

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, prior to permitting the Contractor to place the friction course, and 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 absolutely necessary to determine the surface upon which the friction course will be placed, and the friction course itself, meet the surface acceptance tolerances established in the **FDOT Specifications**. It is the Contractor's responsibility to perform the straightedge testing and to take any action required to correct surface irregularities. For limited access or other high-speed roadways where the design speed is equal to or greater than 55 miles per hour, the Department will be responsible for the smoothness acceptance testing on the friction course by a laser profiler and will 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 the correction of surface irregularities.

11.5.5 Verification

11.5.5.1 15 Foot Rolling Straightedge Testing

(A) Resident Level Responsibilities

Straightedge testing will take place on the last structural layer and on the friction course in accordance with **Specification Article 330-9.4**. The straightedge testing may be performed either behind the final roller of the paving train or as a separate operation after the completion of the last structural layer and after completion of the friction course. The 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 results of the straightedge testing in the Department's database. The VT-2, as the PA's designee, will finalize the QC sample, enter data in a Verification Sample to document the verification review of the QC data and provide his Technician Identification Number (TIN) and the method of correction the Contractor proposes to use.
- (4) Straightedge Deficiencies are automatic Materials Certification Review findings in the **Materials Acceptance and Certification system (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 Bituminous Engineer (DBE) 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. However, if the District proposes leaving a deficiency in place with pay, approval of the State Construction Engineer (SCE) must be obtained before notifying the contractor. Upon request of the DBE, 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 ascertain that each surface irregularity 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 compliance with the procedures specified in **CPAM 11.5.6**.
- (7) The PA shall document the corrected LOT's in Project File and list the exceptions in a **Certification Statement** (a recommended format is attached in **Guidance Document 11-5-A**) and provide a copy to the District Construction Engineer (DCE).

11.5.5.2 Laser Profiler Testing

(A) Resident Level Responsibilities

In accordance with the procedures specified in **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 for the QC operations on the last layer of the structural course and the friction course either behind the final roller of the paving train or as a separate operation. After the correction of all deficiencies on the last structure course and the friction course in accordance with **Specification Section 330-9.4.5**, the procedures for the Laser Profiler testing on friction course specified in **330-9.4.6.2** are as follows:

- (1) The PA will fill out the online **Pavement Evaluation Request Form** (The Form can be accessed through the link:
<https://mac.fdot.gov/Default.aspx>)

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 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 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) The test team will provide a copy of the **Laser Profiler Test Report** to the PA and DMRO within one week after the completion of Laser Profiler testing. Upon completion of the Laser Profiler testing, the test team will furnish a Test Report to the PA with a copy to the DMRO within 7 calendar days.
- (4) Should the **Test Report** indicate any deficiencies, the PA will notify the Contractor and the Contractor shall perform the correction actions in accordance with the requirements of **FDOT Specification Article 330-9**. Straightedge Deficiencies are automatic Materials Certification Review findings in the **Materials Acceptance and Certification system (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 Bituminous Engineer (DBE) 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. However, if the District proposes leaving a deficiency in place with pay, approval of the State Construction Engineer (SCE) 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)** along 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 compliance with the procedures specified in **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 after straightedging is performed.

11.5.6 Resolution

Note: Straightedge deficiencies waived in accordance with **Specification 330-9.4.5** require **SCE 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 shall obtain the recommendation of the Resident Engineer (RE) and the DBE and approval of the DCE prior to notifying the Contractor of any 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, DBE, DCE, and SCE, 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 (by memo or transmittal) the Contractor's request along with the list of surface irregularities to the DBE and DCE, requesting comments and recommendations.
- (3) The PA will approve or disapprove the Contractor's request for corrective action based on the DBE's and the DCE's comments and recommendations. The PA may rescind any approval if satisfactory acceptance test results are not being attained.
- (4) Regardless of the corrective method approved and used by the Contractor, the VT-2 shall be present during the corrective work and will ascertain that each surface irregularity was eliminated or brought within the allowable tolerance as established in the specifications. The corrective work will be reported on **Form No. 700-010-13, Daily Report of Construction**.
- (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 DBE.
- (6) The RE or his designee will document his recommended resolution in **MAC** on the **MAR**.
- (7) Based on the State Construction Office's (SCO's) final recommendation, the PA shall list the approval to leave the deficient areas as exceptions in the Certification Statement (a recommended format is attached in **Guidance Document 11-5-A**) and provide a copy to the DCE.

(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 DBE and the DCE shall provide their recommendations. **Note:** Straightedge deficiencies waived in accordance with **FDOT Specification 330-9.4.5** require SCE approval.

- (2) The DBE will document his recommended resolution on the **MAR**.
- (3) The DCE will document his recommended resolution on the **MAR**.

(C) Central Office Level Responsibilities

- (1) The State Construction Office will review all recommendations to leave deficient areas in place at Full Pay on the **MAR**.

11.5.7 Straightedge Deficiencies Documentation and Adjustments

Straightedge deficiencies can occur in both structural 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 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 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, the DBE, and the DCE are needed prior to notifying the Contractor. The tonnage to be deducted is calculated per ***FDOT Specification 330-9.5*** (examples shown below). The PA will complete the ***Asphalt Concrete Pay Item Reduction Sheet***, as well as, the “Guidance Document” shown in ***Attachment 11-5A***, and submit them with the ***Final Estimates Package***.

(B) Deficiencies Left in Place at Full Pay

If the Contractor request to leave the deficient area(s) in place at Full Pay, the PA must obtain approval from the SCE (after obtaining approval from the RE, the DCE, and the DBE) before notifying the Contractor of the decision. The PA will complete the ***Asphalt Concrete Pay Item Reduction Sheet***, as well as, the “Guidance Document” shown in ***Attachment 11-5A*** and submit them with the ***Final Estimates Package***.

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:

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

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

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.

$$\text{Quantity (Tons)} = L \times W \times 0.0044 \text{ (equation for FC-5 only)}$$

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

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 inch

$G_{mm} = 2.417$

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

Total Length = 10 ft. + 50 ft. + 50 ft. = 110 ft.

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

Quantity (Tons) = $110 \times 12 \times 1.5 \times 2.417 \times 0.0024 = 11.48 \text{ Tons} = 11.5 \text{ Ton deduction}$

Note: Situations can occur where the extension of the deficiency is less than 50 ft. This can occur at the beginning or ending of the project limits, 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:

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

$$\text{Quantity (Tons)} = 85 \times 12 \times 1.5 \times 2.417 \times 0.0024 = 8.88 \text{ Tons} = 8.9 \text{ Ton deduction}$$

EXAMPLE 2:

Deficient Length = 10 ft.

Width = 12 ft.

Total length = Deficiency length plus 50 ft. on each side, therefore;

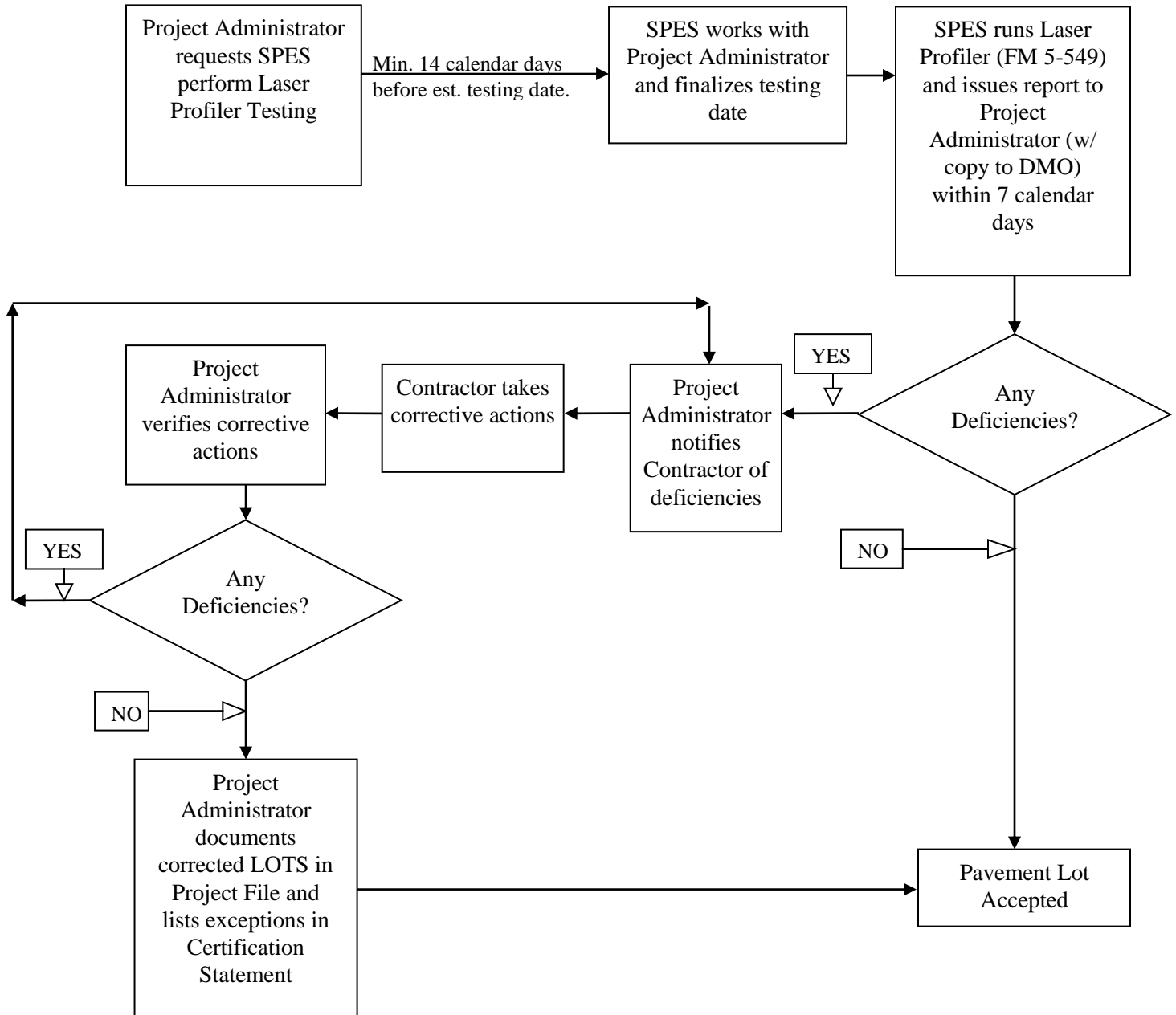
Total deficient length = 10 ft. + 50 ft. + 50 ft. = 110 ft.

Quantity (Tons) = $L \times W \times 0.0044$ (equation for FC-5 only)

Quantity (Tons) = $110 \times 12 \times 0.0044 = 5.81 \text{ Tons} = 5.8 \text{ Ton deduction}$

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

Remarks:

1. SPES: State Pavement Evaluation Section (State Materials Office in Gainesville).
2. Action Taken:
 - a. Remove and Replace
 - b. Leave in place at No Pay
 - c. Leave in place at Full Pay