NCDOT Technical Bulletin
Project Services

3-27-08 TB-2008-1

General Subject: ASPHALT PAVEMENT

Ultra-Thin Bonded Wearing Course

Background and Definition

The Department is starting to let more projects that have *Ultra-Thin Bonded Wearing Course* (UTBWC). Because this type of surface treatment is not as common as typical asphalt overlay, this Technical Bulletin briefly highlights the critical elements of UTBWC.

UTBWC is a coarsely graded hot mix asphalt (HMA) placed in a thin layer onto a warm Polymer-Modified Emulsion Membrane (PMEM). The PMEM is sprayed onto the existing pavement immediately before applying the hot mix asphalt. The UTBWC is placed in ¼", $^3/_8$", or ½" compacted thickness; therefore, is more of a surface treatment than a normal HMA, in that the UTBWC does not provide much structural value. This treatment offers a very durable, skid resistant surface that will protect the overlaid pavement for several years and is a good inhibitor for reflective cracking.

Audience

Project Inspectors, Construction Engineers, Project Engineers, Design Engineers

Materials

1. *PMEM*: A polymer modified emulsified asphalt binder that is sprayed onto the existing pavement surface to provide a water-impermeable seal and to bond the new hot mix to the existing surface.
2. *UTBWC:* A plant mixed HMA comprised of an intermediate size stone (such as 78M), fine aggregates (such as screenings, a 70-28 asphalt binder, an anti-strip additive, and a mineral filler if needed.

Mix Types

1. Type A (Coarsest – 100% Passing ¾")
2. Type B (Mid-Size – 100% Passing ½")
3. Type C (Finest Size –100% Passing 3/8")

Rates of Application

1. Mix
   Type A = 90 lbs/yd^2 (+/- ¾" uncompacted)
   Type B = 70 lbs/yd^2 (+/- 5/8" uncompacted)
   Type C = 50 lbs/yd^2 (+/- ½" uncompacted)
2. Polymer-modified emulsion = Typically in range of 0.15 to 0.25 gals/yd^2 but exact rate will be under "Comments" on JMF.

Mix Design and JMF

Contractor must submit proposed mix design and JMF for the HMA to M&T Asphalt Design Engineer at least 10 days prior to start up. Mix Design Procedures may be obtained from the M&T Asphalt Design Engineer. If approved, the Pavement Construction Engineer will issue a JMF. The approved mix design and JMF must be at asphalt plant prior to beginning work.

Surface Preparation

1. Cover and/or protect manhole covers, valve boxes, drains, catch basins, etc. prior to paving.
2. Remove thermoplastic pavement markings.
3. Clean and fill cracks & joints greater than

¼" wide.
4. Fill surface irregularities greater than 1" deep.
5. Thoroughly clean entire pavement surface.

Equipment

1. Paving Machine
   a. Self priming capable of storing and spraying the PMEM onto existing pavement.
   b. Adjustable full width screed with crown adjustments.
   c. Electronic screed controls with either 30-foot minimum length mobile grade reference system or 24-foot non-contacting laser or sonar type ski.
2. Compaction Equipment – Minimum of one steel double drum asphalt roller with a minimum weight of 10 tons.

Application

1. Plant mixed HMA delivered by trucks to paver on project.
2. Paver applies spray coverage of PMEM at temperature of 140º - 180º F.
3. Paver spreads and screeds HMA at temperature between 300ºF to 330ºF within 3 seconds of the PMEM application.
4. Roller compact UTBWC with minimum 2 passes before HMA temperature falls below 185º F.

Restrictions

Do not place UTBWC
1. Between October 31 and April 1
2. When the pavement surface temperature is less than 50º F
3. On a wet pavement

Inspection Details

1. Plant Mix Testing
   Plant mix testing is performed in accordance with applicable QMS provisions in the contract. Some key testing points are:
   a. HMA temperature: +/- 15ºF of JMF temperature
   b. Binder content and gradation tests (1 sample per 500 tons Ultra-thin HMA)
   c. Draindown test (Beginning production & weekly thereafter)
   d. TSR : Compacted to 100 gyrations (Beginning production)
2. Roadway Testing
   a. HMA temperature : + 15ºF to - 25ºF of JMF temperature
   b. Roadway Surface Temperature > 50ºF
   c. No Density Requirements (Minimum 2 passes with steel wheel roller)

Payment

1. Ultra-Thin HMA: Actual number of tons documented on weigh tickets.
2. Application of Ultra-Thin HMA: Measured square yards of application (actual length X contract / directed width).
3. Binder for Plant Mix, PG 70 - 28
4. Theoretical number of tons of binder.
   a. Determined by multiplying JMF binder percentage times actual number of tons of Ultra-Thin HMA.
   b. Binder price adjustments based on PG 64-22 regardless of grade used.

Keywords

Ultra-Thin HMA
HMA
PMEM

Filing

File in TB notebook under Tab No. 6

Obtain More Information From

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