SECTION 330
HOT MIX ASPHALT -
GENERAL CONSTRUCTION REQUIREMENTS

330-1 Description.

This Section specifies the basic equipment and construction requirements for hot mix asphalt (including warm mix asphalt) pavements and bases. Establish and maintain a quality control system that provides assurance that all materials, products and completed construction submitted for acceptance meet Contract requirements.

330-2 Quality Control (QC) Requirements.

330-2.1 Minimum QC Requirements: In addition to the requirements set forth in Section 105, describe in the Quality Control Plan (QCP) how the following attributes will be monitored: pavement density, mix temperature, pavement smoothness, pavement cross-slope, mix spread rate, and pavement texture, including methods for monitoring pavement segregation and the corrective actions that will be taken to resolve any identified problems. Perform as a minimum, the following activities necessary to maintain process control and meet Specification requirements:

1. Pavement Density: Monitor the pavement temperature with an infrared temperature device so that compaction is completed before the surface temperature of the pavement drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement. Monitor the roadway density with either 6 inch diameter roadway cores, a nuclear density gauge, or other density measuring device, at a minimum frequency of once per 1,500 feet of pavement.

2. Mix Temperature: Determine the mix temperature at the roadway for the first five loads and one out of every five loads thereafter.

3. Mix Spread Rate: Monitor the mix spread rate at the beginning of each day's production, and as needed to control the operations, at a minimum of once per 200 tons placed. When determining the spread rate, use, at a minimum, an average of five truckloads of mix.

4. Pavement Texture: Monitor the pavement texture to minimize pavement segregation. Use density gauges, infrared temperature measurement devices, or roadway cores at the beginning of each day's production, and as necessary, both at truck exchanges and during normal paving operations.

5. Reporting: Ensure the accuracy of the Quality Control Roadway Reports on the Department's approved form to reflect the actual surface area of the finished work and be in compliance with the requirements of the Contract Documents.

330-2.2 Personnel Qualifications: Provide QC Technicians in accordance with Section 105.

330-3 Limitations of Operations.

330-3.1 Weather Limitations: Do not transport asphalt mix from the plant to the roadway unless all weather conditions are suitable for the paving operations.

330-3.2 Limitations of Paving Operations:

330-3.2.1 General: Place the mixture only when the surface upon which it is to be placed has been previously prepared, is intact, firm, dry, clean, and the tack or prime coat,

with acceptable spread rate, is properly broken or cured. Do not place friction course until the adjacent shoulder area has been dressed and grassed.

330-3.2.2 Ambient Air Temperature: Place the mixture only when the air temperature in the shade and away from artificial heat meets requirements of Table 330-1. The minimum ambient temperature requirement may be reduced by 5ºF when using warm mix technology, if mutually agreed to by both the Engineer and the Contractor.

Table 330-1

Ambient Air Temperature Requirements for Paving

Layer Thickness or Asphalt Binder Type	Minimum Temperature (°F)
≤ 1 inch	50
Any mixture > 1 inch containing a PG asphalt binder having a high temperature designation ≥ 76°C	45
Any mixture > 1 inch containing a PG asphalt binder having a high temperature designation < 76°C	40
FC-5[(1)]	65

[(1)]As an exception, place the mixture at temperatures no lower than 60ºF, only when approved by the Engineer based on the Contractor's demonstrated ability to achieve a satisfactory surface texture and appearance of the finished surface. The minimum ambient temperature may be further reduced to 55ºF when using warm mix technology, if agreed to by both the Engineer and the Contractor.

330-3.2.3 Rain and Surface Conditions: Immediately cease transportation of asphalt mixtures from the plant when rain begins at the roadway. Do not place asphalt mixtures while rain is falling, or when there is water on the surface to be covered. Once the rain has stopped and standing water has been removed from the tacked surface to the satisfaction of the Engineer and the temperature of the mixture caught in transit still meets the requirements as specified in 320-6.3, the Contractor may then place the mixture caught in transit.

330-3.2.4 Wind: Do not place the mixture when the wind is blowing to such an extent that proper and adequate compaction cannot be maintained or when sand, dust, etc., are being deposited on the surface being paved to the extent that the bond between layers will be diminished.

330-4 Surface Preparation.

330-4.1 Cleaning: Prior to placing the mixture, clean the surface of the base or underlying pavement of all loose and deleterious material by the use of power brooms or blowers, supplemented by hand brooming where necessary.

330-4.1.1 Application over Asphalt Rubber Membrane Interlayer (ARMI): Where an asphalt mix is to be placed over a newly constructed ARMI, do not sweep or otherwise disturb the cover material prior to placing the asphalt mix, unless directed by the Engineer.

330-4.2 Tacking: Apply a tack coat on all existing pavement surfaces that are to be overlaid with an asphalt mix as specified in Section 300 and between successive layers of all asphalt mixes. Apply a tack coat on freshly primed bases only when so directed by the Engineer.

330-5 Paving Equipment.

330-5.1 General Requirements: Use equipment that is mechanically sound and capable of consistently meeting the requirements of these Specifications.

330-5.2 Asphalt Paver:

330-5.2.1 General: Provide an asphalt paver that is self-propelled, can be steered, and is equipped with a receiving and distribution hopper and a mechanical screed. Use a mechanical screed capable of adjustment to regulate the depth of material spread and to produce the desired cross-section.

330-5.2.2 Automatic Screed Control: For all asphalt courses placed with an asphalt paver, equip the paver with automatic longitudinal screed controls of either the skid type, traveling stringline type, or non-contact averaging ski type with a minimum length of 25 feet. On the final layer of asphalt base, overbuild, and structural courses, and for friction courses, use the joint matcher in lieu of the skid, traveling stringline, or non-contact averaging ski on all passes after the initial pass. Equip the asphalt paver with electronic cross slope controls.

330-5.2.3 Screed Width: Provide an asphalt paver having a screed width greater than 8 feet when required to pave full width lanes. Do not use extendable screed strike-off devices that do not provide preliminary compaction of the mat in place of fixed screed extensions. Use a strike-off device only on irregular areas that would normally be done by hand and on shoulders 5 feet or less in width. When using the strike-off device on shoulders in lieu of an adjustable screed extension, demonstrate the ability to obtain an acceptable texture, density, and thickness.

When using an extendable screed device to extend the screed's width on the full width lane or shoulder by 24 inches or greater, the Engineer will require an auger extension, paddle, or kicker device unless written documentation from the manufacturer is provided that these are not necessary.

330-5.3 Rollers:

330-5.3.1 Steel-Wheeled Rollers: Provide compaction equipment capable of meeting the density requirements described in these Specifications. In the event that density testing is not required, and the standard rolling pattern is used, provide a tandem steel-wheeled roller weighing 5 to 15 tons for breakdown rolling. For finish rolling, use a separate roller with a weight of 5 to 15 tons. Variations from these requirements shall be approved by the Engineer.

330-5.3.2 Traffic Rollers: Provide compaction equipment capable of meeting the density requirements described in the Specifications. In the event that density testing is not required, and the standard rolling pattern is used, provide a self-propelled, pneumatic-tired traffic roller equipped with at least seven smooth-tread, low pressure tires, equipped with pads or scrapers on each tire. Maintain the tire pressure between 50 and 55 psi or as specified by the manufacturer. Use rollers with a minimum weight of 6 tons. Do not use wobble-wheeled rollers. Variations from these requirements shall be approved by the Engineer.

330-5.3.3 Prevention of Adhesion: Do not allow the mixture to adhere to the wheels of any rollers. Do not use fuel oil or other petroleum distillates to prevent adhesion. Do not use any method which results in water being sprinkled directly onto the mixture.

330-5.4 Coring Equipment: Furnish a suitable saw or drill for obtaining the required density cores.

330-5.5 Hand Tools: Provide the necessary hand tools such as rakes, shovels, and other similar tools, and a suitable means for keeping them clean. Do not use diesel fuel or other petroleum based solvents contained in an open container for cleaning purposes on the paver.

330-6 Placing Mixture.

330-6.1 Requirements Applicable to All Pavement Types:

330-6.1.1 Alignment of Edges: Place all asphalt mixtures by the stringline method to obtain an accurate, uniform alignment of the pavement edge. As an exception,

pavement edges adjacent to curb and gutter or other true edges do not require a stringline. Control the unsupported pavement edge to ensure that it will not deviate more than plus or minus1.5 inches from the stringline.

330-6.1.2 Paving Width: If necessary due to the traffic requirements, place the mixture in strips in such a manner as to provide for the passage of traffic. As an option, where the road is closed to traffic, place the mixture to the full width with machines traveling in echelon.

330-6.1.3 Mix Temperature: Maintain the temperature of the mix at the time of paving within the master range as defined in 320-6.3. The minimum frequency for taking mix temperatures on the roadway will be as indicated in 320-6.3. Any load or portion of a load of asphalt mix on the roadway with a temperature outside of the master range shall be rejected for use on the project. Immediately notify the Engineer of the rejection.

330-6.1.4 Speed of Paver: Establish the forward speed of the asphalt paver based on the rate of delivery of the mix to the roadway but not faster than the optimum speed needed to adequately compact the pavement.

330-6.1.5 Thickness and Spread Rate of Layers: Construct each layer as defined in the following table:

Table 330-2	
Thickness and Target Spread Rate Requirements	
Mix Type	Specification Section and Article
Type SP	334-1
Type FC	337-8
Type B	234-8
ATPB	287-8

330-6.1.5.1 Thickness Control: Ensure the spread rate is within 5% of the target spread rate. When determining the spread rate, use, at a minimum, an average of five truckloads of mix. When the average spread rate is beyond plus or minus 5% of the target spread rate, monitor the thickness of the pavement layer closely and adjust the construction operations.

If the Contractor fails to maintain an average spread rate within plus or minus 5% of the target spread rate for two consecutive days, the Engineer may elect to stop the construction operation at any time until the issue is resolved.

330-6.1.5.2 Maximum Spread Rate Tolerances: When the average spread rate for the total structural or friction course pavement thickness measured in accordance with 330-6.1.5.1 exceeds the maximum spread rate tolerances shown in Table 330-3, address the unacceptable pavement in accordance with 330-9.5.

Table 330-3		
Maximum Spread Rate Tolerances		
Course	Design Thickness	Spread Rate Tolerance
Structural	$\geq$ 2.5 inches	± 50 lbs per sy
Structural	< 2.5 inches	± 25 lbs per sy
Friction (dense)	-	± 25 lbs per sy
Friction (open)	-	± 15 lbs per sy

As an exception, the Engineer may allow the Contractor to leave areas in place if it is determined by the Engineer that the deficiency is not a significant detriment to the pavement quality. A reduction to the pay item quantity will be made in accordance with 330-9.5.2.

330-6.1.6 Correcting Defects: Before starting any rolling, check the surface; correct any irregularities; remove all drippings, sand accumulations from the screed, and fat spots from any source; and replace them with satisfactory material. Do not skin patch. When correcting a depression while the mixture is hot, scarify the surface and add fresh mixture.

330-6.1.7 Hand Work: In limited areas where the use of the paver is impossible or impracticable, the Contractor may place and finish the mixture by hand.

330-7 Compacting Mixture.

330-7.1 General Requirements: When density testing for acceptance is required, select equipment, sequence, and coverage (number of times the roller passes over a given area of pavement) of rolling to meet the specified density requirement. Regardless of the rolling procedure used, complete the final rolling before the surface temperature of the pavement drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement.

330-7.2 Standard Rolling Procedure: When density testing for acceptance is not required, propose an alternative rolling pattern to be approved by the Engineer or use the following standard rolling procedure:

1. Breakdown rolling: Provide two static coverages with a tandem steel-wheeled roller, following as close behind the paver as possible without pick-up, undue displacement, or blistering of the material.
2. Intermediate rolling: Provide five static coverages with a pneumatic-tired roller, following as close behind the breakdown rolling operation as the mix will permit.
3. Finish rolling: Provide one static coverage with a tandem steel-wheeled roller, after completing the breakdown rolling and intermediate rolling, but before the surface pavement temperature drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement.

330-7.3 Rolling Procedures: Utilize procedures that will uniformly compact the pavement layer to the desired density level, while meeting the appropriate smoothness requirements, without damaging the pavement surface, crushing aggregate or leaving excessive roller marks, roller heads, or ripples. While rolling is in progress, monitor the surface continuously, and adjust the compaction operations to comply with the surface requirements.

330-7.4 Compaction of Areas Inaccessible to Rollers: Use hand tamps or other satisfactory means to compact areas which are inaccessible to a roller, such as areas adjacent to curbs, gutters, bridges, manholes, etc.

330-7.5 Correcting Defects: Do not allow the compaction equipment to deposit contaminants onto the pavement surface. Remove and replace any areas damaged by such deposits as directed by the Engineer. Correct any depressions that develop before completing the rolling by loosening the mixture and adding new mixture to bring the depressions to a true surface. Should any depression remain after obtaining the final compaction, remove the full depth of the mixture, and replace it with sufficient new mixture to form a true and even surface. Correct all defects prior to laying the subsequent course.

330-7.6 Use of Traffic Roller: Use a traffic roller on the first overbuild course. Use a traffic roller or vibratory roller (unless restricted by the Contract Documents) on the first structural layer placed on an ARMI.

330-7.7 Compaction at Bridge Structures: Compact asphalt mixtures placed over bridge decks and approach slabs using static compaction only. Utilize the standard rolling procedure described in 330-7.2 or an alternative procedure approved by the Engineer.

330-8 Joints.

330-8.1 General: When laying fresh mixture against the exposed edges of joints, place it in close contact with the exposed edge to produce an even, well-compacted joint after rolling.

330-8.2 Transverse Joints: Place the mixture as continuously as possible to minimize transverse joints. When constructing permanent transverse joints, meet the surface requirements as defined in 330-9. Construct temporary transverse joints in such a manner to allow traffic to pass over it. When resuming the paving operation, construct a transverse joint by cutting back on the previously placed pavement at a location where the straightedge requirements are met. At the project limits, tie into the adjoining pavement layers as shown in the Plans.

330-8.3 Longitudinal Joints: Place each layer of pavement so that all 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 longitudinal joints for friction course layers should be within 6 inches of the lane edge or at the center of the lane. The Engineer may waive this requirement where offsetting is not feasible due to the sequence of construction.

330-8.4 Placing Asphalt Next to Concrete Pavement: When placing asphalt next to concrete pavement, construct the joint as shown in the Plans.

330-9 Surface Requirements.

330-9.1 General: Construct a smooth pavement with good surface texture and the proper cross-slope.

330-9.2 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. Address any pavement not meeting the requirements of this specification in accordance with 330-9.5.

For dense graded structural and friction course mixtures, in areas not defined to be a density testing exception per 334-5.1.2, obtain for the Engineer three 6 inch diameter roadway cores at locations visually identified by the Engineer to be segregated. The Engineer will determine the density of each core in accordance with FM 1-T 166 and calculate the percent G_{mm} of the segregated area using the average G_{mb} of the roadway cores and the QC sublot G_{mm} for the questionable material. If the average percent G_{mm} is less than 90.0, address the segregated area in accordance with 330-9.5.

Do not use asphalt concrete mixtures containing aggregates that cause a different color appearance in the final wearing surface unless the section is greater than or equal to one mile in length and across the full width of the pavement, including shoulders and turn lanes. Exceptions to these requirements will be permitted if approved by the Engineer.

330-9.3 Cross Slope: Construct a pavement surface with cross slopes in compliance with the requirements of the Contract Documents. Furnish an electronic level with a length of 4 feet and an accuracy of 0.1 degree, approved by the Engineer for the control of cross slope. Make this electronic level available at the jobsite at all times during paving operations.

330-9.3.1 QC Requirements: Calibrate the electronic levels a minimum of once per day before paving operations begin, in accordance with manufacturer's instructions.

Compare the QC level with the Verification level before paving operations begin, and at any time as directed by the Engineer. If the comparison between the QC and Verification levels is within the comparison tolerance of plus or minus 0.2%, the QC level is considered to compare favorably and can be used for measurement and acceptance of cross slopes. If the levels do not compare favorably, perform a second comparison using another calibrated electronic level (FDOT or Contractor) for resolution. If this resolution level compares favorably with the QC level, the QC level is considered to be verified. If the second level does not compare favorably with the QC level, discontinue the use of the QC electronic level and obtain another approved electronic level that meets the requirements of this specification. Regardless of the comparison analysis outcome, the Contractor assumes all risk associated with placing the pavement at the correct cross slope.

Measure the cross slope of the compacted pavement surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. Record all measurements to the nearest 0.1% on the Cross Slope Measurement Data Form and submit to the Engineer for documentation.

1. Tangent Sections: Measure the cross slope at a minimum frequency of one measurement every 100 feet per lane. Calculate the absolute deviation of each cross slope measurement and then average the absolute deviations of ten consecutive cross slope measurements. (The absolute deviation is the positive value of a deviation) When the average absolute deviation cross slope is consistently within the acceptance tolerance as shown in Table 330-4 and upon the approval of the Engineer, the frequency of cross slope measurements can be reduced to one measurement every 200 feet during paving operations.

2. Superelevated Sections: Measure the cross slope every 100 feet per lane within the length of the full superelevation. Calculate the absolute deviation of each measurement and then average the absolute deviations of ten consecutive cross slope measurements. For the transition sections, measure the cross slope at control points identified in the Plans, or if not shown in the Plans, at a control point at the location of 0.0% cross slope and calculate the absolute deviation. For curves where the length of full superelevation is less than 250 feet, measure the cross slope at the beginning point, midpoint and ending point of the fully superelevated sections, calculate the absolute deviation, and average. When the number of measurements is less than ten and the length of full superelevation is greater than 250 feet, average the absolute deviation of all measurements.

If the average absolute deviation of the cross slope measurements falls outside the acceptance tolerance, as shown in Table 330-4, stop the paving operation and make adjustments until the problem is resolved to the satisfaction of the Engineer. If an individual cross slope deviation falls outside the acceptance tolerance as shown in Table 330-4, make corrections at no cost to the Department in accordance with 330-9.5 to address the deficient area of the structural course. Complete all corrections before placement of the final pavement surface layer, unless stated otherwise in the Plans, or as determined by the Engineer. For pavement with multiple layers, the deficient areas for the structural course may be left in place, upon the approval of the Engineer. For friction course layers, make corrections in accordance with 330-9.5.

The limits of deficient areas requiring correction may be verified and adjusted with more accurate measurement methods, including survey instruments, upon approval by the Engineer at no cost to the Department.

Should the Contractor wish to have any corrections waived, submit a request to the Engineer for approval. The Engineer may waive the corrections at no reduction in payment if the deficiencies are sufficiently separated so as not to affect the overall traffic safety, surface drainage and ride quality characteristics of the pavement and the corrective action would unnecessarily mar the appearance of the finished pavement.

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

Table 330-4
Cross Slope Acceptance Tolerance

Roadway Feature	Individual Absolute Deviation	Average Absolute Deviation
Tangent section (including turn lanes)	0.4%	0.2%
Superelevated curve	0.4%	0.2%
Shoulder	0.5%	0.5%

In the event that the distance between two edges of deficient areas is less than 100 feet, the correction work shall include the area between the deficient sections.

330-9.3.2 Verification: The Engineer will verify the Contractor's cross slope measurements by randomly taking a minimum of ten cross slope measurements per lane per mile in tangent sections, control points in transition sections, and a minimum of three cross slope measurements on fully superelevated sections over a day's production. The Engineer will measure the cross slope of the compacted pavement surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. If the average absolute deviation or an individual cross slope deviation falls outside of the acceptance tolerance as shown in Table 330-4, immediately make a comparison check at the QC test locations to verify the QC measurements in the section. If the comparisons are beyond the acceptable comparison tolerance in accordance with 330-9.3.1, stop the paving operations until the issue is resolved to the satisfaction of the Engineer. Correct any cross slope not meeting the individual deviation acceptance tolerance in accordance with 330-9.5 at no cost to the Department. The Engineer reserves the right to check the pavement cross slope at any time by taking cross slope measurements at any location.

330-9.4 Pavement Smoothness: Construct a smooth pavement meeting the requirements of this Specification.

330-9.4.1 General: Furnish a 15 foot manual and a 15 foot rolling straightedge meeting the requirements of FM 5-509. Obtain a smooth surface on all pavement courses placed, and then straightedge all layers as required by this Specification.

330-9.4.2 Test Method: Perform all straightedge testing in accordance with FM 5-509 in the outside wheel path of each lane. The Engineer may require additional testing at other locations within the lane.

330-9.4.3 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.

330-9.4.4 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.

330-9.4.5 QC Testing:

330-9.4.5.1 General: Straightedge the final Type SP structural layer and friction course layer in accordance with 330-9.4.2, with the exception that if the method of acceptance is by laser profiler, then straightedging of the friction course layer is not required. Test all pavement lanes and ramps where the width is constant and document all deficiencies in excess of 3/16 inch on a form approved by the Engineer.

330-9.4.5.2 Straightedge Exceptions: Straightedge testing will not be required in the following areas: shoulders, intersections, tapers, crossovers, sidewalks, shared use paths, parking lots and similar areas, or in the following areas when they are less than 250 feet in length: turn lanes, acceleration/deceleration lanes and side streets. The limits of the intersection will be from stop bar to stop bar for both the mainline and side streets.

As an exception, in the event the Engineer identifies a surface irregularity in the above areas that is determined to be objectionable, straightedge and address all deficiencies in excess of 3/8 inch in accordance with 330-9.5.

The Engineer may waive straightedge requirements for transverse joints at the beginning and end of the project, at the beginning and end of bridge structures, at manholes, and at utility structures if the deficiencies are caused by factors beyond the control of the Contractor, as determined by the Engineer. 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.

330-9.4.5.3 Intermediate Layers and Temporary Pavement: When the design speed is 55 mph or greater and the intermediate Type SP layer or temporary pavement is to be opened to traffic, if the Engineer identifies a surface irregularity that is determined to be objectionable, straightedge and address all deficiencies in excess of 3/8 inch within 72 hours of placement in accordance with 330-9.5.

330-9.4.5.4 Final Type SP Structural Layer: Straightedge the final Type SP structural layer in accordance with 330-9.4.2, 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 QC straight edging operations. Address all deficiencies in excess of 3/16 inch in accordance with 330-9.5.

When the final structural course is to be opened to traffic and the design speed is 55 mph or greater, if any defect is 3/8 inch or greater, the Engineer may require deficiencies to be corrected within 72 hours after opening to traffic.

330-9.4.5.5 Friction Course Layer: Where required per 330-9.4.5.1, straightedge the friction course layer in accordance with 330-9.4.2, 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 QC straightedging operations. Address all deficiencies in excess of 3/16 inch in accordance with 330-9.5.

330-9.4.6 Acceptance:

330-9.4.6.1 Straightedge Acceptance: For areas of roadways where the design speed is less than 55 miles per hour, acceptance for pavement smoothness of the friction course will be based on verified QC measurements using the straightedge as required by 330-9.4.5. The Engineer will verify the straightedge testing by observing the QC straightedging operations.

330-9.4.6.2 Laser Acceptance: For areas of high speed roadways where the design speed is equal to or greater than 55 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 straightedge in accordance with 330-9.4.5.5 and 330-9.4.6.1.

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 and a report issued with the Ride Number (RN) reported to one decimal place. If corrections are made, as required following Laser Acceptance, the pavement will not be retested for smoothness using the Laser Profiler.

For this testing, the pavement will be divided into 0.1 mile segments. Partial segments equal to or greater than 0.01 mile will be considered as a 0.1 mile segment. The pavement will be accepted as follows:

1) For segments with a RN greater than or equal to 4.0, the pavement will be accepted at full pay.

2) For segments with a RN less than 4.0, the Engineer will further evaluate the data in 0.01 mile intervals for both wheel paths.

If the RN is 3.5 or above for all 0.01 mile intervals in both wheel paths, the segment will be accepted at full payment.

If the RN is less than 3.5 for one or more 0.01 mile intervals, the segment will be tested with the rolling straightedge in both wheel paths in accordance with FM 5-509. If approved by the Engineer, this straightedging may be completed (in both wheel paths) as part of the QC straightedging operations described in 330-9.4.5.5, prior to testing with the laser profiler. 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 QC straightedging operations. Address all deficiencies in excess of 3/16 inch in accordance with 330-9.5.

Test and accept areas at the beginning and ending of the project, bridge approaches and departures, and areas where the segment is less than 0.01 mile, with the straightedge in accordance with 330-9.4.5.5 and 330-9.4.6.1.

330-9.5 Unacceptable Pavement:

330-9.5.1 Corrections: Address all areas of unacceptable pavement at no cost to the Department. Retest all corrected areas and assure the requirements of these Specifications are met.

330-9.5.1.1 Structural Layers: Correct all deficiencies, as defined in these Specifications, in the Type SP structural layers 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.

As an option, for high straightedge deficiencies only, mill the pavement surface the full lane width to a depth and length that is adequate to remove the deficiency. This option only applies if the structural layer is not the final surface layer.

330-9.5.1.2 Friction Course: Correct deficiencies in the friction course or final surface 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. As an exception, the Engineer may allow the Contractor to leave these areas in place if it is determined by the Engineer that the deficiency is not a significant detriment to the pavement quality. A reduction to the pay item quantity will be made in accordance with 330-9.5.2.

330-9.5.2 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^2 as determined through the following equation:

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

Where: L = Lane length (ft.)
W = Lane width (ft.)

330-10 Protection of Finished Surface.

Keep sections of newly compacted asphalt concrete, which are to be covered by additional courses, clean until the successive course is laid.

Do not dump embankment or base material directly on the pavement. Dress shoulders before placing the friction course on adjacent pavement.

Equip blade graders operating adjacent to the pavement during shoulder construction with a 2 inch by 8 inch or larger board, or other attachment providing essentially the same results, attached to their blades in such manner that it extends below the blade edge in order to protect the pavement surface from damage by the grader blade.

To prevent rutting or other distortion, protect sections of newly finished dense-graded friction course and the last structural layer prior to the friction course from traffic until the surface temperature has cooled below 160ºF.

The Contractor may use artificial methods to cool the pavement to expedite paving operations. The Department may direct the Contractor to use artificial cooling methods when maintenance of traffic requires opening the pavement to traffic at the earliest possible time.