



## Florida Department of Transportation

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SECRETARY

January 26, 2010

Monica Gourdine  
Program Operations Engineer  
Federal Highway Administration  
545 John Knox Road, Suite 200  
Tallahassee, Florida 32303

Re: Office of Design, Specifications  
Section 330  
Proposed Specification: **3270300 Milling of Existing Asphalt Pavement –  
Construction.**

Dear Ms. Gourdine:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

These changes were proposed by David Wang of the State Construction Office to clarify the Quality Control and Verification Testing processes and measurement acceptance criteria for cross slopes on milled roadway surfaces for tangent and superelevated sections.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to ST986RP or rudy.powell@dot.state.fl.us.

If you have any questions relating to this specification change, please call Rudy Powell, State Specifications Engineer at 414-4280.

Sincerely,

Rudy Powell, Jr., P.E.  
State Specifications Engineer

RP/dt

Attachment

cc: Gregory Jones, Chief Civil Litigation  
Florida Transportation Builders' Assoc.  
State Construction Engineer

**MILLING OF EXISTING ASPHALT PAVEMENT – CONSTRUCTION.****(REV ~~111-262523-1009~~)**

ARTICLE 327-3 (Paged 248–249) is deleted and the following substituted:

**327-3 Construction.**

**327-3.1 General:** Remove the existing raised reflective pavement markers prior to milling. Include the cost of removing existing pavement markers in the price for milling.

When milling to improve rideability or cross slope, remove the existing pavement to the average depth specified in the plans, in a manner that will restore the pavement surface to a uniform cross-section and longitudinal profile. The Engineer may require the use of a stringline to ensure maintaining the proper alignment.

Establish the longitudinal profile of the milled surface in accordance with the milling plans. Ensure that the final cross slope of the milled surface parallels the surface cross slope shown on the plans or as directed by the Engineer. Establish the cross slope of the milled surface by a second sensing device near the outside edge of the cut or by an automatic cross slope control mechanism. The plans may waive the requirement of automatic grade or cross slope controls where the situation warrants such action.

*Operate the milling machine to minimize the amount of dust being emitted. The Engineer may require prewetting of the pavement.*

*Provide positive drainage of the milled surface and the adjacent pavement. Perform this operation on the same day as milling. Repave all milled surfaces no later than the day after the surface was milled unless otherwise stated in the plans.*

*If traffic is to be maintained on the milled surface prior to the placement of the new asphalt concrete, provide suitable transitions between areas of varying thickness to create a smooth longitudinal riding surface. Produce a pattern of striations that will provide an acceptable riding surface. The Engineer will control the traveling speed of the milling machine to produce a texture that will provide an acceptable riding surface.*

*Prior to opening an area which has been milled to traffic, sweep the pavement with a power broom or other approved equipment to remove, to the greatest extent practicable, fine material which will create dust under traffic. Sweep in a manner that will minimize the potential for creation of a traffic hazard and to minimize air pollution.*

*Sweep the milled surface with a power broom prior to placing asphalt concrete.*

*In urban and other sensitive areas, use a street sweeper or other equipment capable of removing excess milled materials and controlling dust. Obtain the Engineer's approval of such equipment, contingent upon its demonstrated ability to do the work.*

*Perform the sweeping operation immediately after the milling operations or as directed by the Engineer.*

**327-3.2 Quality Control Requirements:** *Furnish an electronic level with a length of 4 feet and an accuracy of plus or minus 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 milling operations. Calibrate and compare electronic levels and perform the comparison test in accordance with 330-12.3.1 at a minimum frequency of once per day before any milling operation.*

Multiple cuts may be made to achieve the required pavement configuration or depth of cut. ~~Include in the Quality Control Plan a system to control the cross slope of the milling surface with a minimum frequency of one cross slope measurement every 250 feet during milling operations in order to ensure that the slopes are uniform and in compliance with the designed milling slope. When the difference between the measured cross slope and the designed cross slope exceeds  $\pm 0.2\%$  for travel lanes (including turn lanes) and  $\pm 0.5\%$  for shoulders, make all corrections immediately to bring the cross slope into an acceptable range. The Engineer will periodically verify the Contractor's measurements at the job site.~~ *Measure the cross slope of the milled surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. Record all the measurements to the nearest 0.1% on an approved form and submit to the Engineer for documentation.*

*1. Tangent Sections: Measure the cross slope per lane at a minimum frequency of one measurement every 1200 feet. Calculate the ~~average~~ absolute deviation of cross slope at each measurement and then ~~calculate the average of the~~ absolute deviation of ten consecutive cross slope ~~of ten consecutive~~ 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 327-1 and upon approval by the Engineer, the frequency of the cross slope measurements can be reduced to one measurement every 200 feet during milling operations. ~~ten consecutive cross slope measurements and record the results on the approved form and submit to the Engineer for documentation.~~*

*2. Superelevated Sections: Measure the cross slope every 100 feet per lane within the length of full superelevation. Calculate the absolute deviation of each measurement and then average the absolute deviation of ten consecutive cross slope measurements. For every transition section, ~~measure the cross slope at control points identified in the plans or, if not shown in the plans, at a control point at a location of 0.0% cross slope. of every transition section.~~ For curves where the length of the fully superelevated section is less than 250 feet, measure the cross slope at the beginning point, midpoint and ending point of the fully superelevated section. ~~Calculate the average absolute deviation and average of ten consecutive cross slope measurements~~ *When the number of measurements is more than ten or the average absolute deviation of all the measurements, when the number of measurement less than ten and the length of full superelevation is greater than 250 feet, average the absolute deviation of all measurements. Construct the superelevation and the transitions with lane rotation in accordance with the requirements of the Contract Documents.**

*If the average absolute deviation of the cross slope measurements falls outside the acceptance tolerance shown in Table 327-1, stop the milling operations 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 327-1, make corrections only in the deficient area to the satisfaction of the Engineer at no cost to the Department. For pavement with multiple cuts, the deficient areas not*

caused by the final cut may be ~~allowed to be~~ left in place upon approval of the Engineer. All milling corrections shall be completed before placement of the asphalt course unless stated otherwise in the plans or as determined by the Engineer.

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 an engineering determination indicates that the deficiencies are sufficiently separated so as not to significantly affect the final cross slope or project grade.

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.

<i>TABLE 327-1 Cross Slope Milling Acceptance Tolerance</i>		
<i>Roadway Feature</i>	<i>Individual Absolute Deviation</i>	<i>Average Absolute Deviation</i>
<i>Tangent section (including turn lanes)</i>	$\pm 0.4\%$	$\pm 0.2\%$
<i>Superelevated curve (unless the design tolerance is shown in the plans)</i>	$\pm 0.4\%$	$\pm 0.2\%$
<i>Shoulder</i>	$\pm 0.5\%$	$\pm 0.5\%$
<p><i>Note:</i> 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 deficient sections.</p>		

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

**327-3.3 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 on tangent sections, control points in transition sections, and a minimum of three cross slope measurements on fully superelevated sections. The Engineer will measure the cross slope of the milled 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 the acceptance tolerance as shown in Table 327-1, immediately make a comparison check at the QC test locations to verify the QC measurements in the questionable section. If the comparisons are beyond the acceptable comparison tolerance in accordance with 327-3.2, stop the milling operation until the problem is resolved to the satisfaction of the Engineer. Correct any cross slope not meeting the individual deviation acceptance tolerance at no cost to the Department. The Engineer reserves the right to check the cross slope of the milled surface at any time by taking cross slope measurements at any location.

~~The Engineer will verify the Contractor's cross slope measurements by randomly taking a minimum of ten cross slope measurements per mile on tangent sections and a minimum~~

*of three cross slope measurements on fully superelevated sections. If the average absolute deviation or an individual falls outside the acceptance tolerances as shown in Table 327-1, immediately compare with the QC measurements in the section. If the comparison is outside the acceptance tolerance, stop the milling operation until the problem is resolved to the satisfaction of the Engineer. Correct any cross slope not meeting the individual measurement acceptance tolerance of this specification at no cost to the Department. The Engineer reserves the right to verify the cross slope of the milling surface at any time.*

————— The Engineer will randomly take ten measurements of the cross slope per day for the first two days of milling operation. If the average cross slope of the ten random measurements per day varies more than the required tolerance (0.2% for travel lanes including turn lanes and 0.5% for shoulders), the milling operation shall be stopped until appropriate corrective actions are made to bring the cross slope into an acceptable range. Approval of the Engineer will be required prior to resuming the milling operation. A recheck of ten random measurements will be made after corrective actions are taken. If the recheck indicates that the cross slope is out of control, the deficient section(s) shall be corrected to bring the cross slope into an acceptable range. During milling operations, the Engineer reserves the right to take ten cross slope measurements per day. If the average cross slope of the ten measurements varies more than the permissible tolerance, the milling operation will be stopped until appropriate corrective actions are made to bring the cross slope into an acceptable range and the deficient sections shall be corrected accordingly.

————— The Engineer may waive the corrections specified above if an engineering determination indicates that the deficiencies are sufficiently separated so as not to significantly affect the final cross slope.

————— For intersections, tapers, crossovers, transitions at the beginning and end of the project and in other similar areas, the cross slope will be adjusted as directed by the Engineer to match the actual site conditions.

————— Operate the milling machine to minimize the amount of dust being emitted. The Engineer may require prewetting of the pavement.

————— Provide positive drainage of the milled surface and the adjacent pavement. Perform this operation on the same day as milling. Repave all milled surfaces no later than the day after the surface was milled unless otherwise stated in the plans.

————— If traffic is to be maintained on the milled surface prior to the placement of the new asphalt concrete, provide suitable transitions between areas of varying thickness to create a smooth longitudinal riding surface. Produce a pattern of striations that will provide an acceptable riding surface. The Engineer will control the traveling speed of the milling machine to produce a texture that will provide an acceptable riding surface.

————— Prior to opening an area which has been milled to traffic, sweep the pavement with a power broom or other approved equipment to remove, to the greatest extent practicable, fine material which will create dust under traffic. Sweep in a manner that will minimize the potential for creation of a traffic hazard and to minimize air pollution.

————— Sweep the milled surface with a power broom prior to placing asphalt concrete.

~~————— In urban and other sensitive areas, use a street sweeper or other equipment capable of removing excess milled materials and controlling dust. Obtain the Engineer's approval of such equipment, contingent upon its demonstrated ability to do the work.~~

~~————— Perform the sweeping operation immediately after the milling operations or as directed by the Engineer.~~

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**(REV 1-26-10)**

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**327-3.2 Quality Control Requirements:** Furnish an electronic level with a length of 4 feet and an accuracy of plus or minus 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 milling operations. Calibrate and compare electronic levels in accordance with 330-12.3.1 at a minimum frequency of once per day before any milling operation.

Multiple cuts may be made to achieve the required pavement configuration or depth of cut. Measure the cross slope of the milled surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. Record all the measurements to the nearest 0.1% on an approved form and submit to the Engineer for documentation.

1. Tangent Sections: Measure the cross slope per lane at a minimum frequency of one measurement every 100 feet. Calculate the absolute deviation of cross slope at each measurement and then average the absolute deviation 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 327-1 and upon approval by the Engineer, the frequency of the cross slope measurements can be reduced to one measurement every 200 feet during milling operations..

2. Superelevated Sections: Measure the cross slope every 100 feet per lane within the length of full superelevation. Calculate the absolute deviation of each measurement and then average the absolute deviation of ten consecutive cross slope measurements. For every transition section, measure the cross slope at control points identified in the plans or, if not shown in the plans, at a control point at a location of 0.0% cross slope. For curves where the length of the fully superelevated section is less than 250 feet, measure the cross slope at the beginning point, midpoint and ending point of the fully superelevated section, 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 shown in Table 327-1, stop the milling operations 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 327-1, make corrections only in the deficient area to the satisfaction of the Engineer at no cost to the Department. For pavement with multiple cuts, the deficient areas not caused by the final cut may be left in place upon approval of the Engineer. All milling corrections shall be completed before placement of the asphalt course unless stated otherwise in the plans or as determined by the Engineer.

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 an engineering determination indicates that the deficiencies are sufficiently separated so as not to significantly affect the final cross slope or project grade.

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 327-1
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Cross Slope Milling Acceptance Tolerance
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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 tow edges of deficient areas is less than 100 feet, the correction work shall include the area between the deficient sections.

**327-3.3 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. The Engineer will measure the cross slope of the milled 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 the acceptance tolerance as shown in Table 327-1, immediately make a comparison check at the QC test locations to verify the QC measurements in the questionable section. If the comparisons are beyond the acceptable comparison tolerance in accordance with 327-3.2, stop the milling operation until the problem is resolved to the satisfaction of the Engineer. Correct any cross slope not meeting the individual deviation acceptance tolerance at no cost to the Department. The Engineer reserves the right to check the cross slope of the milled surface at any time by taking cross slope measurements at any location.