all labor, equipment, and materials required to construct the ATPB at designated locations, including joints, where required. The unit contract price shall include but not be limited to surface preparation, haul, compaction, Contractor testing as specified, tack coat applications and additives.

GSP Notes:

4.07.1 A typical temperature range for ATPB manufacturing would be 260-300°F for Warm Mix Asphalt (WMA) processes or 315-325°F for Hot Mix Asphalt (HMA) processing for PG 70-22ER binders.

4-07.3(2) Temperature-viscosity curves are developed for dense graded HMA mixing and compaction applications and should be used as references only. ATPB should typically be mixed at the bottom of the temp.- viscosity curve temperature range or cooler to minimize over compaction during the placement process. WMA processing for ATPB is typically mixed and compacted approximately 30 to 60°F below the bottom of the temperature-viscosity curve temperature ranges shown for dense graded HMA applications.

4-07.3(6) A tack coat between the ATPB and the subsequent layer of porous HMA is not generally necessary unless the ATPB has been used for construction staging or if the surface has otherwise become dirty. Newly placed, clean ATPB does not require a tack coat. If the ATPB needs to be cleaned prior to paving, a light tack coat is appropriate.

4-07.3(7) Typical temperature range during initial placement would be approximately 225-250°F for WMA ATPB and approximately 250-275°F for HMA ATPB.

4-07.3(7) Prior successful projects have incorporated two initial low amplitude vibratory roller passes to seat and orient the ATPB aggregate matrix followed by static rolling to create a final smooth surface without roller marks.

General The use of warm mix asphalt technology is encouraged as it generally minimizes issues related to over consolidation of the ATPB during placement.

END OF SECTION