

SECTION 320—AGGREGATE-BITUMINOUS BASE COURSE

320.1 DESCRIPTION—This work is construction of a bituminous-treated, aggregate base course. When placed on subgrade, this work includes the preparation of subgrade as specified in [Section 210](#).

320.2 MATERIAL—

- (a) **Aggregate.** Type C or better, No. 2A, [Section 703.2](#).
- (b) **Bituminous Material.** One of the following, as specified in [Section 702](#):
- Class PG 64-22 or Class PG 58-28
 - Emulsified Asphalt—Class MS-2(E-4) or CMS-2(E-5)

(c) **Composition of Mixture.** Combine the aggregates and bituminous material in proportions required to produce an accepted composition. Produce a mixture with at least 3.5% bituminous material, computed as a percentage by mass (weight) of the total mixture.

1. JMF. When Asphalt Cement is used in the mixture, prepare and submit a JMF to the District Materials Engineer/District Materials Manager for acceptance. The JMF shall conform to the accepted composition and the following Marshall values. Test the mixture according to [PTM No. 705](#):

- Stability at 60 °C (140F) at least 2200 N (500 pounds).
- Flow from 6 to 16.

These values are not required for daily plant control.

Determine the design density from the accepted Marshall design criteria.

Produce a mixture conforming to the JMF. The Representative may require a new JMF if unsatisfactory results or other conditions make it necessary. If using emulsified asphalt, do not prepare a JMF. Determine the design density and the optimum liquid content according to [PTM No. 106](#), Method B. The liquid content of the mixture is the sum of the percentage of free water and the percentage of bituminous material.

2. Mixture Production and Acceptance. [Section 305.2](#)

320.3 CONSTRUCTION—

(a) Equipment.

1. Plant. Mix materials, using continuous-flow or batch-type central mix plants, mechanical mixers, or travel plants. When liquids are automatically metered, use equipment that will control the liquids within a variation of not more than $\pm 0.5\%$ from the specified percentage.

For central plant mixing, use a mixer equipped with batching or metering devices designed to measure the specified quantity of material.

2. Hauling. To transport the base course from a central mix plant to the project, use clean, tight vehicles, with protective covers that do not have rips or holes.

3. Spreaders. Use adjustable, self-propelled mechanical spreaders capable of placing and screeding base material without segregation.

4. Bituminous Distributor. [Section 460.3\(b\)](#)

5. Compaction Equipment. [Section 108.05\(c\)3](#)

(b) Mixing and Spreading.

1. General. Spray water uniformly through the aggregate before or at the time of addition or application of the emulsified asphalts to ensure a moisture content from 2% to 8% when tested according to [PTM No. 106](#), Method B. For asphalt cements use heat-dried aggregate with a maximum moisture content of 1/2%.

Determine moisture content at the time of compaction according to [PTM No. 106](#), Method B. If necessary, aerate the mixture to reduce the water content in emulsions so the total liquid content (liquid bituminous material and water) of the mixture does not exceed the optimum moisture content of the aggregate.

Maintain the temperature range of the bituminous material when added to the mixture or applied to aggregate according to Bulletin 25. Do not add or apply bituminous material to the aggregate when the air temperature in the shade is 10 °C (50F) or less or when weather conditions are unfavorable. Do not place the base course on a wet surface or on a surface with a temperature less than the air temperature specified above.

If using bituminous material other than Asphalt Cement, do not place base course from September 15 to May 1, unless otherwise permitted.

Construct base courses 150 mm (6 inches) or less in compacted depth in one layer. Construct base courses more than 150 mm (6 inches) in compacted depth in two or more layers of approximately equal compacted depth, with no layer less than 75 mm (3 inches) nor more than 150 mm (6 inches) in depth.

Allow only necessary shaping and processing equipment to travel over the spread mixture. Remove and replace mixture that is displaced or contaminated.

2. Central Plant Mixing and Spreading. Thoroughly mix materials to produce a uniform mixture. Spread the mixture on the surface in a loose layer that will compact to the full layer depth.

3. In-Place Mixing and Spreading. Spread the aggregate on the surface in a uniform, loose layer that will compact to the specified layer depth.

For travel plants equipped to meter the liquid bituminous material, apply bituminous material to the aggregate during the first mixing pass of the travel plant. Adjust the travel speed and the number of passes to obtain a uniform mixture.

For travel plants not equipped to meter the liquid bituminous material, apply the bituminous material to the aggregate in successive applications using a distributor. After each application, immediately cut in or blend the bituminous material with the aggregate. After applying all the bituminous material, mix the aggregate and bituminous material while also adjusting the travel speed and number of plant passes to obtain a uniform mixture.

(c) Compaction. Compact the base course to at least 100% of the design density. If using Asphalt Cement, compact to at least 90% of the design density.

After placing the first layer of a multiple-layer base course, apply a tack coat of bituminous material using a pressure distributor as specified in [Section 460.3\(b\)](#). Apply the tack coat at a rate from 0.25 L/m² to 0.30 L/m² (0.05 gallon per square yard to 0.07 gallon per square yard). If asphalt cement is used in the mixture, use Class RS-1 (E-1A), or CRS-1 (E-1C) emulsified asphalt in the tack coat.

(d) Finishing. Mix, compact, and finish the base course in a continuous operation and complete finishing during daylight hours.

(e) Construction Joints. At the end of each day's work, install a temporary wood bulkhead with a true vertical face, the full depth and width of the base course to form a straight transverse construction joint. Instead of a bulkhead, the Contractor may install a construction joint by scarifying and blending a portion of the previous day's work with the new mixture, and re-compacting to obtain uniformity.

Where necessary or indicated, construct longitudinal joints by sawing the completed work to a vertical face that is free of loose material.

(f) Density. Take one field density test, according to AASHTO T 191 or T 310, for each 2500 m² (3,000 square yards) of each layer.

When the base course fails to comply with the specified density requirements, apply additional compaction to obtain the required density. If additional compaction does not obtain satisfactory density, remove and replace the defective lot. The Representative may require additional density tests to determine if the defective area is less than the entire lot.

(g) Surface Tolerance. [Section 210.3\(c\)](#)

(h) Tests for Depth. At locations determined by the Representative, carefully dig or drill one test hole to the full depth of the completed base course in each 2500 m² (3,000 square yards) of completed base course.

The Representative will measure the depth of the base course. After the Representative completes depth measurements, backfill and compact base course mixture in the test holes.

Immediately remove and replace sections in which the depth is deficient by 13 mm (1/2 inch) or more. Start correction at the point of determined deficiency and proceed longitudinally and transversely until the depth meets the 13 mm (1/2-inch) requirement.

(j) Maintenance and Traffic. Until placing the surface course, maintain the completed base course as specified in Sections [105.13](#) and [901](#).

Maintain and protect base course the Representative opens to traffic as specified in Sections [107.15](#) and [901](#).

Allow only necessary local traffic and essential construction equipment on the base course. Repair or replace marred, distorted, or otherwise damaged pavement.

320.4 MEASUREMENT AND PAYMENT—Square Meter (Square Yard)