# ITEM 442 SUPERPAVE ASPHALT CONCRETE



**442.01 Description.** This work consists of gyratory mix design, material, and quality control requirements for constructing a Superpave asphalt concrete pavement surface or intermediate course. The asphalt concrete pavement course consists of aggregate, and asphalt binder mixed in a central plant and spread and compacted on a prepared surface.

The requirements of Item 441 apply, except as modified by this specification.

**442.02 Type A Mix Design.** Design the mixture composition for a Type A mix according to 441.02 and the most recent *Asphalt Institute Superpave Mix Design Manual* (SP-2) for design procedures and material properties except as modified by this subsection. Include in the JMF submittal the standard City cover and summary page; all printouts from the gyratory compactor (all gyratory points not necessary); and analysis covering the required mix properties. Submit one compacted gyratory sample and loose mix for compaction of another sample, in addition to a 5-pound (2000 g) loose sample, for each JMF.

The Contractor may use the Marshall flow test in design as an indicator of potential for excess tenderness.

Supply aggregate according to the lane current average daily truck traffic (Lane ADTT) as follows unless otherwise shown on the plans:

$$\text{Lane ADTT} = \text{Current ADT} \times T_{24} \times 0.45$$

Where:

Current ADT = current average daily traffic count from the plans
$T_{24}$ = percent trucks per day from the plans

**TABLE 442.02-1 GYRATION LEVEL AND MATERIAL REQUIREMENTS**

| Lane ADTT | Nini | Ndes | Nmax | Coarse Aggregate Angularity | Fine Aggregate Angularity | Flat and Elongated Particles | Sand Equivalent |
|---|---|---|---|---|---|---|---|
| <4000 | 7 | 65 | 105 | 95 * /90 ** | 44 | 10 | 45 |
| >4000 | 7 | 65 | 105 | 100 * /100 ** | 44 | 10 | 50 |

* Percent fractured (one or more faces) according to ASTM D5821
** Percent fractured (two or more faces) according to ASTM D5821

Submit aggregate to be used to the Laboratory for approval a minimum of 3 weeks before submitting a JMF for approval.

If fine aggregate is from crushed carbonate stone or air-cooled blast furnace slag, the City will not require the fine aggregate angularity (FAA) test. The City will allow a blend of a material not meeting the FAA with a material that meets the FAA, but calculate the FAA result based on the individual City FAA results and actual blend percentages. Obtain City approval of any blends.

The restricted zone does not apply. Use control points according to SP-2, except as specified in Table 442.02-2.

**TABLE 442.02-2 AGGREGATE GRADATION REQUIREMENTS**

| Sieve Size | 9.5 mm mix (% passing) | 12.5 mm mix (% passing) | 19 mm mix (% passing) |
|---|---|---|---|
| 1 1/2 inch (37.5 mm) | | | 100 |
| 3/4 inch (19 mm) | | 100 | 85 to 100 |
| 1/2 inch (12.5 mm) | 100 | 95 to 100 | 90 max |
| 3/8 inch (9.5 mm) | 90 to 100 | 96 max | |
| No. 4 (4.75 mm) | 70 max | 52 min | |
| No. 8 (2.36 mm) | 34 to 52 | 34 to 45 | 28 to 45 |
| No. 200 (75 µm) | 2 to 8 | 2 to 8 | 2 to 6 |

Ensure that the F/A ratio is a maximum of 1.2. Use a 2-hour cure in design process.

If more than 15 percent fine aggregate not meeting FAA is used, perform a loaded wheel test (LWT) according to City Supplement 1057. To estimate a LWT sample mix volume, use the bulk density from gyratory specimens at $N_{des}$. Results less than 0.20 inch (5.0 mm) at 120 °F (49 °C) are considered passing.

The Contractor may use reclaimed asphalt concrete pavement according to 401.04. Test design volumetric properties at $N_{des}$. Test $N_{max}$ for the required criteria. Ensure that the VMA is not less than the minimum values of Table 442.02-3.

**TABLE 442.02-3 VMA CRITERIA**

| Mix | VMA (percent minimum) |
|---|---|
| 9.5 mm | 15 |
| 12.5 mm | 14 |
| 19.0 mm | 13 |

**442.03 Type B Mix Design.** Apply the mix design specified in 442.02 for a Type A mix except as modified by this subsection:

Modify the Coarse Aggregate Angularity of Table 442.02-1 according to Table 442.03-1.

**TABLE 442.03-1**

| Lane ADTT | Coarse Aggregate Angularity |
|---|---|
| <4000 | 65 * /65 ** |
| >4000 | 75 * /70 ** |
| * Percent fractured (one or more faces) according to ASTM D5821<br>** Percent fractured (two or more faces) according to ASTM D5821 | |

Ensure that at least 50 percent by weight of virgin fine aggregate is aggregate meeting FAA or is crushed carbonate stone or air-cooled blast furnace slag. Modify the No. 8 (2.36 mm) sieve requirement for a 12.5 mm mix in Table 442.02-2 to 34 to 40 percent. Apply an F-T value of +2 according to 441.02 and 441.09.

**442.04 Asphalt Binder.** Use a PG 70-22M asphalt binder for surface courses and a PG 64-28 asphalt binder for intermediate courses.

The minimum total asphalt binder content for a surface course is 5.7 percent.

**442.05 Quality Control.** Conform to 441.09, except as specified in this subsection. Ensure that plant operation and quality control testing conform to the Contractor's QCP.

Use a gyratory compactor conforming to the requirements of Superpave. If the gyratory compactor was moved to the plant before production, calibrate it and present the results to the Laboratory. Condition samples for air voids for 2 hours.

Determine bulk gravity for air voids determination on specimens compacted to $N_{des}$.

If the design gradation requires an LWT test, take a sample sufficient to run a LWT test once each day for the first 3 days and test it according to City Supplement 1057. The Contractor may perform the LWT test in the Contractor's Level 2 laboratory, but must compact the sample the same day the sample was taken, cure it overnight, and test it the following day. Give the test result and sample density to the Engineer the day of the LWT test. Report the LWT data on the Quality Control Report.

**442.06 Compaction**. Cease production if compaction causes bumps in the mix or the mix is excessively tender.

**442.07 Acceptance**. The City will base acceptance of the asphalt concrete mix on the item specified in the Contract (i.e. Item 448).

**442.08 Basis of Payment**. The City will pay for accepted quantities at the contract prices as follows:

| Item | Unit | Description |
|---|---|---|
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Intermediate Course, 9.5 mm, Type A (448) |
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Intermediate Course, 9.5 mm, Type B (448) |
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Surface Course, 12.5 mm, Type A (448) |
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Surface Course, 12.5 mm, Type B (448) |
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Surface Course, 9.5 mm, Type A (448) |
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Surface Course, 9.5 mm, Type B (448) |
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Intermediate Course 19 mm, Type A (448) |
| 442 | Cubic Yard (Cubic Meter) | Asphalt Concrete Intermediate Course, 19 mm, Type B (448) |