501-R-752 INERTIAL PROFILER WITH SMOOTHNESS PAY ADJUSTMENTS FOR PCCP,
FIXED INTERVAL

(Revised 10-20-22)

The Standard Specifications are revised as follows:

SECTION 501, BEGIN LINE 63, DELETE AND INSERT AS FOLLOWS:

The aggregate blend submitted on the CMDS shall produce an optimized aggregate gradation in accordance with ~~ITM 226 sections 6.2.1 and 6.3~~*the Department provided spreadsheet*. The aggregate blend shall consist of, at a minimum, one concrete coarse aggregate and one fine aggregate, size No. 23. One additional class A intermediate-sized coarse aggregate may be included if approved by the Engineer.

SECTION 501, DELETE LINES 409 THROUGH 514.

SECTION 501, AFTER LINE 514, INSERT AS FOLLOWS:

501.25 Pavement Smoothness

Pavement smoothness will be accepted by means of an inertial profiler, a 16 ft long straightedge, or a 10 ft long straightedge as described below.

(a) Inertial Profiler with Smoothness Pay Adjustments

When a pay item for Inertial Profiler, PCCP is included in the contract, the Contractor shall furnish, calibrate, and operate an approved inertial profiler in accordance with ITM 917 for the acceptance of longitudinal smoothness on the mainline traveled way, including adjacent acceleration or deceleration lanes, where both of the following conditions are met:

1. *The posted speed is greater than 45 mph.*

2. *The traveled way width and slope are constant and is at least 0.5 mi in length.*

The profiles International Roughness Index, IRI, results including areas of localized roughness, and fixed interval IRI results shall become the property of the Department. The inertial profiler shall remain the property of the Contractor.

The paving exceptions and areas exempt from inertial profiler operation will be in accordance with ITM 917.

If the posted speed limit for an entire smoothness section is less than or equal to 45 mph, the section will be exempt from inertial profiler operation and the smoothness within the section will be accepted in accordance with 501.25(b).

If the posted speed limit is greater than 45 mph for a portion of a smoothness section and is less than or equal to 45 mph for the remainder, the section smoothness acceptance will be as follows:

1. *By inertial profiler for the portion of the section with a posted speed limit greater than 45 mph.*

2. *In accordance with 501.25(b) for the portion of the section with a posted speed limit less than or equal to 45 mph.*

(b) 16 ft Straightedge

The Contractor shall furnish and operate a 16 ft straightedge in accordance with 306.03(d) and as described below. The 16 ft straightedge shall be used to measure smoothness along the direction of mainline traffic.

Locations on the pavement surface scraped by the straightedge shall be marked. The pavement shall be corrected in accordance with 501.25(e) to meet the required tolerance. For existing utility and manhole castings that required no grade adjustment, the tolerance may be adjusted after being reviewed and approved by the Engineer.

For contracts which include the Inertial Profiler, PCCP pay item, the 16 ft long straightedge or the Inertial Profiler simulating the 16 ft long straightedge shall be used to measure longitudinal smoothness at the following locations:

1. *All mainline traveled way lanes shorter than 0.5 mi.*

2. *All mainline traveled way lanes at locations exempted from inertial profiler operation in accordance with ITM 917.*

3. *All mainline traveled way lanes within smoothness sections with posted speed limits less than or equal to 45 mph throughout the entire section length.*

4. *All tapers.*

5. *All ramps.*

6. *All turn lanes, including bi-directional left turn lanes shorter than 0.5 mi.*

7. *All acceleration and deceleration lanes associated with ramps with posted speeds of 45 mph or less.*

8. *All shoulders.*

9. *All intersections with significant change in cross slope.*

For contracts where the inertial profiler is not used for smoothness acceptance, the 16 ft straightedge shall be used to measure longitudinal smoothness at the above locations, on all mainline traveled way lanes and ramps with posted speeds greater than 45 mph, and on ramp acceleration or deceleration lanes.

(c) 10 ft Straightedge

The 10 ft straightedge will be in accordance with 306.03(d). The 10 ft straightedge will be used to check transverse slopes across travel lanes and shoulders, approaches, and

crossovers. When the 10 ft straightedge is used, the pavement variations shall be corrected to 1/8 in. or less.

(d) Areas of Localized Roughness, ALR

At locations where the inertial profiler is used, all areas having a localized roughness in excess of 160 in./mi utilizing continuous IRI with a 25 ft window shall be corrected subject to approval by the Engineer. After ALRs have been identified, a grinding simulation shall be performed to estimate whether the ALR can be corrected to an IRI value of less than 160 in./mi with no more than 1/4 in. grind depth at any spot. If such correction is not possible, then an ALR with an IRI value less than 190 in./mi can remain uncorrected if approved by the Engineer and ALR with an IRI value greater than 190 in./mi shall require full depth removal and replacement of sufficient area to meet specifications.

In addition, if there is only one ALR in any two-lane mile section, then no smoothness correction will be required if the ALR does not exceed 190 in./mi and the overall smoothness in accordance with 501.25(d) of the two-lane mile section does not require any corrective action. A two-lane mile section will start one mile before the ALR and end one mile after the ALR in order that all two-lane mile sections will have, at most, one ALR each.

(e) Smoothness Correction

Pavement smoothness variations outside specified tolerances shall be corrected by grinding with a groove type cutter or by replacement. Grinding will not be allowed until the PCCP is 10 days old and flexural strength testing yields a modulus of rupture of 550 psi or greater. The grinding of the pavement to correct the profile shall be accomplished in either the longitudinal or the transverse direction. The PCCP texture after grinding shall be uniform. If the grinding operation reduces the tining grooves to a depth of less than 1/16 in. and the longitudinal length of the removal area exceeds 15 ft, or two or more areas are within 30 ft of each other, the PCCP shall be re-textured in accordance with 504.03.

The width of the corrected area may be partial or full lane width, depending on the respective wheel path profiles. After the corrective action is complete, the inertial profiler shall be operated throughout the entire affected smoothness section to verify the adequacy of the corrective action.

At locations where the 16 ft straightedge is used, the pavement variations shall be corrected to 1/4 in. or less.

SECTION 501, DELETE LINES 632 THROUGH 657.

SECTION 501, AFTER LINE 657, INSERT AS FOLLOWS:
(d) Smoothness

Smoothness pay adjustments will only be applied when the smoothness is measured by an inertial profiler in accordance with 501.25(a).

When the pavement smoothness is tested with an inertial profiler, payment will be based on the Mean Roughness Index, MRI, for each lane for each 0.1-mile section of paving. The MRI for a 0.1-mile section is the average of the IRI of the two-wheel paths. A Quality Assurance Pay Factor, PF_s, for smoothness will apply to the planned thickness of

the PCCP. The quality assurance adjustment for each section will be calculated by the following formula:

$$q_s = (PF_s - 1.00) \; x \; A \; x \; U$$

where:

q_s = *quality assurance adjustment for smoothness for one section*
PF_s = *pay factor for smoothness*
A = *area of the section, sq yd*
U = *unit price for the material, $/sq yd.*

The quality assurance adjustment for smoothness, Q_s, for the contract will be the total of the quality assurance adjustments for smoothness, q_s, on each section by the following formula:

$$Q_s = \sum q_s$$

When smoothness is measured by an inertial profiler, payment adjustments will be made for any 0.1-mile section based on the initial MRI generated and in accordance with the following table. The MRI pay factors for smoothness will be determined prior to any required smoothness correction in accordance with 510.25(d). Smoothness correction if required shall be in accordance with 501.25(d). For any 0.1-mile sections containing transverse construction joints that are required as per the planned maintenance of traffic, the pay factors for smoothness may be determined after corrective action at the discretion of the Contractor. Regardless of the tabulated value, the maximum pay factor for a smoothness section where corrective action has been performed will be 1.00.

PAY FACTORS FOR SMOOTHNESS Posted Speed greater than 45 mph	
MRI, in./mi	*Pay Factor, PF_s*
over 0 to 35	*1.08*
over 35 to 40	*1.07*
over 40 to 45	*1.05*
over 45 to 50	*1.03*
over 50 to 55	*1.02*
over 55 to 60	*1.01*
over 60 to 70	*1.00*
over 70 to 75	*0.99*
over 75 to 80	*0.98*
over 80 to 85	*0.96*
over 85 to 90	*0.95*
over 90	*PF_s will be 0.95 and the section shall be corrected to 90 or less.*

SECTION 501, BEGIN LINE 719, DELETE AND INSERT AS FOLLOWS:

501.31 Basis of Payment

The accepted quantities of QC/QA-PCCP will be paid for at the contract unit price per square yard for the thickness specified, complete in place.

Furnishing and operating the 16 ft straightedge shall be included in the cost of other pay items within this section.

Payment for furnishing, calibrating, ~~and~~ operating the ~~profilograph~~*inertial profiler*, and furnishing *IRI* profile information will be made at the contract lump sum price for ~~profilograph~~*Inertial Profiler*, PCCP.

SECTION 501, BEGIN LINE 746, DELETE AND INSERT AS FOLLOWS:
> ~~Profilograph~~*Inertial Profiler*, PCCP .... LS

SECTION 501, BEGIN LINE 752, DELETE AND INSERT AS FOLLOWS:
The price of ~~profilograph~~*Inertial Profiler*, PCCP will be full compensation regardless of how often the ~~profilograph~~*inertial profiler* is used or how ~~many profilograms are produced~~*often the IRI is determined*.

SECTION 502, BEGIN LINE 358, DELETE AND INSERT AS FOLLOWS:
502.20 Pavement Smoothness
Pavement smoothness will be in accordance with 501.25 except ~~profilograph~~*inertial profiler* requirements will not apply.