

### **330 HOT BITUMINOUS MIXTURES-GENERAL CONSTRUCTION REQUIREMENTS.**

**(REV 6-18-07) (FA 7-11-07) (1-08)**

SUBARTICLE 330-11.2 (Page 254) is deleted and the following substituted:

**330-11.2 Longitudinal Joints:** For all layers of pavement except the leveling course, place each layer so that longitudinal construction joints are offset 6 to 12 inches laterally between successive layers. Plan offsets in advance so that longitudinal joints of the friction course are not in wheel path areas. The Engineer may waive this requirement where offsetting is not feasible due to the sequence of construction.

ARTICLE 330-12 (Pages 254-257) is deleted and the following substituted:

#### **330-12 Surface Requirements.**

**330-12.1 General:** Construct a smooth pavement with good surface texture and the proper cross-slope.

**330-12.2 Texture of the Finished Surface of Paving Layers:** Produce a finished surface of uniform texture and compaction with no pulled, torn, raveled, crushed or loosened portions and free of segregation, bleeding, flushing, sand streaks, sand spots, or ripples. Correct any area of the surface that does not meet the foregoing requirements in accordance with 330-12.5.1.

Do not use asphalt concrete mixtures containing aggregates that cause a different color appearance in the final wearing surface in sections less than 1 mile in length and across the full width of the roadway unless approved by the Engineer.

**330-12.3 Cross Slope:** Construct a pavement surface with cross slopes in compliance with the requirements of the Contract Documents. Furnish a level with a minimum length of 4 feet or a digital measuring device approved by the Engineer for the control of cross slope. Make this level or measuring device available at the jobsite at all times during paving operations. Utilize electronic transverse screed controls on the paving machine (unless directed otherwise by the Engineer) to obtain an accurate transverse slope of the pavement surface.

**330-12.3.1 Quality Control Requirements:** Measure the cross slope of the pavement surface by placing the measuring device perpendicular to the roadway centerline. Report the cross slope to the nearest 0.1%. Record all the measurements on an approved form and submit to the Engineer for documentation.

Measure the cross slope at a minimum frequency of one measurement every 100 feet during paving operations to ensure that the cross slope is uniform and in compliance with the design cross slope. When the difference between the measured cross slope and the design cross slope exceeds  $\pm 0.2\%$  for travel lanes (including turn lanes) or  $\pm 0.5\%$  for shoulders, make all corrections immediately to bring the cross slope into the acceptable range.

When the cross slope is consistently within the acceptable range, upon the approval of the Engineer, the frequency of the cross slope measurements can be reduced to one measurement every 250 feet during paving operations.

**330-12.3.2 Verification:** The Engineer will verify the Contractor's cross slope measurements by randomly taking a minimum of ten measurements of the cross slope over a day's production. If the average cross slope of the ten random measurements varies more than the allowable tolerance from the design cross slope ( $0.2\%$  for travel lanes including turn lanes

and 0.5% for shoulders), take immediate action to bring the cross slope into the acceptable range. A recheck of the cross slope will then be made following the adjustment. If the recheck indicates that the cross slope is still out of tolerance, stop the paving operations and correct the deficient section in accordance with 330-12.5.1. Resume paving operations only upon approval of the Engineer. The Engineer reserves the right to verify the pavement cross slope at any time by taking cross slope measurements as described above.

The Engineer may waive the corrections specified above (at no reduction in payment) if:

- 1) the deficiencies are sufficiently separated so as not to affect the overall ride quality, traffic safety and surface drainage characteristics of the pavement and;
- 2) the corrective action would unnecessarily mar the appearance of the finished pavement.

For intersections, tapers, crossovers, transitions at beginning and end of project and similar areas, adjust the cross slope to match the actual site conditions or as directed by the Engineer.

**330-12.4 Pavement Smoothness:** Construct a smooth pavement meeting the requirements of this Specification.

**330-12.4.1 General:** Furnish a 15 foot manual and a 15 foot rolling straightedge meeting the requirements of FM 5-509. Make them available at the job site at all times during paving operations. Obtain a smooth surface on all pavement courses placed, and then straightedge all final structural and friction course layers in accordance with 330-12.4.5.

**330-12.4.2 Test Method:** Perform all straightedge testing in accordance with FM 5-509 with one pass of the rolling straightedge operated along the outside wheel path of each lane being tested. The Engineer or these specifications may require additional testing at other locations within the lane.

**330-12.4.3 Traffic Control:** Provide traffic control in accordance with Section 102 and the Design Standards Index Nos. 607 or 619 during all testing. When traffic control cannot be provided in accordance with Index Nos. 607 or 619, submit an alternative Traffic Control Plan as specified in 102-4. Include the cost of this traffic control in the Contract bid prices for the asphalt items.

**330-12.4.4 Process Control Testing:** Assume full responsibility for controlling all paving operations and processes such that the requirements of these Specifications are met at all times. Address in the QC Plan the methods to be used to control smoothness.

**330-12.4.5 Quality Control Testing:**

**330-12.4.5.1 General:** Straightedge the final Type SP structural layer and friction course layer with a rolling straightedge. Test all pavement lanes and ramps where the width is constant using a rolling straightedge and document all deficiencies on a form approved by the Engineer.

**330-12.4.5.2 Rolling Straightedge Exceptions:** Testing with the rolling straightedge will not be required in the following areas: intersections, tapers, crossovers, parking lots and similar areas. In addition, testing with the rolling straightedge will not be performed on the following areas when they are less than 50 feet in length: turn lanes, acceleration/deceleration lanes and side streets. However, correct any individual surface irregularity in these areas that deviates from the plan grade in excess of 3/8 inch as determined by a 15 foot manual straightedge, and that the Engineer deems to be objectionable, in accordance with 330-12.5.1.

In addition, the Engineer may also waive the straightedging requirements on ramps and superelevated sections where the geometrical orientation of the pavement results in an inaccurate measurement with the rolling straightedge.

**330-12.4.5.3 Intermediate Layers:** Straightedge all intermediate Type SP layers (structural and overbuild) as necessary to construct a smooth pavement.

**330-12.4.5.4 Final Type SP Structural Layer:** Straightedge the final Type SP structural layer with a rolling straightedge, either behind the final roller of the paving train or as a separate operation. Notify the Engineer of the location and time of straightedge testing a minimum of 48 hours before beginning testing. The Engineer will verify the straightedge testing by observing the Quality Control straightedging operations. Correct all deficiencies in excess of 3/16 inch in accordance with 330-12.5.1, and retest the corrected areas prior to placing the friction course.

For bicycle paths, straightedge the final structural layer with a rolling straightedge, either behind the final roller of the paving train or as a separate operation. Correct all deficiencies in excess of 5/16 inch in accordance with 330-12.5.1. Retest all corrected areas. If the Engineer determines that the deficiencies on the bicycle path are due to field geometrical conditions, the Engineer will waive corrections with no deduction to the pay item quantity.

**330-12.4.5.5 Friction Course Layer:** Straightedge the friction course layer with a rolling straightedge, either behind the final roller of the paving train or as a separate operation upon completion of all paving operations. Notify the Engineer of the location and time of straightedge testing a minimum of 48 hours before beginning testing. The Engineer will verify the straightedge testing by observing the Quality Control straightedging operations. Correct all deficiencies in excess of 3/16 inch in accordance with 330-12.5.1, and retest the corrected areas to meet this requirement.

**330-12.4.5.6 Quality Control for Laser Acceptance:** Quality control straightedging and corrections for the Final Type SP Structural Layer and Friction Course Layer are required when acceptance is by Laser Profiler in accordance with 330-12.4.6.2.

Additionally, if determined necessary by the Engineer when any Type SP layer will be opened to traffic, straightedge the pavement with a rolling straightedge and correct all deficiencies in excess of 3/8 inch within 72 hours of placement. Correct all deficiencies in accordance with 330-12.5.1.

#### **330-12.4.6 Acceptance:**

**330-12.4.6.1 Straightedge Acceptance:** For areas of roadways where the design speed is less than 50 miles per hour, acceptance for pavement smoothness of the friction course will be based on verified Quality Control measurements using the rolling straightedge as required by 330-12.4.5. The Engineer will verify the straightedge testing by observing the Quality Control straightedging operations. The Engineer may allow the contractor to leave in place at no pay areas that would be required to be removed and replaced if it is determined by the Engineer not to be a significant detriment to the ride quality. A reduction to the pay item quantity will be made in accordance with 330-12.5.2.

**330-12.4.6.2 Laser Acceptance:** For areas of high speed roadways where the design speed is equal to or greater than 50 miles per hour, acceptance testing for pavement smoothness of the friction course (for mainline traffic lanes only) will be based on the Laser Profiler. Ramps, acceleration and deceleration lanes, and other areas not suitable for testing with

the Laser Profiler will be tested and accepted with the rolling straightedge in accordance with 330-12.4.5.5 and 330-12.4.6.1.

Upon completion of all corrections to the friction course, the pavement smoothness of each lane will be determined by a Laser Profiler furnished and operated by the Department in accordance with FM 5-549. The average Ride Number of both wheel paths reported to one decimal place. If additional corrections are made as required following Laser Acceptance, the pavement will not be retested for smoothness using Laser Acceptance

For this testing the pavement will be divided into 0.1 mile segments. Partial segments equal or greater than 0.01 mile shall be considered as a 0.1 mile segment. For areas at the beginning and ending of the project, bridge approaches and departures, and areas where the segment is less than 0.01 mile, these areas shall be tested and accepted with the rolling straightedge in accordance with 330-12.4.5.5 and 330-12.4.6.1.

(A) For friction course on high speed roadways where the design speed is equal to or greater than 50 miles per hour: The acceptance criteria for pavement smoothness are as shown in Table 330-2.

Table 330-2	
RN Per 0.1 mile Segment	Method of Acceptance
RN $\geq$ 4.0	Acceptance with full payment
RN $\leq$ 3.9	Note 1.
<p><b>Note 1:</b> For segments with a RN less than 4.0, the Engineer will issue a second RN report for those segments in 0.01 mile intervals for both wheelpaths. If the RN in the second report is 3.5 or above for all 0.01 mile intervals in both wheelpaths, the whole segment will be accepted at full payment. If the RN in the second report is less than 3.5 for one or more 0.01 mile intervals, the entire segment will be tested with the rolling straightedge in both wheelpaths in accordance with 330-12.4.5.5. This straightedging (and corrections and retesting as necessary) is required and not optional.</p>	

The Engineer may allow the contractor to leave in place at no pay areas that would be required to be removed and replaced if it is determined by the Engineer not to be a significant detriment to the ride quality. A reduction to the pay quantity item will be made in accordance with 330-12.5.2.

**330-12.5 Correcting Unacceptable Pavement:**

**330-12.5.1 General:** Correct all areas of unacceptable pavement at no cost to the Department.

**330-12.5.1.1 Structural Layers:** Correct deficiencies in the Type SP structural layer by one of the following methods:

a. Remove and replace the full depth of the layer, extending a minimum of 50 feet on both sides (where possible) of the defective area for the full width of the paving lane.

b. Mill the pavement surface to a depth and width that is adequate to remove the deficiency. (This option only applies if the structural layer is not the final surface layer.)

**330-12.5.1.2 Friction Course:** Correct deficiencies in the friction course layer by removing and replacing the full depth of the layer, extending a minimum of 50 feet on both sides (where possible) of the defective area for the full width of the paving lane. The Engineer may allow the contractor to leave in place at no pay areas that would be required to be

removed and replaced if it is determined by the Engineer not to be a significant detriment to the ride quality. A reduction to the pay quantity item will be made in accordance with 330-12.5.2.

**330-12.5.2 Reduction in Pay Item Quantity:** When the Engineer elects to waive corrections, the Department will reduce the pay quantity for the pay item in question by the amount of material that the Contractor would have removed and replaced had the correction been made. When the pay quantity is in tons, the Department will base the reduction on the volume of material that the Contractor would have removed (the length by the lane width by layer thickness) multiplied by the Maximum specific gravity of the mix as determined through the following equation:

$$\text{Quantity (tons)} = L \times W \times t \times G_{mm} \times 0.0024$$

Where: L = Lane length (ft.)

W = Lane width (ft.)

t = Layer thickness (in.)

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

For FC-5 open-graded friction course, the Department will base the reduction on the area that the Contractor would have removed (the length by lane width) multiplied by a spread rate of 80 lb/yd<sup>2</sup> as determined through the following equation:

$$\text{Quantity (tons)} = L \times W \times 0.0044$$

Where: L = Lane width (ft.)

W = Lane length (ft.)