

**SPECIAL PROVISION
SPECIFICATION 964 – WARM MIX ASPHALT (WMA) PAVEMENTS
SUPERPAVE**

964-1 WARM MIX ASPHALT PAVEMENT - Warm Mix Asphalt (WMA) is the generic term used to describe the reduction in production, paving, and compaction temperatures achieved through the application of one of several WMA technologies.

Production and paving temperatures may need to be increased, within the limits stated herein, for higher reclaimed asphalt pavement (RAP) contents, increased haul distances, decreased ambient temperatures, or other WMA project specific conditions.

964-1.01 Description

- a. This work shall consist of constructing one or more courses of Superpave Warm Mix Asphalt (WMA) pavement on a prepared foundation in accordance with these specifications, using manufactured WMA additives indicated in PRHTA W 401-10, and in conformance with the lines, grades, thickness and typical cross sections and smoothness requirements shown on the plans or established by the Engineer. Courses will be identified as, leveling (SPL), base (SPB) and surface (SPS).
- b. The work shall also include the application of any required tack and prime coats as specified in Specifications 407 and 408 respectively.

964-2 TRAFFIC LEVELS, CATEGORIES AND TYPES OF MIXES, AND THICKNESS REQUIREMENTS – Shall be as per Article **959-2**.

964-3 MATERIALS - Provide materials as follows:

964-3.01 Asphalt Binder – Provide a virgin asphalt binder as specified in article **959-3.01**.

964-3.02 Virgin Aggregate – Provide virgin aggregate as specified in article **959-3.02**

964-3.03 Reclaimed Asphalt Pavement (RAP) – As an alternative for using virgin aggregates provide RAP that meets the requirements of Section 703-3.02 of Specification 703-Aggregates, except that the maximum percentage of RAP allowed to be incorporated in each course shall be 20% by weight of total mix.

964-3.04 Hydrated Lime – Shall meet the requirements specified in **959-959-3.02 f**.

964-3.05 Chemical Anti-Strip Agent – Shall meet the requirements specified in **959-3.02 g**.

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The use of chemical anti-strip agents and/or hydrated lime is mandatory in WMA. The Contractor shall be responsible for verifying the affinity/compatibility of the proposed quantity and source of anti-strip agent and/or hydrated lime with all mix components, including the WMA additive. The quantity of anti-strip agent and/or hydrated lime shall be determined based upon moisture susceptibility test procedure (AASHTO T 283).

In cases in which the WMA additive may have an anti-stripping agent as an integral part of the product, a certification from the WMA supplier shall be provided to that effect.

- 964-3.06 Warm Mix Asphalt Additives** - WMA may be produced by one of the mineral or chemical additives stated in PRHTA W 401-10 that allow the reduction of mix production temperatures to within 185 degrees Fahrenheit to 280 degrees Fahrenheit.

Provide WMA additive blended with the asphalt binder at the liquid asphalt terminal prior to production of the asphalt mixture; or Blend the WMA additive with the asphalt mixture in the mixing plant. When blending in the asphalt mixing plant, introduce the WMA additive according to the recommendations of the wax additive producer in order to achieve a uniform blend.

- 964-3.07 Composition of Mixtures** – Shall meet the following:

- a. Requirements specified in **959-3.03**, including the appendix of AASHTO R-35 (WMA).
- b. Perform Dynamic modulus testing (AASHTO TP-79) for information purposes. Use specimens for Dynamic Modulus testing to perform flow number determination (AASHTO TP-79).
- c. Requirements specified in articles **959-3.03 c (6) and (7)** are not applicable to WMA.
- d. Moisture susceptibility requirements specified in SP 959 will take precedence over Appendix AASHTO R 35.

Pre-approved HMA Superpave job mix formulas may be used to produce WMA Superpave by adding WMA additives to the mix provided the following procedures and requirements are followed and met:

- a. The proportions of HMA job mix formula shall be verified and adjusted, if necessary, to produce 4% air voids at the optimum asphalt content.

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- b. Determine production and compaction temperatures for WMA based upon WMA additive manufacturer recommendations and ensuring producing 4% air voids at selected compaction temperature.
- c. Follow Appendix of AASHTO R35 for sample preparation and mix evaluation. However, moisture susceptibility requirements specified in SP 959 will take precedence over moisture susceptibility requirements in Appendix AASHTO R 35.

Submit the following information for all WMA mix designs:

- 1. All information required in article **959-3.03 d**.
- 2. WMA additive information.
- 3. WMA technology manufacturer's established recommendations for usage.
- 4. WMA technology manufacturer's established target rate for additives, the acceptable variation for production, and documentation showing the impact of production variations.
- 5. WMA technology material safety data sheets (MSDS).
- 6. Production Temperature.
- 7. Compaction Temperature
- 8. Asphalt binder performance grade test data at the proposed WMA additive dosage.

964-4 ACCEPTANCE SAMPLING AND TESTING – Shall meet the requirements specified in **959-4**. All acceptance and performance sampling and testing shall be conducted with WMA technology added to the mix.

964-5 CONSTRUCTION REQUIREMENTS - Shall meet the requirements specified in **959-5**.

Comply with manufacturer's recommendations for incorporating additives and WMA technologies into the mix. Comply with manufacturer's recommendations regarding the receiving, storage, and delivery of additives.

Use equipment and WMA technologies capable of producing asphalt mixtures that meet specification requirements and are workable at the minimum placement and compaction temperature desired.

The contractor shall modify the bituminous mixing plant as required by the manufacturer to introduce the WMA technology. Plant modifications may include additional plan instrumentation, the installation of WMA additive delivery system, tuning the plant burner and adjusting the flights in order to operate at lower production temperature and/or reduced tonnage.

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Mixing shall meet the requirements of article **959-5.10**. Delivery temperature to the project site shall be consistent with the WMA additives and performance during control strip section.

964-6 BASIS OF ACCEPTANCE – Shall be as per Section **959-6**.

964-7 METHOD OF MEASUREMENT - Shall be as per Section **959-7**.

964-8 BASIS OF PAYMENT - Shall be as per Section **959-8**, except that prices and payment shall also include full compensation for the cost of the WMA additive, additional sampling and testing performed and any other plant adjustment or equipment necessary for proper use of the WMA technologies.

Payment will be made under items described below:

<u>Pay Item</u>	<u>Pay Unit</u>
Warm Mix Asphalt Pavement - Superpave (SPS).....	Ton
Warm Mix Asphalt Pavement - Superpave (SPB).....	Ton
Warm Mix Asphalt Pavement - Superpave (SPL).....	Ton
Control Strip Section	Ton