

**DENSE GRADED ASPHALT BASE BELOW PORTLAND CEMENT CONCRETE PAVEMENTS.**

**(REV 9-23-14)**

SECTION 234AB is inserted after Section 234 (Pages 218 - 221):

**SECTION DEV234AB  
DENSE GRADED ASPHALT BASE BELOW PORTLAND CEMENT CONCRETE  
PAVEMENTS**

**234-1 Description.**

**234-1.1 General:** Construct a dense graded asphalt base course below Portland cement concrete pavements using plant-produced hot-mix asphalt as defined in these specifications. Base course mixes are designated as B-12.5. The Contractor may use a Type SP-12.5 mixture (Traffic Level B or C) in accordance with Section 334 in lieu of a Type B-12.5.

**234-2 Materials.**

**234-2.1 General:** Use materials that conform to the requirements of Division III. Specific references are as follows:

Superpave PG Asphalt Binder or	
Recycling Agent.....	916-1, 916-2
Coarse Aggregate, Stone, Slag or	
Crushed Gravel.....	Section 901
Fine Aggregate.....	Section 902

**234-2.2 Reclaimed Asphalt Pavement (RAP) Material:** RAP may be used as a component material of the asphalt mixture provided the requirements of 334-2.3 are met.

**234-3 General Composition of Mixture.**

**234-3.1 General:** Compose the asphalt mixture using a combination of aggregate (coarse, fine or mixtures thereof), mineral filler if required, and asphalt binder material. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the mix design. Aggregates from various sources may be combined.

**234-3.2 Mix Design:** Meet the following mix design requirements. Compact the mixture in the laboratory using a Superpave gyratory compactor in accordance with AASHTO T 312-11. Design fine mixes in accordance with 334-3.2.2.1 only. Utilize a design number of gyrations of 65. The design air void content shall be within the range of 3.5 to 4.5%. The minimum voids in the mineral aggregate (VMA) shall be 12.0%. The minimum effective binder content shall be 4.5%. Utilize FM 1-T 209 for determination of the mixture's maximum specific gravity for air void determination. Select the appropriate binder grade based on Table 334-2. The Engineer reserves the right to change the asphalt binder type and grade at design based on the characteristics of the RAP asphalt binder, and reserves the right to make changes during production. Use a liquid anti-strip additive, at a rate of 0.5% by weight of the asphalt binder. The anti-strip additive must be listed on the APL. Other rates of anti-strip additive may be used upon approval of the Engineer. Furnish a copy of the mix design(s) to the Engineer prior to any paving work. Prior to the production of the asphalt mixture, submit the proposed mix design with supporting test data indicating compliance with all mix design criteria to the Engineer. Include

representative samples of all component materials, including asphalt binder and all applicable information listed in 334-3.2.7. Allow the State Materials Engineer a maximum of four weeks to either conditionally verify or reject the mix as designed. Mix design revisions will be handled in accordance with 334-3.3.

#### 234-4 Contractor's Process Control.

Meet the requirements of 320-2, 330-2 and 334-4.

#### 234-5 Acceptance of the Mixture.

The mixture will be accepted in accordance with the requirements of 334-5 with the following exception that Table 334-5 will be replaced by Table 234-1. Use the permissible variations for longitudinal and transverse grades as specified in 200-7.

Table T234-1 Master Production Range	
Characteristic	Tolerance <sup>(1)</sup>
Asphalt Binder Content (percent) <sup>(1)</sup>	Target $\pm 0.60$
Passing No. 200 Sieve (percent) <sup>(1)</sup>	Target $\pm 2.00$
Air Voids (percent) <sup>(1)</sup>	2.00 – 6.00
Density (percent $G_{mm}$ ) (minimum) <sup>(2)</sup>	90.00
<sup>(1)</sup> Tolerances for sample size of $n = 1$ from the verified mix design	
<sup>(2)</sup> Based on an average of 5 randomly located cores	

#### 234-6 Plant, Methods and Equipment.

Meet the requirements of Section 320.

#### 234-7 Construction Requirements.

**234-7.1 General:** Meet the General Construction Requirements of Section 330, with the following modifications:

**234-7.1.1 Temperature Limitations:** Spread the mixture only when the air temperature is at least 40°F. Do not place the material on frozen subgrade.

**234-7.1.2 Tack Coat:** Unless otherwise authorized by the Engineer, apply a tack coat between successive layers of base material.

**234-7.1.3 Thickness of Layers:** Construct each course in layers not to exceed 3 inches compacted thickness.

**234-7.1.4 Paving Equipment:** A motor grader may be used to spread the first course of multiple course bases when the subgrade will not support the use of a mechanical spreader. The Engineer will not require mechanical spreading and finishing equipment for the construction of base widening strips less than 6 feet in width.

**234-7.1.5 Compaction Equipment:** In areas where standard rollers cannot be accommodated, vibratory rollers supplemented with trucks, motor graders, or their compaction equipment approved by the Engineer may be used.

### 234-8 Thickness Requirements.

**234-8.1 General:** The total thickness of the Type B asphalt layers will be the plan thickness as shown in the Contract Documents. Before paving, propose a thickness for each individual layer meeting the requirements of this specification, which when combined with other layers (as applicable) will equal the plan thickness. For construction purposes, the plan thickness and individual layer thickness will be converted to spread rate based on the maximum specific gravity of the asphalt mix being used, as well as the minimum density level, as shown in the following equation:

$$\text{Spread rate (lbs. per square yard)} = t \times G_{mm} \times 43.3$$

Where:  $t$  = Thickness (in.) (Plan thickness or individual layer thickness)

$G_{mm}$  = Maximum specific gravity from the verified mix design

The weight of the mixture shall be determined as provided in 320-3.2. For target purposes only, spread rate calculations should be rounded to the nearest whole number.

**234-8.2 Spread Rate Tolerance:** Control the average spread rate on a daily basis within plus or minus 5% of the target spread rate for the individual layer(s) established by the Engineer. When the average daily spread rate is outside this tolerance from the target, adjust the spread rate to the required value established by the Engineer. The Engineer will periodically verify the spread rate at the job site during the paving operation.

**234-8.3 Allowable Deficiencies:** The Engineer will allow a maximum deficiency from the specified spread rate for the total thickness as follows:

1. For pavement of a specified thickness of 2-1/2 inches or more: 50 lbs. per square yard.
2. For pavement of a specified thickness of less than 2-1/2 inches: 25 lbs. per square yard.

**234-8.4 Pavement Exceeding Allowable Deficiency in Spread Rate:** Where the deficiency in spread rate for the total thickness is: (1) in excess of 50 lbs. per square yard for pavements with a specified thickness of 2-1/2 inches or more, or (2) in excess of 25 lbs. per square yard for pavements with a specified thickness of less than 2-1/2 inches, the Engineer may require removal and replacement at no cost or may require a correction as specified in 234-8.5. The Engineer may require the Contractor to core the pavement for thickness in order to determine the area of pavement with deficient thickness.

As an exception to the above, the Contractor may leave pavement outside the main roadway in place without compensation when the Engineer allows, even though the deficiency exceeds the tolerance as specified above.

The Department will not compensate the Contractor for any pavement removed or for the work of removing such pavement.

**234-8.5 Correcting Deficiency by Adding New Surface Material:** In the event the total thickness as determined by the spread rate is excessively deficient as defined above and approved by the Engineer for each particular location, correct the deficient thickness by adding new surface material and compact it using a rolling pattern as approved by the Engineer. The Engineer will determine the area to be corrected and the thickness of new material added. Perform all overlaying and compacting at no expense to the Department.

### 234-9 Method of Measurement.

The quantity to be paid for will be the plan quantity. The pay areas will be adjusted based upon the following formula:

Pay Area = Surface Area (Project Average Spread Rate/Specified Spread rate for the Total Thickness).

Where: The project average spread rate is calculated by totaling the arithmetic mean of the average daily spread rate values for each layer, and the specified spread rate for the total thickness is based upon the plan thickness converted to spread rate as defined in 234-8.1.

The pay area shall not exceed 105% of the designed surface area.

Prepare a Certification of Quantities, using the Department's current approved form, for the certified Superpave Asphalt Base pay item. Submit this certification to the Engineer no later than Twelve O'clock noon Monday after the estimate cut-off or as directed by the Engineer, based on the quantity of asphalt produced and accepted on the Contract. The certification must include the Contract Number, FPID Number, Certification Number, Certification Date, period represented by Certification, and the tons produced for each asphalt pay item.

### **234-10 Basis of Payment.**

Prices and payments will be full compensation for all work specified in this Section, including the applicable requirements of Sections 320, 330 and 334. The bid price for the asphalt mix will include the cost of the liquid asphalt binder or the asphalt recycling agent and the tack coat application as directed in 300-8. For the calculation of unit price adjustments of bituminous material specified in 9-2.1.2, the average asphalt binder content of the base mixes to be used in these calculations is set at 6.25%.

Payment will be made under:

Item No. 285-            7-        Optional Base – per square yard.

Do Not Use Without  
CO Specs Authorization