Section 11.5

TESTING AND CORRECTING ASPHALT PAVEMENT SURFACE DEFICIENCIES

11.5.1 Purpose

To provide a uniform procedure for determining that the last structural layer meets the applicable straightedge requirements, before permitting the Contractor to place the friction course, and ensure the quality of smoothness of friction course meets ***Florida Department of Transportation (FDOT) Specification*** requirements. Examples of how to calculate pay deductions for surface deficiencies are also shown.

11.5.2 Authority

Sections 20.23(3)(a) and 334.048(3) Florida Statutes (F.S.)

11.5.3 References

Federal-Aid Policy Guide (FAPG), 23 CFR, Chapter I, Subchapter G – Engineering and Traffic Operations, Part 637 - Construction Inspection and Approval
Section 330, Standard Specifications for Road and Bridge Construction

11.5.4 General

The FDOT's intent is for the friction course to be uniform thickness and not rut, distort, or ravel. Therefore, it is necessary to determine the smoothness of the surface upon which the friction course will be placed, as well as, ensure the friction course meets the surface acceptance tolerances established in the ***FDOT Specifications***. It is the Contractor's responsibility to perform the straightedge testing and take any action required to correct surface irregularities. For limited access or other high-speed roadways with a design speed of 55 miles per hour or greater, the Department will perform the smoothness acceptance testing on the friction course using a laser profiler and provide a test report to the Project Administrator (PA). Based on the laser profiler test report, and other related ***Specification*** requirements, the Contractor is responsible for correcting surface irregularities.

11.5.5 Verification

11.5.5.1 15 Foot Rolling Straightedge Testing

(A) Resident Level Responsibilities

Perform straightedge testing on the last structural layer and on the friction course in accordance with ***Specification Article 330-9.4***. Straightedge testing may be performed either behind the final roller of the paving train or as a separate operation after completion of the last structural layer and after completion of the friction course. Straightedging will be performed by a Contractor's Paving Level 1 or Level 2 Technician, qualified under the Construction Training and Qualification Program (CTQP). The Contractor will notify the Department of the location and time of testing a minimum of 48 hours before beginning testing. A standard 15-foot rolling straightedge will be used. The procedures are as follows:

(1) A CTQP Qualified Asphalt Paving Verification Technician Level 2 (VT-2) representing the Department will be present and accompany the Contractor's employee operating the rolling straightedge. Calibration of the 15-foot rolling straightedge shall be performed in accordance with ***FM 5-509 Measurement of Pavement Smoothness with the 15-Foot Rolling and Manual Straightedges*** and visually reviewed and verified before each testing day.

(2) The VT-2 will continuously observe the indicator for highs and lows in excess of 3/16 inch and monitor the Contractor's Paving Level 1 or Level 2 Technician recording the locations and magnitude of each out-of-tolerance deficiency. The contractor's employee will mark the location on the pavement with spray paint or other marking method. The ***Daily Report of Construction, Form No. 700-010-13***, will reflect this inspection.

(3) After the straightedging operation, the Contractor shall enter the straightedge test results in the Department's ***Materials Acceptance and Certification system (MAC)*** database. The VT-2 will provide their Technician Identification Number (TIN) on the QC Sample in the Witnessed by TIN field to document the verification review of the QC data, and finalize the QC sample as the PA's designee.

(4) Straightedge Deficiencies are automatic Materials Certification Review findings in ***MAC.*** They are promoted as a ***Materials Acceptance Resolution (MAR)*** in ***MAC*** by the Materials Certification Review Program Maintenance User. The PA will discuss Contractor's proposed correction method with the District Pavement Materials Engineer (DPME) and approve or disapprove the proposed method. If the

proposed method is not approved, the PA shall require the Contractor to resubmit their correction plan. The PA may propose waiving the corrections and pay deductions if the deficiencies are caused by manholes, valve boxes, intersections, etc. that are beyond control of the Contractor. If the District proposes leaving a deficiency in place at full pay, approval of the District Construction Engineer (DCE) must be obtained before notifying the contractor. Upon request of the DPME, the PA will provide a copy of the verified straightedging report for their use.

(5) The VT-2 shall be present during the corrective work and will verify each surface deficiency was eliminated or brought within the allowable tolerance as established in the ***FDOT Specifications***. The corrective work will be reported on the ***Daily Report of Construction***.

(6) Resolution of the deficient area(s) will be handled in accordance with ***CPAM 11.5.6***.

11.5.5.2 Laser Profiler Testing

(A) Resident Level Responsibilities

In accordance with ***CPAM 11.5.5.1***, the Contractor's CTQP Qualified Paving Level 1 or Level 2 Technician shall perform the 15-foot rolling straightedge testing on the last layer of structural course and on the friction course either behind the final roller of the paving train or as a separate operation. In accordance with ***Specification Section 330-9.4.5,*** after correction of all deficiencies on the last structure course and on the friction course, the procedures for the Laser Profiler testing on friction course specified in ***330-9.4.6.2*** are as follows:

(1) The PA will request a pavement evaluation in MAC as a sample login to notify the Pavement Evaluation Section (PES) of State Materials Office (SMO) or the District Materials and Research Office (DMRO) responsible for the Laser Profiler testing a minimum of 14 calendar days before the estimated date for friction course smoothness acceptance testing. In the event the estimated date is revised, the PA will inform the SMO PES or the DMO about the updated information as soon as possible. Detailed instructions to submit a pavement evaluation request in MAC can be accessed through the following link:
http://www.fdot.gov/materials/mac/training/

(2) The Laser Profiler test team will inform the PA about the date of their arrival to the project site and the PA will inform the Contractor to clean the pavement if it is needed and will provide necessary assistance to the test team in order to facilitate

the Laser Profiler testing on the project site. Guidelines for limitations on Laser Profiler testing are as follows: (a) Design speed is less than 55 miles per hour, (b) Bridges approaches and departures, project beginning and endings and segment less than 0.01 mile (52.8 feet), (c) Railroad crossings, (d) Ramps turn lanes, acceleration and deceleration lanes, (e) Areas where the design speed is greater than or equal to 55 miles per hour, that have signalized intersections which affect the consistent speed of the testing vehicle. Those intersections including areas before and after the signalized intersections are not considered suitable for Laser Profiler testing. The exact areas suitable for Laser Profile testing will be determined on the project by the Laser Profiler operator depending on the situations created by these intersections. There are some projects with design speed greater than or equal to 55 miles per hour that have signalized intersections, but the project site conditions allow Laser Profiler testing vehicle to operate at consistent speed. Under this situation, the project shall be tested by Laser Profiler.

(3) Upon completion of the Laser Profiler testing, the Laser Profiler test team will furnish a copy of the ***Laser Profiler Test Report*** to the PA and DMRO within 7 calendar days.

(4) Should the ***Test Report*** indicate any deficiencies, the PA will notify the Contractor and the Contractor shall perform corrections in accordance with ***FDOT Specification Article 330-9***. Straightedge Deficiencies are automatic Materials Certification Review findings in ***MAC.*** They are promoted as a ***MAR*** in ***MAC*** by the Materials Certification Review Program Maintenance User. The PA will discuss Contractor's proposed correction method with the DPME and approve or disapprove the proposed method. If the proposed method is not approved, the PA shall require the Contractor to resubmit their correction plan. The PA may propose waiving the corrections and pay deductions if the deficiencies are caused by manholes, valve boxes, intersections, etc., if they are beyond control of the Contractor. However, if the District proposes leaving a deficiency in place at full pay, approval of the DCE must be obtained before notifying the contractor.

(5) In consideration of the safety and traffic control operations, the PA may approve a Contractor's request to use the QC results of 15 foot rolling straightedge testing as a reference for correction actions after the completion of Laser Profiler testing. However, under this situation, the 15 foot rolling straightedge shall be performed in accordance with ***CPAM 11.5.5.1(3)*** in both wheel paths behind the final roller of the paving train and shall be verified by the VT-2.

(6) The Department will monitor/ verify Contractor's corrective work in accordance with

CPAM 11.5.5.1(4) and document the results in accordance with ***CPAM 11.5.5.1(4) and (6)***. The resolution of the deficient area(s) will be handled in accordance with ***CPAM 11.5.6***.

A flow chart (titled, "Acceptance Testing Process for Pavement Smoothness by Laser Profiler") is attached to indicate the process of acceptance testing for pavement smoothness by Laser Profiler.

Note: Per the Specifications, on Laser Profiler projects (Design Speed 55 mph and greater) the contractor may elect to have Laser Profiler testing of the friction course performed before conducting straightedge testing. In such cases, they would only have to straightedge areas identified by the laser profiler data as having a ride number less than 3.5 and correction of the friction course would occur after Laser Profiler and straightedge testing is performed.

11.5.6 Resolution

Note: Straightedge deficiencies waived in accordance with ***Specification 330-9.4.5*** require DCE approval. The resolution of the material acceptance is documented in ***MAC*** as part of the Materials Certifications Review process.

(A) Resident Level Responsibilities

(1) If the Contractor proposes to leave the deficient area(s) in place at No Pay, the PA must obtain the recommendation of the Resident Engineer (RE) and the DPME and approval of the DCE prior to notifying the Contractor of such approval. If the Contractor requests to leave the deficient area(s) in place at Full Pay, the PA must obtain the concurrence of the RE, DPME, and DCE before notifying the Contractor of the decision.

(2) If the Contractor plans to use corrective methods other than method (a) Removing and Replacement or method (b) Milling, as specified in ***FDOT Specifications Section 330***, a written request for approval of the proposed methods must be submitted to the PA. The PA will send the Contractor's request along with the list of surface irregularities to the DPME and DCE, requesting comments and recommendations.

(3) The PA will approve or disapprove the Contractor's request for corrective action based on the DPME's and the DCE's comments and recommendations. The PA may rescind any approval if satisfactory acceptance test results are not being

achieved.

(4) Regardless of the corrective method approved and used by the Contractor, the VT-2 shall be present during the corrective work and will verify that each surface irregularity was eliminated or brought within the allowable specification tolerance. The corrective work will be reported on ***Form No. 700-010-13, Daily Report of Construction***. One or more follow-up QC samples Witnessed by the VT-2 must be entered into MAC to document that the original deficiencies have been addressed. The VT-2, as the PA's designee, shall include the MAC Sample Id(s) on the MAR finding.

(5) Upon verifying all corrections have been made, the PA will notify the Contractor in writing about the Engineer's determination of pavement surface acceptance with copies to the DCE and the DPME.

(6) The RE, or the RE's designee, will document their recommended resolution in ***MAC*** on the ***MAR***.

(B) District Level Responsibilities

(1) If the Contractor proposes to leave the deficient area(s) in place at Full Pay and states the reason for doing so, the DPME and the DCE shall provide their recommendations. **Note:** Straightedge deficiencies waived in accordance with ***FDOT Specification 330-9.4.5*** require DCE approval.

(2) The DPME will document their recommended resolution on the ***MAR***.

(3) The DCE will document their recommended resolution on the ***MAR***.

11.5.7 Straightedge Deficiencies Documentation and Adjustments

Straightedge deficiencies can occur in structural courses and friction courses.

Straightedge Deficiencies are either:
(1) Corrected (removed and replaced) at no cost to the Department
(2) Left in place at No Pay or Full Pay.

1. Straightedge Deficiencies that are corrected (Removed and Replaced)

The defective surface will be removed and replaced with an acceptable surface at no additional cost to the Department in accordance with ***FDOT Specifications Article 330-9***. The asphalt used for correcting straightedge deficiency will be shown as a "Straightedge Correction" on the ***Asphalt Roadway - Daily Report of Quality Control***.

(A) Deficiencies when LOT's are still open:

Tests will be performed on the asphalt used for straightedge corrections when a random number occurs. The area(s) to be corrected will need to be shown on the ***Asphalt Roadway - Daily Report of Quality Control*** in the LOT the asphalt is produced in. The amount of material used to correct these deficiencies will be shown on the ***Asphalt Roadway - Daily Report of Quality Control*** as a "Straightedge Correction".

(B) Deficiencies when LOT's are closed:

If the Straightedge deficiencies are corrected after all LOT's are closed, a new LOT will not be opened, and no QC material tests are required. The asphalt used for correcting the straightedge deficiency shall be reported on the last ***Asphalt Roadway - Daily Report of Quality Control*** for that mix type (structural or friction).

Note: Report the asphalt as a "Straightedge Correction" to ensure the asphalt is not paid for within the LOT. Straightedge corrections are shown on the ***Asphalt Roadway - Daily Report Of Quality Control*** in order to document that the straightedge corrections were made. The original ***Asphalt Roadway - Daily Report of Quality Control*** showing where the deficient areas were first paved do not need to be revised.

2. Straightedge Deficiencies that are Left in Place at No Pay or Full Pay

(A) Deficiencies Left in Place at No Pay

If the PA determines to leave the asphalt in place at No Pay, approvals from the RE, DPME, and DCE are needed before notifying the Contractor of the decision. The tonnage

to be deducted is calculated per ***FDOT Specification 330-9.5*** (examples shown below). The PA will complete the "Guidance Document" shown in ***Attachment 11-5-A*** and submit it with the ***Final Estimates Documentation***.

(B) Deficiencies Left in Place at Full Pay

If the Contractor requests to leave the deficient area(s) in place at Full Pay, the PA must obtain approval from the RE, DPME, and DCE before notifying the Contractor of the decision. The PA will complete the "Guidance Document" shown in ***Attachment 11-5-A*** and submit it with the ***Final Estimates Documentation***.

Note 1: For straightedge deficiencies left in place at Full Pay, no changes are required to the original asphalt's Bituminous Adjustments or Fuel Adjustments.

Note 2: For straightedge deficiencies left in place at No Pay, no changes are required to the asphalt's Bituminous Adjustments or Fuel Adjustments.

Note 3: The CPF will not be affected in any case.

Pay Item Reduction Calculations

The Department will calculate the pay item reduction in accordance with ***FDOT Specifications Section 330-9.5.2***. The pay item reduction is based on the quantity of material the Contractor would have removed and replaced had the correction been made. The quantity is determined by the following equation:

Quantity (tons) = L X W X t X Gmm X 0.0024

Where:
L = Total Length (ft.)
The total length (L) is the deficient length that is extended 50 ft. on each side of the deficiency
W= Width (ft.)
t = Thickness (inches)
G_{mm} – Maximum Specific Gravity of the Asphalt Mix
The constant 0.0024 = 43.3 Lbs/SY divided by 9 SF/SY, divided by 2000 Lbs/Ton

For FC-5 only (Open-Graded Friction Course), a different equation is used. The length and width are multiplied by a constant equal to 0.0044. The constant of 0.0044 is based on an FC-5 spread rate of 80 Lbs/SY, divided by 9 SF/SY, divided by 2000 Lbs/Ton.

Quantity (Tons) = L X W X 0.0044 (equation for FC-5 only)

Where:
L= Total Length (ft.)
The total length (L) is the deficient length that is extended 50 ft. on each side of the deficiency, per Specifications.
W= Width in (ft.)
t = Thickness (inches)
The constant 0.0044= 80 Lbs/SY divided by 9 SF/SY, divided by 2000 Lbs/Ton

EXAMPLE 1:

Deficiency Length = 10 ft.
Width = 12 ft.
Thickness is 1.5 inches
G_{mm} = 2.417

Total Length = Deficiency Length plus 50 ft. on each side, therefore;
Total Length = 10 ft. + 50 ft. + 50 ft. = 110 ft.

Quantity (Tons) = L X W X t X G_{mm} X 0.0024
Quantity (Tons) = 110 X 12 X 1.5 X 2.417 X 0.0024 = 11.48 Tons = 11.5 Ton deduction

Note: Situations can occur where the extension of the deficiency is less than 50 ft. This can occur at the beginning or ending of a project, beginning of a bridge approach slab, etc. For example: if the deficient length is 5 ft., and one side of the extension is 50 ft. and the other is 30 ft., the total deficient length is 85 ft. The equation to determine the quantity would be as follows:

Quantity (Tons) = L X W X t X G_{mm} X 0.0024
Quantity (Tons) = 85 X 12 X 1.5 X 2.417 X 0.0024 = 8.88 Tons = 8.9 Ton deduction

EXAMPLE 2:

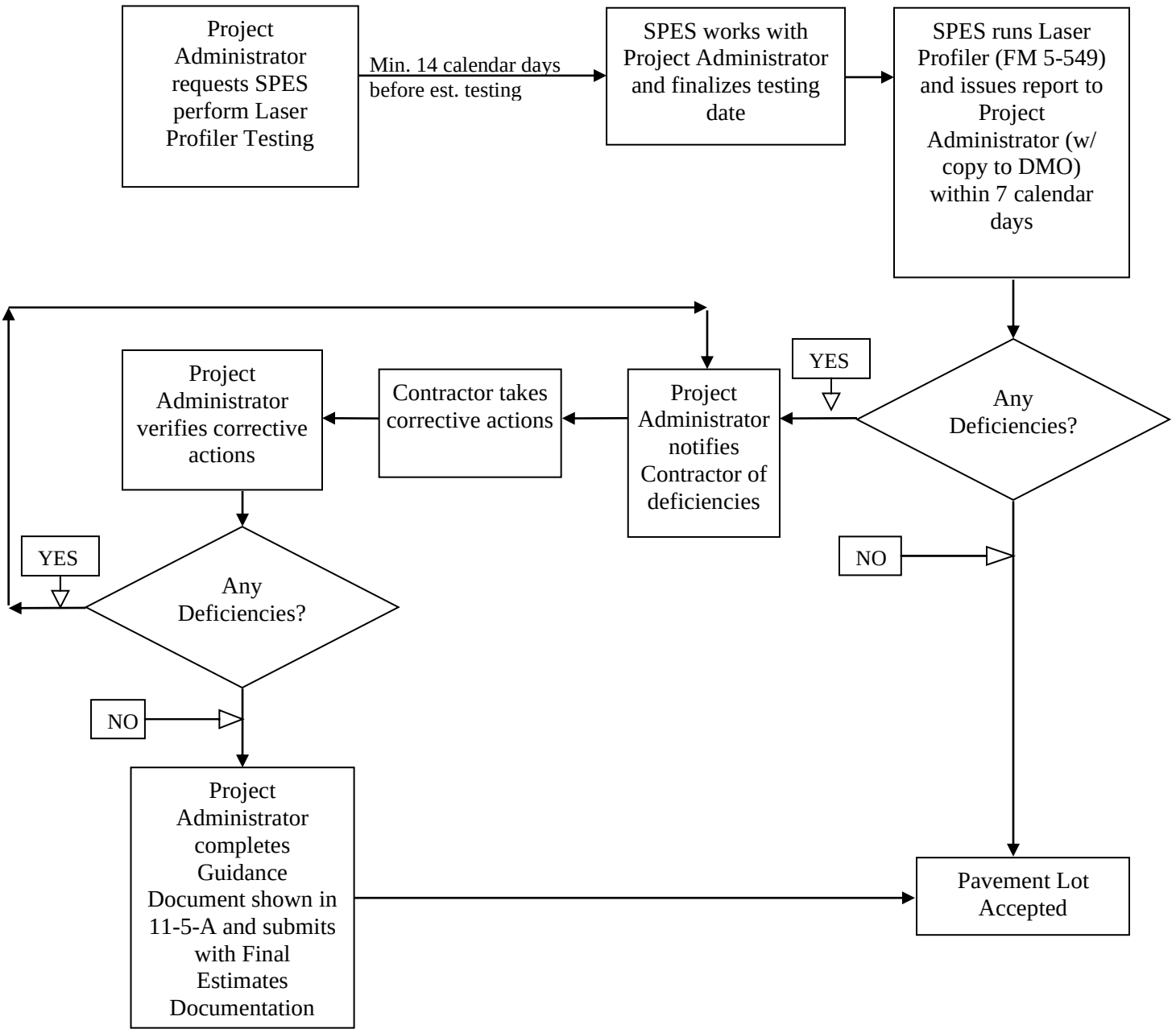
Deficient Length = 10 ft.
Width = 12 ft.

Total length = Deficiency length plus 50 ft. on each side, therefore;
Total deficient length = 10 ft. + 50 ft. + 50 ft. = 110 ft.
Quantity (Tons) = L X W X 0.0044 (equation for FC-5 only)

Quantity (Tons) = 110 X 12 X 0.0044 = 5.81 Tons = 5.8 Ton deduction

FLOW CHART

Acceptance Testing Process for Pavement Smoothness by Laser Profiler



ATTACHMENT 11-5-A
Guidance Document 11-5-A

Recommended Format for Deficiencies				
LOT #	**Sta. From (MP)**	**Sta. To (MP)**	**Deficiencies by Laser Profiler (RN) or Straightedge (inch)**	**Action Taken**

1. Options for Action Taken entry:

    a. Remove and Replace
    b. Leave in place at No Pay
    c. Leave in place at Full Pay