

450.04 Smoothness Requirements.

(a) Testing Device.

1. Description.

The testing device shall be an inertial profiler that satisfies the requirements of ALDOT-448, "Evaluating Pavement Profiles," including the portable storage device(s) referenced herein. Portable storage devices containing profile measurements shall become the property of the Department at the time the measurements are taken.

b. Equipment Requirements.

The inertial profiler shall be a certified, non-contact, laser-based device capable of simultaneously measuring both wheelpaths meeting all the requirements of ALDOT-448.

Portable storage device(s) for the inertial profiler shall be furnished in sufficient quantities for all calibration, test runs, and actual tests deemed necessary by the Engineer. Unless approved in advance by the Engineer, all portable storage devices provided by the Contractor will take the form of commonly available 2G USB flash drives.

(b) Testing Procedure.

1. Description.

Smoothness testing shall be conducted in accordance with the requirements given in ALDOT 448. The Contractor shall furnish the necessary certified personnel to operate the inertial profiler.

The smoothness test shall be performed as soon as practical after the pavement hardens sufficiently to prevent damage to the surface finish but no later than the next work day after placement of the concrete, unless otherwise authorized by the Engineer.

The smoothness test is considered a part of the paving operation and will be performed immediately in the proper sequence, in a satisfactory manner, even to the exclusion of other work.

Smoothness testing shall be performed and reported daily until the contractor demonstrates the ability to achieve a Mean Roughness Index (MRI) value of less than 65 in/mile. If the Contractor demonstrates the ability to achieve a MRI value of less than 65 in/mile then the Contractor may elect to perform and report the smoothness testing at a frequency he determines but not to exceed 5 working days production.

2. Smoothness Requirements.

The results of the inertial profiler tests will be evaluated by Department personnel as outlined in ALDOT-448.

If a Mean Roughness Index (MRI) value of 120 inches per mile {2.0 m/km} is exceeded in any test section of any daily paving operation, the paving operation will be suspended as soon as possible after results of the unacceptable test section are obtained. The paving will not be allowed to resume until corrective action is taken by the Contractor.

The contractor will be allowed to diamond grind any test section whose Mean Roughness Index exceeds 65 inches per mile. All diamond grinding shall be performed with no additional compensation from the Department. Diamond grinding may be separate locations of grinding or continuous grinding within a test section. Diamond grinding at any location shall be for the full width of the pavement test section.

If diamond grinding is performed the measurement of pavement thickness for acceptance and payment will be made after diamond grinding is completed. The determination of the pavement thickness will be by coring a location determined by the Engineer using ALDOT-210. The Contractor will be responsible for cost of coring and repairing the core hole. All voids resulting from coring operations shall be filled and consolidated with the same concrete mixture used during paving. Voids shall be filled on the same day that the cores are extracted using the same concrete mixture used for paving. Price adjustments will be made for smoothness after the diamond grinding is completed. All test sections of pavement where the Mean Roughness Index remains greater than 120 inches per mile shall be removed and replaced (in accordance with the details shown on the plans) by the Contractor without additional compensation.

The price adjustments for smoothness are given in Subarticle 450.08(b).

450.05 Tolerance in Pavement Thickness.

Pavement (main roadway, shoulders, intersections, entrances, crossovers, ramps, etc.) thicknesses will be checked by the Department for compliance with required thickness by measuring the length of cores or by the use of MIT Scan T2 device. Pavement with deficient thickness will be paid for on an adjusted unit price as described in Subarticle 450.08(b). Thickness measurements shall be made after all operations, if applicable, have been performed to improve smoothness.

Pavement that is deficient from the required thickness by more than 0.75 inches shall be replaced in accordance with the details shown on the plans at no cost to the Department.

450.06 Acceptance of Concrete Based on Compressive Strength.

Concrete cylinders, 6 inches x 12 inches in size, will be made by the Department from randomly selected concrete batches in each pavement testing unit as designated by the Engineer.

The compressive strength shall be the average of two cylinder test results. If the average compressive strength of the cylinders is equal to or greater than 100 % of the required 28-day compressive strength, the concrete will be accepted with no price reduction. If the average compressive strength of the cylinders is 85 % or greater but less than 100 % of the required 28-day compressive strength, a price adjustment will be applied to the applicable pay item for the increment of pavement represented by the low break. The formula for the determination of the price adjustment is given in Subarticle 450.08(b).

If the average compressive strength of the cylinders is less than 85 % of the required strength, the concrete pavement shall be removed and replaced in accordance with the details shown on the plans without additional compensation.

450.07 Method of Measurement.

The amount of concrete pavement to be paid for under this section shall be the number of square yards {square meters} of pavement completed and accepted, measured in place and calculated to the nearest square yard {square meter}. The width will be the width of the pavement shown on the typical cross section of the plans plus additional widening where called for, or directed by the Engineer in writing. The width will be the outside to outside measurement of the pavement including any area covered by integral curb or concrete median strip. The length will be measured along the surface of the centerline.

Reinforced concrete bridge end slabs will be measured in square yards {square meters} and will be paid for separately.

The number of profilographs measured for payment will be the actual number of units ordered and accepted.

450.08 Basis of Payment, Price Adjustments and Pavement Replacement.

(a) General.

The square yardage {square meters} of concrete pavement and bridge end slab, measured as provided above, will be paid for at the contract unit price bid per square yard {square meter}, which payment shall be full compensation for furnishing and placing all materials, including any reinforcing steel and supports, anchor concrete, sleeper slab concrete, structural steel (except bridge joint armor plates), dowels, and all other joint material, any additives, and for all materials, equipment, tools, labor, and incidentals required to complete the work (including the finishing, grooving, or tining of the surface).

No additional payment over the contract unit bid price will be made for any pavement which has an average thickness in excess of that shown on the plans.

Integral curb, measured as provided above, will be paid for at the contract unit price per linear foot {meter} which shall be payment in full for all materials and work required in completing the item.

The ordered and accepted profilographs, measured as noted above, will be paid for at the contract unit price bid which shall be full compensation for furnishing the unit and includes all equipment, tools, labor, calibration, maintenance, services, supplies, chart paper, and incidentals necessary to complete these items of work.

(b) Price Adjustments and Deficiencies requiring Pavement Replacement.

1. General.

The descriptions of "mainline pavement testing unit and non-mainline pavement testing unit" are given in 450.02(h)2 and 450.02(h)3 respectively.

Mainline pavement testing units will be designated for acceptance and payment based on smoothness, concrete strength, and pavement thickness. Non-mainline pavement testing units will be designated for acceptance and payment based on concrete strength and pavement thickness.

2. Price Adjustment based on Smoothness.

The Mean Roughness Index shall be measured as noted in Subarticle 450.04(b).

When the MRI is more than 65 inches per mile {1.0 m/km}, per section, a unit price reduction will be assessed. When the MRI is less than 40 inches per mile {0.6 m/km} per section, a unit price increase will be added. The price adjustments are given in Table 1.

TABLE I	
Mean Roughness Index Inches/Mile/Section {meters/Kilometer/Section}	Contract Price Adjustment Percent of Pavement Unit Bid Price
Under 40 {Under 0.6}	105 - (MRI / 8) {105 - (MRI / 0.12)}
40 to less than 65 {0.6 to less than 1.0}	100
65 thru 120 {1.0 thru 2.0}	100 - [(MRI - 65)/2.75] {100 - [(MRI - 1.0)/0.05]}
Over 120 {Over 2.0}	Unacceptable

Where diamond grinding is performed to bring the Mean Roughness Index to 65 inches per mile or less, payment for the test section will be a maximum of 100 % of the contract price.

3. Price Adjustment based on Pavement Thickness.

Where the thickness of pavement, measured as described in Article 450.05, is deficient from the required thickness, payment will be made at an adjusted price as shown in the following table.

PRICE ADJUSTMENT FOR DEFICIENCY IN PAVEMENT THICKNESS	
Deficiency in Pavement Thickness	Price Adjustment
Greater than 0.00" to less than or equal to 0.10"	100 %
Greater than 0.10" to less than or equal to 0.25"	90 %
Greater than 0.25" to less than or equal to 0.40"	80 %
Greater than 0.40" to less than or equal to 0.55"	70 %
Greater than 0.55" to less than or equal to 0.75"	60 %
Greater than 0.75"	Replace Pavement Testing Unit

4. Price Adjustment based on Compressive Strength.

Payment for concrete pavement will be adjusted based on compressive strength as described in Article 450.06.

The price adjustment shall be determined from the following formula:

$$\text{Price Adjustment (\% Payment)} = 100 \times (1.0 - [(f'_c - f_{c\text{AVG}}) / (0.30 f'_c)])$$

f'_c = Required 28-day Compressive Strength (psi) {MPa} as designated from the correlation of the compressive strength with the required flexural strength;

$f_{c\text{AVG}}$ = Average Compressive Strength of Test Cylinders (psi) {MPa};

The price reduction shall be rounded to the nearest tenth of a percent.

5. Range of Price Adjustments and Assessment of Combined Price Adjustments.

The range of price adjustment based on smoothness is 105 % to 80 %.

The range of price adjustment based on pavement thickness is 100 % to 60 %.

The range of price adjustment based on compressive strength shall be 100 % to 50 %.

If more than one price adjustment is required, the product of the price adjustments (percentage price adjustments multiplied together) will be applied to the contract price for the pavement.