SECTION 32 12 16

HOT MIX ASPHALTIC CONCRETE PAVEMENT

(Sentences and/or paragraphs that are double underlined indicate revisions that were made from the 2009 specification.)

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item covers Hot Mixed Asphaltic Concrete Paving and consists of any combinations of base, level up, and finish courses.

1.2 MEASUREMENT AND PAYMENT

A. Unless otherwise modified by the design engineer, Hot Mix Asphaltic Concrete Paving shall be measured by the square yard of each HMACP course in conformity with the requirements, and meeting all requirements of the plans and special provisions (if any) with regards to line, grade, compacted thickness, air voids, and final cross section.

B. Sliding scale pay factors or alternative remedies may be applied for City capital projects at the City's discretion Sliding scale factors will be applied for the unit price bid for Hot-Mix Asphaltic Concrete, which fail to meet the density requirements. The sliding scale pay factors are shown in the table below. They shall be applied to each day's production.

The table below applies to both development and capital projects. In the case of a development project the column titled "Percent Payment" does not apply.

Average Percent Air Voids*	**Alternate Remedies**	**Percent Payment**
8.0 or Less	Do Nothing	100
8.1 to 10.0	1" HMAC Overlay w/ Wedge Grind	85
10.1 to 12.0	1" HMAC Overlay w/ Wedge Grind	75
Above 12.0	Remove and Replace	Reject **

* **Average of 4 samples**
****If the Engineer agrees to accept densities below 88.0%, the pay factor shall be 50%.**

C. Unless otherwise modified by the design engineer, all labor, equipment and materials necessary to provide Hot Mix Asphaltic Concrete Paving in place in accordance with the plans, special provisions and these specifications will be paid for at the unit price designated in the proposal and included in the construction contract. ~~Any tack and/or p~~Prime coat shall be considered subsidiary to the bid item "Hot Mix Asphaltic Concrete".

1.3 SUBMITTALS

A. Mix Design

B. Aggregate Properties

PART 2 – PRODUCTS

2.1 MATERIALS

HMAC shall be composed only of the following materials:

A. MINERAL AGGREGATE: Mineral aggregates shall consist of sound, durable stone particles of limestone, slag, or a mixture thereof of uniform quality throughout and free from dirt, organic or other deleterious material occurring either freely in the material or as a coating on the aggregate. Abrasion loss of aggregate material shall not exceed 40% (unless lightweight) when tested in accordance with the Los Angeles Abrasion Test (ASTM C-131).

B. MINERAL FILLER: Mineral filler shall consist of thoroughly dry stone dust of uniform quality throughout and free from dirt, organic or other deleterious material occurring either freely in the material or as a coating on the material. The plasticity index of any mineral filler shall be less than 6.

C. ASPHALT: Asphalt shall be grade PG64-22, PG 70-22 or PG76-22 as designated by the design engineer and the same shall be used on all HMAC provided for any one project.

D. The paving mixture shall consist of a uniform mixture of aggregates, fillers and asphaltic material as required to meet the following requirements:

1. Coarse Aggregate: Coarse aggregate (retained on the No. 10 sieve) shall be so crushed as to have a minimum of 85% of the particles retained on the No. 4 sieve with two or more mechanically induced crushed farces as determined by Tex-460-A (Part 1). Field sand, if used, shall not exceed fifteen (15%) percent of the total aggregate mix.

GRADATION AND ASPHALT CONTENT

Column 1 AGGREGATE GRADATION (ASTM C-136)	Column 2 TOLERANCE FOR JOB-MIX FORMULA * PERCENT BY WEIGHT						Column 3 TOLERANCE FOR COMPANY FIELD SAMPLE LAB RESULTS TO JOB MIX FORMULA **
PASSING	TYPE 'D'		TYPE 'C'		TYPE 'B'		TOLERANCE
	Low %	High %	Low %	High %	Low %	High %	
1-1/2" sieve							+/- 5%
1" sieve					98	100	+/- 5%
3/4" sieve			95	100	84	98	+/- 5%
1/2" sieve	98	100					+/- 5%
3/8" sieve	85	100	70	85	60	80	+/- 5%
No. 4 sieve	50	70	43	63	40	60	+/- 5%
No. 8 sieve	35	46	32	42	29	43	+/- 3%
No. 30 sieve	15	29	14	28	13	28	+/- 3%
No. 50 sieve	7	20	7	21	6	20	+/ 3%
No.200 sieve	2	7	2	7	2	7	+/- 3%
VMA % Min	14		13		12		

Asphalt Content	4	8	4	8	3.5	7	+/- 0.5%

* Column 2 above is the tolerance to be used when creating the job-mix formula

** Column 3 above is the tolerance to be used when comparing the field sample lab results to the job-mix formula. The lab results must fall within the given tolerance when compared to the job-mix formula.

*** A copy of the job-mix formula must be given to the city inspector or representative prior to the placement of asphalt on the job site.

The City, at any time, may require a test be performed to determine if anti-stripping agents are needed for a particular mix. Samples not meeting the specifications listed above will be rejected or may be negotiated for a reduced payment if allowed by the City Engineer.

2. Laboratory Stability: When the proposed mix is prepared in accordance with TxDOT Item 340 (HVEEM Method) the stability shall be at least 35 percent. The tolerance for the density shall be +- 1% based on the density provided on the job mix formula.

3. Laboratory Density: When the proposed mix is prepared in accordance with ASTM D-1559 the air voids of the material as determined by ASTM D-3203 shall be between two percent (2%) and five percent (5%).

2.2 TESTING REQUIREMENTS

The following processes shall be undertaken to assure the desired quality in the constructed product:

A. MIX VERIFICATION: The testing laboratory representative in accordance with both of the following guidelines shall take HMAC samples from the delivering trucks:

1. One sample for each day of delivery and placement.
2. For larger jobs, the City may require two samples be taken, one in the morning and one in the afternoon.

The testing laboratory shall:

1. Note the location where the HMAC being sampled is to be placed.
2. Determine the temperature of the mix at the time the sample is taken. If the temperature is outside of the allowable range as specified in Section 3.1 of this specification, the laboratory representative shall immediately inform the paving contractor's superintendent and the City Inspector.
3. Transport the sample to the laboratory and perform the necessary tests and operations to verify the compliance with the mix design set forth by the design engineer within the tolerances given in Section 1.3 of this specification.
4. Provide written results to the tests and operations as described above to both the paving contractor's superintendent and the City Inspector within 5 working days.

B. COMPACTION VERIFICATION: Compaction tests shall be made following the same schedule of testing as the sampling operations listed above with the City Representative determining the exact location for testing.

The testing laboratory representative shall:

1. Note the location of the compaction test performed

2. Obtain core samples of the paving via ASTM D-5361
3. Transport the cores to the laboratory and perform the necessary operation per ASTM D-3203 to determine the resulting pavement air void percentage.
4. Provide written results of the tests and operations as described above to both the paving contractor's superintendent and the City Inspector within 5 working days.

Compacted HMAC pavement meeting this specification shall have between two percent (2%) and eight percent (8%) air voids.

COMPACTED LIFT THICKNESS ~~AND REQUIRED CORE HEIGHT~~

(Does Not Override Thickness Requirements)

Mixture Type	Compacted Lift Thickness	
	Minimum (in.)	Maximum (in.)
A	3.00	6.00
B	2.50	5.00
C	2.00	4.00
D	1.50	3.00
E	1.25	2.50

C. THICKNESS VERIFICATION: For each core sample taken from the finished paving, the thickness of the HMAC portion of the section shall be measured, noted and provided to the City for review. The thickness shall be as required on the ~~table above~~ plans or in the street design.

D. FINISH SURFACE TOLERANCES: The finish surface of the compacted pavement shall be sealed, smooth and true to the line, grade and cross section as established in the contract documents. There shall be no deviation in excess of 1/8 inch per foot of distance from the nearest point of contact when tested with a 10-foot straight edge placed parallel to the centerline of the roadway. There shall be no deviation from the straight edge in excess of 1/4 inch at any point.

E. The hot-mix asphaltic concrete will be accepted for density based on one day's production. Each day's production will be divided into four sections and one cored or sawed sample will be taken for each section. Each day's production will be accepted, with respect to density, when the average field density determined from the cores is equal to or greater than 92 percent of the maximum theoretical density as determined in accordance with ASTM D2041, and when no individual core density is less than 88.0 percent of the maximum theoretical density. If the Contractor elects to have the density testing rechecked, another group of four cores per each day's production will be obtained. The recheck group will not be averaged with any previous tests.

PART 3 – EXECUTION

3.1 GENERAL

A. The Contractor shall retain full control of all materials, labor methods and equipment used in the placement and compaction of HMAC paving with the following exceptions:

1. Temperature – HMAC and/or ~~tack~~ prime coat materials shall not be placed when the air temperature is 50° F or lower and falling. Placement may be allowed if roadway surface

temperature is 60 degrees or higher. Measure roadway surface temperature with a handheld IR thermometer.

2. ~~Tack~~Inverted (Covered) Prime Coat – ~~Tack~~Inverted (Covered) Prime coat shall be applied to finished flex base .~~clean, dry asphalt surfaces and between asphalt lifts only and shall be applied just prior to placement of HMAC materials. The Contractor shall neatly tack all gutter edges before placing any HMAC. The tack coat material shall be SS-1 applied at a rate of 0.04 to 0.10 gal/sy.~~

3. HMAC Temperature – HMAC materials shall be placed between 250° F and 340° F. Compaction is not allowed on HMAC that has cooled below 210° F at the pavement surface.

4. Rolling Water – Small amounts of water may be used to keep the HMAC from adhering to the placement and compaction equipment. Excessive water and/or any use of petroleum products for this purpose are not allowable.

5. Compaction Roller Traffic – Compaction rollers shall be kept at a slow enough speed to prevent any displacement of material. Rollers shall not be allowed to stand or park on the finished and compacted paving until after 12 hours has passed after final compaction.

END OF SECTION