

## **622 – ASPHALT CONSTRUCTION**

### **622.1 GENERAL PROVISIONS ASPHALT CONSTRUCTION**

This work shall consist of the construction of plant mixed hot mix asphalt (HMA) pavement on the approved prepared foundation, base/binder course, or existing surface in accordance with the specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

Asphalt construction shall conform to the requirements of Sections 450, 455, 460, and 465 of the State Specs and as modified herein. In the State Specs, *Upper Layer* and *Lower Layer* are synonymous with surface course and binder course respectively.

Asphalt pavement shall not be placed during rainfall, snow storms, or any imminent weather that might adversely affect the construction. Asphalt pavement shall not be applied on wet material or wet sub-layers or when the aggregate base and/or existing base is frozen. The Contractor shall notify the Engineer and proceed with construction once the surfaces and material are dry enough to proceed with construction unless the otherwise directed by the Engineer. The Engineer will verify if previously frozen grade is

All asphalt used for this contract shall have the grade PG58-28 unless given written direction by the Engineer or otherwise specified in the plans.

### **622.2 MATERIALS**

#### **1. HMA MIXTURE DESIGN**

For each course, the Contractor shall submit, for the Engineer's review, an asphaltic mix design meeting all necessary criteria. The asphaltic mix design shall consist of aggregate gradations, aggregate blend percentages, Job Mix Formula (JMF), recommended asphalt content, recommended plant mix temperature range, and shall be signed by a Certified Asphaltic Technician III. The design shall be conducted according to procedures in the latest version of the Department's Test Method 1559, Standard Method of Asphaltic Mix Design. The Contractor will run tests on the quality of the aggregates, review the asphaltic mixture design and issue a report. The asphaltic mixture design shall be in effect until modified, in writing, by the Engineer.

The submitted mix design report must be approved by the Engineer or their authorized testing laboratory before paving can begin.

- a. **RECYCLED PAVEMENT**: The Contractor may, at their option, use recycled asphalt pavement. The bituminous base or base/binder course mixtures may contain a combined maximum of 35% (25% combined maximum for surface course mixtures) of fractionated reclaimed asphaltic pavement (FRAP) and reclaimed asphaltic pavement (RAP). The City Engineer reserves the right to approve the source and actual quantity of

the reclaimed asphalt pavement to be used. Recycled asphaltic shingles (RAS) are not permitted.

b. SAMPLES

For the purpose of mix design verification, the Contractor shall supply aggregate samples (upon request only), representative of the average gradation of the job materials, along with the complete Contractor Asphaltic Mix Design, to the City at least 14 calendar days prior to use in the work. No aggregate shall be used in the production of mixtures without prior approval of the Engineer.

The Engineer may at any time request that a sample of HMA be taken from the field or plant by the Contractor at the Contractor’s expense, or perform a plant inspection.

2. POROUS ASPHALT MIX DESIGNS

Where the plans call for porous asphalt, the contractor shall provide mix designs that meet the following design requirements.

	12.5 mm Mix	9.5 mm Mix
Percent Binder Content <sup>1</sup>	5.5 minimum	5.5 minimum
Binder Grade <sup>2</sup>	PG 64-22	PG 64-22
Percent Air Voids (Va @ 50 gyrations)	18 – 20	18 – 20
Percent Tensile Strength Ratio minimum (TSR @ 5 cycles freeze/thaw per ASTM D4867 <sup>3</sup> )	80 minimum	80 minimum
Percent Draindown at Production Temperature <sup>4</sup>	0.3 maximum	0.3 maximum

- 1 - 5.75 - 6.0 percent recommended.
- 2 - Minimum high temperature of 64 degrees C recommended.
- 3 - Cantabro Abrasion test is not included in mix design guidelines.
- 4 - Effective measures to reduce draindown include use of washed manufactured sand in lieu of crusher screenings and fibers. A slight reduction in production temperature may also be considered.

**622.3 PREPARATION OF BASE**

The surface of the base shall be clean, dry, and free of foreign material before paving commences. If the HMA is being placed in multiple lifts, each lift shall be clean, dry, and free of foreign material before applying tack coat for the next lift. The binder and surface course mixtures shall be laid only upon a base which is dry, and only when weather conditions are suitable as determined by the Engineer.

When directed by the Engineer, all breakups, depressions, or any other distressed or unsatisfactory areas of the existing foundation to be paved will be repaired, and

the surface cleaned, prior to placement of the binder and/or surface course. The cost of preparing the foundation to be paved, repairing the old existing base or pavement, and prime or tack coats are incidental to the pavement construction and should not be considered a separate item *unless so designated in the proposal*.

## 1. CONCRETE BASE PREPARATION

Prior to HMA pavement resurfacing, the surface of the existing concrete pavement shall be prepared as follows:

Existing asphaltic surface and all loose patching material or asphaltic patches which protrude above the existing concrete pavement shall be removed to the satisfaction of the Engineer.

### a. JOINT AND CRACK REPAIR

Perform Joint and Crack Repair on existing surfaces as shown in the plan or as directed by the Engineer.

Joint, crack, and pavement surface spalls exceeding 1-1/2 inches in width, with a depth of less than 4 inches, shall have all loose or deteriorated concrete removed to sound concrete. The void shall be vacuumed thoroughly clean. Any joint and crack repair over 4 inches deep will be removed and replaced and paid under the respective items for concrete base patching. Tie bars must be used in any area where patches abut existing concrete.

The cleaned void shall be filled with HMA to the level of the pavement and compacted motorized rollers approved by the Engineer. HMA shall be placed in lifts to ensure complete compaction.

Requests for use of alternate methods and materials must be submitted at least 1 week prior to the date of proposed use.

## 622.4 ADJUSTING UTILITY FRAMES & WATER VALVES

### 1. UTILITY FRAMES

The Contractor shall adjust to finished grade all catch basins and City manhole frames. The masonry mortar and concrete bricks shall comply with the requirements of section 519 of the State Specs. Utility frame adjustments may include rebuilding block or brick as designated on the plans, or as determined by the Engineer.

The Contractor shall remove the existing catch basin or manhole frame, adjust the top of the existing masonry structure, and reinstall the frame. If the condition of the structure to be adjusted requires masonry repairs beyond 6 inches of vertical feet from the bottom of the frame, the additional repairs beyond this limit shall be paid per the relevant bid item, or if no bid item exists the Fixed Extra rate.

Adjustment on manhole frames in asphalt pavement to finished grade shall only be done after the binder layer(s) of hot mix asphalt pavement is completed on asphalt pavement and asphalt resurfacing projects. The binder layers of hot mix asphalt pavement shall be removed only after a vertical edge has been sawed in a box around the frame. The removal and sawing of any lower layers shall be incidental to the work. Backfilling around the frames after adjustment shall be done with compacted fill as specified for the pavement base, and compacted asphalt base/binder material, at Contractor's expense.

The area of asphalt removed around the frame shall be large enough to fully accommodate compaction by a self-propelled pneumatic roller completely within the patched area. **The use of plate compactors will not be permitted for compacting the base aggregate dense and lower layer of HMA around manholes.** The surface layer on the pavement shall not be applied until the all patched areas around the adjusted manhole frames have had a minimum of 12 hours elapse since the binder material was placed. Metal adjusting paving rings installed on top of the casting frame shall not be used unless approved by the Engineer in writing.

If only one layer of asphalt is to be laid, then the adjustment of catch basin and manhole frames shall be done before the upper layer is placed.

While performing the masonry work involved in making adjustments, the Contractor should provide the means to intercept dropped materials before they reach the bottom of the structure.

## 2. ADJUSTING WATER VALVE BOXES

The Contractor shall furnish all labor and equipment necessary to adjust all water valve boxes within the street right-of-way within the actual work limits. This work requires the boxes to be placed at finished grade and be operational.

In asphaltic pavement, all valve boxes shall be set to finished grade after any binder courses and prior to installation of the surface course.

After the pavement is installed, if the City Water Department determines the valve is inoperable due to displacement or faulty adjusting or lack of protection, the Contractor will be required to perform all work necessary to correct the condition with materials, and make the valve operational at the Contractor's own expense within 5 days of notification by the City.

## 3. SURFACE REQUIREMENTS

The Contractor shall set the frames, grates, lids, and water valves accurately so the complete installation is at the correct elevation required to fit the adjoining surfaces. The frames shall be set in pavement areas so that they comply with the following surface requirements.

Place a 6 foot straightedge over the centerline of each frame or water valve parallel to the direction of traffic at the completion of the paving. Make a measurement at each side of the frame and average the two measurements. If this average is greater than 5/8 inch, reset the frame to the correct plane and elevation. If this average is 5/8 inch or less but greater than 3/8 inch, the City will allow the frame to remain in place but shall pay only 50% of the contract unit price for adjusting catch basin frames, manhole frames or water valves. If the frame is higher than the adjacent pavement, then make the two measurements at each end of the straightedge and average them. Frames protruding more than 1/8 inch above the pavement grade shall be reset based on the average.

The Engineer in the field is permitted to direct adjustment measurements to be taken at different locations and/or with different reference points wherever they deem necessary e.g. if a frame is close to the edge of the curb flange.

## **622.5 HMA ASPHALT PAVING**

Placing of the asphalt mixtures shall be as continuous as possible. The width of paving passes shall be adjusted so the locations of longitudinal joints do not coincide for successive passes. However, whatever the width of a pass, the action of the spreader on the mat must be uniform throughout the width of the mat.

The finishing machines shall lap previously laid HMA material a minimum of 3 inches and the material left sufficiently high to allow for compaction. The longitudinal joints in each layer shall be offset from the previous layer by a minimum of 6 inches.

When the surface has cooled to a temperature of 140° F or less, the edges of longitudinal joints shall be painted with hot asphalt cement, or heated to the point of softening with an infrared joint heater, before work is resumed.

No asphalt mixtures shall be laid when the air temperature is at or below 40° F unless permitted by the Engineer and the Contractor has received approval of a cold weather paving plan. Binder mixture shall be spread at a temperature between 225° F and 325° F, and the surface mixture at a temperature between 250° F and 340° F.

The use of hand tampers or other non-mechanical compaction methods is prohibited. The Contractor shall protect all sections of the newly compacted mixture from traffic until they have been cooled and hardened to the satisfaction of the Engineer.

### **1. TACK COAT OF CONCRETE OR HMA PAVEMENT**

Except when otherwise specifically provided by the contract or ordered by the Engineer, penetration tack coat shall be placed in a single application. Tack Coat shall conform to 455.2.5 of the State Specs. Surfaces shall be clean and dry before tack coat is applied.

Tack coat shall not be applied when the surface temperature is less than 32° F. Exceptions will be permitted only with prior written approval of the Engineer.

All sweeping, cleaning and preparation of the binder surface must be completed prior to placing the next layer of asphalt. The surface shall be reasonably free of loose dirt, dust, or other foreign matter.

After the binder or concrete base has been placed, as applicable, apply an asphalt tack coat at 0.05 to 0.07 gallons per square yard after dilution to the surface of concrete base or the binder course and to the edges of the existing pavement, and on any subsequent lifts of binder course. The Engineer may adjust the application rate based on surface conditions. Also tack coat manhole and inlet frames below grade.

The rate of application of asphaltic material shall be determined on the basis of the condition of the surface to be treated and the requirements to produce contemplated results and the amount per square yard to be applied will be specified by the Engineer. The asphaltic material shall not be applied at such a rate as will cause it to flow off the surface. The grade of emulsified asphalt and the time interval between application of tack and laying of HMA pavement shall also be entirely at the discretion of the Engineer.

In addition to the general application of a "tack" coat prior to laying the final surface, hand spraying of "tack" must be performed along all curb flanges and all transverse butt joints and feathered ends. The distributor truck must remain within 500 feet of the surfacing crew to avoid "tacking" too far ahead. The Contractor may be required to remove "tack" that may have been tracked, or carelessly sprayed, on concrete surfaces.

The Contractor shall apply tack coat as directed by the Engineer. Tack shall be considered **incidental** to paving unless noted as a separate bid item.

## 2. COLD WEATHER PAVING

Cold Weather Paving operations shall be implemented by the Contractor if paving operations are being conducted when the atmospheric temperature is at or below 40°F. The Contractor shall conform to the requirements of Section 450.3.2.1.2 of the State Specs when performing Cold Weather Paving. Binder layers of asphalt shall not be placed in temperatures below 32°F unless approved in writing by the Engineer. Binder layers may be placed once the atmospheric temperature reaches 32°F and is rising. The surface layer of asphalt shall not be placed in temperatures at or below 36°F unless approved in writing by the Engineer. Binder layers may be placed once the atmospheric temperature reaches 36°F and is rising.

Cold Weather Paving shall be considered incidental to the contract unless a separate bid item is provided in the contract.

## **622.6 POROUS ASPHALT PAVING**

Do not install when ambient air temperature at pavement site in shade away from artificial heat is below 60 degrees F or when actual ground temperature is below 50 degrees F unless permitted in writing by the Engineer.

Paint contact surfaces, such as permeable paver edge restraints, and concrete pavement, with a thin, uniform coat of Type RS-1 emulsified asphalt immediately before asphalt mixture is placed against them. Coat surfaces of manhole, inlet, and utility frames with oil to prevent bond with asphalt pavement.

The use of surge bins shall not be permitted.

Equip pavers with a joint heater capable of heating longitudinal edge of previously placed mat to a surface temperature of 200 degrees F, or higher if necessary, to achieve bonding of newly placed mat with previously placed mat.

Rollers shall be two-axle tandem rollers with a gross mass (weight) of not less than 8 tons and not more than 12 tons and capable of providing a minimum compactive effort of 250 pounds per inch of width of drive roll. Rolls shall be at least 42 inches in diameter. Do not stop or park rollers on freshly placed mat. Vibratory rollers shall not be used.

The porous asphalt mixture, at time of discharge from haul vehicle, shall be within 10 degrees F of compaction temperature for approved mix design.

Place porous asphalt in a single lift of 4 inches thickness unless otherwise specified in the plans.

Before completing paving operations, test the full permeability of pavement surface by application of clean water at rate of at least 5 gpm over surface, using a hose or other distribution device.

After final rolling, do not permit vehicular traffic of any kind on surface until cooling and hardening has taken place, and in no case within first 48 hours.

The Contractor shall ensure that at no point after placement of the porous asphalt shall any equipment or materials be stored upon the porous pavement. The Contractor shall keep the porous pavement free of soil, dirt, debris and foreign material that may clog the porous asphalt. The Engineer reserves right to require that Work adjacent to pavement, such as landscaping, cleanup, and turf establishment, is completed prior to installation of porous asphalt course, when this work could cause damage to pavement.

## **622.7 QUALITY CONTROL**

The cost of furnishing a quality control program and providing the tests and reports as specified, including density testing, shall be considered incidental to the pavement bid item.

The Contractor shall provide and maintain a quality control program. A quality control program is defined as all activities, including mix design, process control inspection, sampling and testing, and necessary process adjustments related to producing and placing HMA pavement conforming to the specifications.

The testing shall include density testing of in-place HMA pavement with the use of nuclear density gauges. Section 460 of the State Specs shall be modified by these specifications to require the Contractor to test for nuclear density a minimum of every 300 feet. The Contractor shall perform HMA pavement density testing with nuclear gauges operated by a Nuclear Technician I who has been certified by the Highway Technician Certification Program. The Contractor shall furnish nuclear gauges from the State of Wisconsin's most current "List of Approved Nuclear Density Gauges".

The Contractor shall select the test site, station, and offset distance randomly as specified in the State of Wisconsin Construction & Materials Manual. When requested, the Contractor shall provide the Engineer with the original data sheet for each lot within 24 hours of testing completion for that lot. A lot represents 750 tons of a mixture placed within a single layer for each location and target maximum density category.

The Contractor shall not re-roll compacted mixtures with deficient density test results or operate continuously below the specified minimum density. The Contractor shall stop production, identify the source of the problem, and make corrections to produce work meeting specification requirements.

#### 1. POROUS ASPHALT PRODUCTION QUALITY CONTROL

The Contractor shall provide at their expense, and with Engineer approval, a third-party Inspector to oversee and document mix production. Submit mix testing results during production to Inspector. Quality Control Plan may be altered at discretion of Engineer on basis of feasible testing as suggested by asphalt supplier. The plant shall employ a Quality Control Technician (QCT) that performs QC/QA testing and will be certified in discipline of HMA Plant Technician by relevant certifying agency.

The Contractor shall sample, test, and evaluate mix in accordance with methods and minimum frequencies in Table 1 on page 622-8.



Table 1

Test	Minimum Frequency	Test Method
Temperature in Truck at Plant	6 times per day	
Gradation	Greater of either (a) 1 per 500 tons (b) 2 per day, or (c) 3 per job	AASHTO T30
Binder Content	Greater of either (a) 1 per 500 tons, (b) 2 per day, or (c) 3 per job	AASHTO T164
Air Void Content	Greater of either (a) 1 per 500 tons, (b) 2 per day, or (c) 3 per job	ASTM D6752
Binder Draindown	Greater of either (a) 1 per 500 tons, (b) 2 per day, or (c) 3 per job	ASTM D6390

If an analyzed sample is outside testing tolerances, take corrective action. After taking corrective action, sample and test resulting mix. If re-sampled mix test values are outside tolerances, immediately inform Engineer. If the Engineer determines that it is in best interest of project that production is ceased. Contractor is responsible for mix produced for project.

Produced paving mixture produced shall not vary from design criteria for aggregate gradation and binder content by more than stated tolerances. Testing tolerances during production for air void content, binder draindown, and TSR shall be within limits in table below.

Sieve Size	Percent Passing
19mm (3/4 in.)	-
12.5 mm (1/2 in.)	±6.0
9.5 mm (3/8 in.)	±6.0
4.75 mm (No. 4)	±5.0
2.36 mm (No.8)	±4.0
0.075mm (No. 200)	±2.0
Percent PGAB	+0.4, -0.2

Should the paving mixture produced vary from designated grading or asphalt content by more than above tolerances, the Contractor shall immediately make proper changes until it is within these tolerances.

Should mix not meet tolerances specified above upon repeat testing, Engineer may reject further loads of mix.

Any mix that is loaded into trucks during time that plant is changing operations to comply with a failed test shall not be accepted, and should be immediately recycled at the plant by the Contractor.

#### **622.8 PAYMENT**

Tack coat shall be paid per gallon if it is included in the proposal as its own bid item. Otherwise it shall be incidental to the work.