

SECTION 02504

ASPHALT CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This is a material specification for hot mix and cold mix bituminous paving mixtures.

1.02 REFERENCES

- A. AASHTO T-27: Standard Method for Sieve Analysis of Fine and Coarse Aggregate.
- B. AASHTO M-17: Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
- C. AASHTO T-165: Standard Test Method for Effect of Water on Cohesion of Compacted Bituminous Mixtures.
- D. AASHTO T-245: Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
- E. AASHTO T-246: Standard Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
- F. AASHTO T-182: Standard Test Method for Coating and Stripping of Bitumen-Aggregate Mixtures.
- G. AASHTO M-156: Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- H. ASTM D 4215: Standard Specification for Cold-Mixed, Cold-Laid Bituminous Paving Mixture.

1.03 DEFINITIONS

- A. Traffic Classifications:
 - 1. Class I: Parking lots, driveways, light traffic residential streets, light traffic farm roads.
 - 2. Class II: Residential streets, rural farm and residential roads.
 - 3. Class III: Urban minor collector streets, rural minor collector roads.
 - 4. Class IV: Urban minor arterial and light industrial and light industrial streets, rural major collector and minor arterial highways.
 - 5. Class V: Urban freeways, expressways and principal arterial highways, rural interstate and other principal arterial highways.

1.04 SUBMITTALS

- A. Mix Design: Submit each proposed mix design 14 days prior to use in the Work. Include in the report the following information.

1. Mix design method (Rice or Marshall).
 - a. For Marshall, use a five (5) point design.
 2. Job control target data for aggregate ideal grading.
 3. Permissible range limits of bitumen content in mixture.
 4. Mixture's index of retained strength, AASHTO T-165
 5. Additives. If none, state none are required.
 6. Percent voids.
- B. Source Aggregate Sample Report. Indicate rodded weight of aggregate, percentage of wear, weight loss, sand equivalent value, percent of fractured faces, amount of organic matter, plasticity of fines, and percentage of fines retained on the aggregate.
- C. Pre-Approved Mix Design Data: If supplier has on record, a City approved mix design, submit name and address of supplier for each mix design 3 days prior to using asphalt concrete mix.

1.05 QUALITY ASSURANCE

- A. Bitumen weights shall be determined by the mix design.
- B. Use asphalt cement when recycled asphalt mixtures are indicated.
- C. Do not change source of supply of paving asphalt or aggregate without Engineer's written approval.
- D. Each shipment of bituminous material shall be uniform in appearance and consistency with no foaming when heated to the specified mixing temperature.
- E. Do not use storage containers contaminated with other asphalt types or grades.
- F. Gradation, asphalt content, marshall density, and maximum density shall be determined by extraction tests.

PART 2 PRODUCTS

2.01 PAVING ASPHALT

- A. Provide type and grade indicated.
- B. The mix design shall target 3% voids. However, the percent asphalt or fines may need to be adjusted to achieve optimal strength.

2.02 AGGREGATES - MATERIALS

- A. Clean, hard, tough, durable and sound mineral aggregates that consist of crushed stone, crushed gravel, or crushed slag conforming to the following requirements:
 1. Rodded Weight density; not less than 75 pounds per cubic foot.

2. Percentage of wear of coarse aggregate retained on the No. 8 sieve; not exceeding 40 unless specific aggregates having higher values are know to be satisfactory.
 3. Weight loss; not exceeding 16 percent by weight when subject to 5 cycles of sodium sulfate.
 4. The combined aggregate after going through the dryer shall have a sand equivalent value of not less than 50 percent.
- B. Coarse Aggregate: Use an aggregate that the portion retained on the No. 4 sieve has not less than 50 percent of particles by weight with at least two mechanically fractured faces or clean angular faces.
- C. Fine Aggregate:
- D. Fine aggregate passing the No. 4 sieve may be either a natural or manufacture product containing not more than 2 percent by weight of organic matter or other deleterious substances.
1. Aggregate passing the No. 40 sieve is nonplastic.
 2. The weight of minus 200 mesh material retained in the aggregate, as determined by the difference in percent passing a No. 200 sieve by washing and dry sieving without washing, does not exceed 6 percent of the total sample weight.
 3. Mineral Filler: When mix design indicates need, add as separate ingredient; AASHTO M-17.

2.03 AGGREGATES - MASTER GRADING BAND LIMITS

- A. Gradation will be per the standard drawings.
- B. The following gradations describe the total percent passing by weight, AASHTO T-27, and is based on fine and coarse aggregate having approximately the same bulk specific gravities.

MASTER GRADING BAND LIMITS				
Sieve Size	DENSE MIXTURES			
	Type DM-3/4		Type DM-1/2	
	Min	Max	Min	Max
1"				
3/4"	100	----		
1/2"	----	----	100	----
3/8"	75	91	----	----
# 4	46	62	60	80
# 8	----	----	----	----
# 16	22	34	28	42
# 50	11	23	11	23
# 200	5	9	5	9

2.04 AGGREGATES - JOB-CONTROL GRADING BAND LIMITS

- A. The job control formula shall produce a smooth curve approximately paralleling the master grading band limits for the designated mix. If application of the tolerances results in a job control

grading band outside the master grading band, the full job control tolerances shall apply. The following describes the job control grading bands.

JOB-CONTROL GRADING BAND LIMITS					
Sieve Size	Amount Passing Sieve, weight %				
	1 Test	2 Tests	3 Tests	4 Tests	5 Tests
≥ ½	± 10	± 7.3	± 6.3	± 5.6	± 5.2
3/8	± 9	± 6.9	± 5.9	± 5.3	± 4.9
No. 4	± 9	± 6.7	± 5.7	± 5.2	± 4.8
No. 8	± 7	± 5.6	± 4.8	± 4.3	± 4.0
No. 16	± 7	± 5.2	± 4.6	± 4.2	± 3.9
No. 50	± 6	± 4.3	± 3.8	± 3.4	± 3.2
No. 200	± 3	± 2.4	± 2.0	± 1.8	± 1.7

2.05 MARSHALL MIX DESIGN

- A. The Marshall mix design shall be based upon AASHTO T-245, traffic classifications, and the following:

MARSHALL MIX DESIGN REQUIREMENTS						
	CLASS I		CLASS II & III		CLASS IV & V	
	Min	Max	Min	Max	Min	Max
Number of Compaction Blows (each end of specimen)	35	34	50	50	75	75
Stability, lb	1500	-----	1500	-----	1750	-----
Flow, in 0.01 in. units	8	20	8	18	8	16
% Air Voids, Surfacing and Leveling Base	3	5	3	5	3	5
	3	8	3	8	3	8
Unconfined Compression Strength Retention, % (AASHTO T-165)	65	-----	65	-----	65	-----

- B. Compensate for specific gravity and absorption of aggregate to determine bitumen content by laboratory testing.
 C. A maximum 15% by RAP is allowed.
 D. Dust to Binder ratio should not be more than 1.4.

2.06 MIXING PLANT

- A. Hot-mixed, hot-laid paving mixtures; AASHTO M-156.

2.07 SOURCE QUALITY CONTROL

- A. Unconfined Compression Strength Retention: When crushed mineral aggregate which is thoroughly coated with bitumen has an index of retained strength less than 65 percent bring the strength into compliance by adding any of the following additives to the mix.

1. Anti-stripping agent.
 2. Hydrated lime.
 3. Portland cement.
- B. Coating and Stripping of Bitumen-Aggregate Mixture: Immediately after mixing, the mixing shall meet the requirements of AASHTO T-182, whereby not more than 5 percent of the aggregate particles shall remain uncoated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Plant Mix Bituminous Paving: In accordance with Section 02510.

END OF SECTION