

ITEM 10403.125141 - PAVEMENT RIDE QUALITY ADJUSTMENT to 18403.125102

DESCRIPTION

This is a performance based specification in which the Contractor is responsible for constructing the mainline section of pavement within a specified ride quality range. Measure ride quality daily using a verified and properly calibrated inertial profiler and report the test results to the Engineer as an average International Roughness Index (IRI) for each pavement-ride-quality (PRQ) lot. Test all new flexible pavement and HMA overlays of pavement and bridge decks except: shoulders, gore areas, ramps shorter than 300 m, turn-outs, turn-arounds, driveways, parking areas and other similar miscellaneous paving. The pavement and all other quality adjustments are constructed, measured and paid for under their appropriate items.

MATERIALS None Specified

CONSTRUCTION DETAILS

A. Definitions of Terms. For the purposes of this specification, the following terms are defined below.

Calibration. All procedures, contained in Materials Method 24.1, followed to ensure that each individual data collection device is operating properly.

International Roughness Index (IRI). An index computed from a longitudinal profile measurement reported in m/km. For this specification IRI is computed according to the quarter-car model. IRI computed according to the quarter-car indicates the amount of suspension travel that one wheel of a standard vehicle would experience when traveling over a longitudinal profile.

Measurement. A single determination of IRI along the reference line for the entire length of a single PRQ lot in the direction of traffic.

Pavement Ride Quality (PRQ) Lot. A PRQ lot is a continuous 200 m section of pavement one lane wide, in areas shown in the contract documents as requiring pavement ride quality testing. Ride Quality testing is performed for each PRQ lot. Payment adjustments are made separately for each PRQ lot.

Quarter-car Model. A mathematical model of one wheel (one quarter) of a car of a standard weight with a standard tire, standard spring rate and standard damping. The standard car is also known as the "golden car" and was established in NCHRP Report 228.

Reference line. The imaginary line the noncontact height sensor traces along the pavement surface. The intended reference line for all Quality Control (QC) and Quality Assurance (QA) tests is located 0.9 m to the left of the right edge of the PRQ lot (right wheelpath). The closer all tests are taken to the same reference line, the less variability will occur between the results.

Test. The average of three consecutive measurements taken on the same day in the same PRQ lot by the same inertial profiler and operator.

Verification. All procedures, contained in Materials Method 24.1, followed to ensure the test results produced by a profiler are within an acceptable variation of the true profile.

ITEM 10403.125141 - PAVEMENT RIDE QUALITY ADJUSTMENT to 18403.125102

B. Inertial Profiler Requirements. A self-powered test vehicle conforming to ASTM E950 Class I and AASHTO PP43 containing an automated recording system capable of providing the following information to the on-board display, onboard data storage device, and on-board printer.

- The date, time, contract number, route, location, test direction, lane and operator for each test.
- The equipment parameters related to calibration.
- A general profile, using a scale of 1:300 horizontal and 1:1 vertical.
- The average IRI and range for the specified wheelpath for each PRQ lot.
- Location and height of any defects exceeding an equivalent 6 mm defect template.
- A simulated profile for each PRQ lot that contains a defect requiring repair.

Alternative equipment types may be used as approved by the Director, Materials Bureau. Submit requests to use alternative equipment to the Director, Materials Bureau, at least 14 days prior to the start of QC testing. Alternative equipment will be approved provided it meet the following requirements.

- Meeting requirements for ASTM E950 Class 1 and AASHTO PP43.
- Equipped with automated data collection system and on board data storage device.
- Capable of providing all required information immediately on a monitor and in printed form within one hour of completing testing.

Provide an executable copy of the IRI calculation software used by the profiler to the Engineer before beginning QC testing.

C. Equipment Verification, Calibration and Daily Control Section Testing.

- 1. Verification.** Prior to using an inertial profiler on a Department project, the profiler must be verified according to Materials Method 24.1.
- 2. Calibration.** Calibrate the inertial profiler according to frequency and procedures given in Materials Method 24.1.
- 3. Daily Control Section Testing.** Create a control section at or near the project site according to the procedures of Materials Method 24.1. Each day of quality control testing, perform one measurement on the control section. Record the results and track the performance of the inertial profiler according to the procedures of Materials Method 24.1.

D. Quality Control (QC) Measurements.

- 1. Layout PRQ Lots.** Divide the pavement areas designated in the contract documents as requiring pavement ride quality testing into PRQ lots according to the following instructions.
 - Divide the pavement areas into 200 m \pm 0.1 m sections of pavement one lane wide.
 - PRQ lots may include pavement placed on more than one day.
 - Each PRQ lot must be continuous. PRQ lots may not straddle areas not designated for ride quality testing.
 - Include pavement sections shorter than 100 m located between a PRQ lot and an area not designated for ride quality testing or the end of the project in the adjacent PRQ lot.
 - Pavement sections at least 100 m long, but less than 200 m, located between a PRQ lot and an area not designated for ride quality testing or the end of the project will be separate PRQ lots.

ITEM 10403.125141 - PAVEMENT RIDE QUALITY ADJUSTMENT to 18403.125102

Provide the Engineer with a table listing the location of each PRQ lot at least 48 hours prior to starting QC testing. Report the PRQ lot locations in a table constructed with the following format.

- Provide a table with 5 columns and a single row for each PRQ lot.
- Title the columns as shown below.

PRQ Lot No.	Direction	Lane/Ramp No.	Begin Station	End Station
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- Provide the following information in each column in the format described herein.
 - PRQ Lot No. Provide the number for the PRQ lot. PRQ lot numbers should begin with 1 and ascend as needed. The PRQ lot numbering system should begin at one end of the project and continue sequentially in the direction of traffic. Each PRQ lot must have a unique number assigned.
 - Direction Provide the Direction of traffic flow for the PRQ lot.
 - Lane/Ramp No. Lane numbers will begin with 1 corresponding to the right most lane and continue sequentially to the left most lane for each direction. Ramps will be designated by number or name and function (off or on).
 - Begin Station The station $\pm 0.1\text{m}$ at which testing for the PRQ lot will begin. Testing is always performed in the direction of traffic.
 - End Station The station $\pm 0.1\text{m}$ at which testing for the PRQ lot will end.

- 2. Identify the Reference line.** Locate and mark the reference line with a 50 mm wide paint dot every 15 m along the length of each PRQ lot. Maintain the marks until all QC and QA testing is complete for the PRQ lot in question.
- 3. Perform QC Testing.** Perform one test in every PRQ lot according to Test Method 402-01F. Perform QC testing after the final surface course has been paved and compacted.

If any pavement repair is made in a PRQ lot under the provisions of §105-4 Conformity with Plans and Specifications or under the provisions for corrective action in this specification, repeat the QC testing for that PRQ lot. If repairs are made in the left wheelpath and not in the right wheelpath, establish the reference line and perform the repeat tests in the left wheelpath. The final tests will be used for payment.
- 4. Report Results.** Provide the following information to the Engineer within 1 hour of the completing that day's testing.
 - a. Daily IRI Testing Summary Report.** Provide a daily IRI testing summary report, consisting of a header and results table, to the Engineer as a printout and a computer file. The computer file may be in spreadsheet or ASCII format.
 - a1. Header.** Include the following information in the report header.

ITEM 10403.125141 - PAVEMENT RIDE QUALITY ADJUSTMENT to 18403.125102

- Project D number
- Date
- Filter Settings

a2. Results Table. Provide a table consisting of 9 columns labeled as shown below and one row for each PRQ lot tested during that day. Report all results in units of m/km calculated to the nearest 0.01 m/km.

Sublot #	Direction	Lane/ Ramp	Begin Station	End Station	Measurement 1	Measurement 2	Measurement 3	Test
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b. List of Surface Defects. Provide the Engineer with a print-out directly from inertial profiler providing the locations of all points surface defects greater than 6 mm over a 5 m length.

E. Corrective Action.

Repair procedures are subject to the Engineer's Approval. Present the proposed repair procedures to the Engineer at least 48 hours before beginning the repair work. Pavement thickness, location of repair and level of ride quality and effectiveness of a proposed procedure will be primary considerations in determining the proposed procedure's acceptability.

- 1. Repair High Points.** Repair all locations identified as high points during QC testing.
- 2. Repair Lots with Unacceptable IRI.** Repair all PRQ lots identified by the Engineer as needing repair according to the procedures in Method of Measurement of this specification.

METHOD OF MEASUREMENT

The provisions of §401-4, §402-4 and §403-4 apply including the following:

Quality payment adjustments for ride quality are applicable for hot mix asphalt in accordance with the specifications herewith and the provisions outlined in the contract proposal. Quality payment adjustments are measured in Quality Units.

- Determined Quality Units for each PRQ lot by using Table 1.
- For PRQ lots of a length different from 200 m, adjust the number of Quality Units according to Equation 1.
- Determine the total number of Quality Units for each day's production by summing the Quality Units from all PRQ lots paved on that day.

ITEM 10403.125141 - PAVEMENT RIDE QUALITY ADJUSTMENT to 18403.125102

Table 1 Determination of Quality Units	
PRQ lot IRI (m/km)	Quality Units
< 0.55	5
0.56 - 0.70	2.5
0.71 - 0.90	1
0.91 - 1.10	0
1.11 - 1.30	0
1.31 - 1.50	0
1.51 - 1.90 ⁽¹⁾	0
> 1.90 ⁽¹⁾	0

(1) The Department will evaluate the lot to determine if it will remain in place. The level of ride quality, location, traffic volume and speed limit will be primary considerations in determining if the pavement will remain in place. If the pavement cannot remain in place, repair it according to the procedures under Corrective Action in this specification. If the pavement can remain in place the Raw Quality Units will be calculated according to Table 1.

Equation 1 Quality Units = Quality Units from Table 1 x $\left(\frac{\text{length of PRQ lot (m)}}{200 \text{ m}} \right)$

BASIS OF PAYMENT

Payment of Quality Units will be made based on the Index Price listed in the contract documents. The index price shown in the itemized proposal for each Quality Unit is considered the price bid. The unit (index) price is NOT to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figure will be disregarded and the original price will be used to determine the total amount bid for the Contract.

Include the cost for all equipment and labor required to comply with this specification in the unit bid price for the appropriate surface course HMA Item.

Payment will be made under:

Item No.	Item	Pay Unit
10403.125141	Pavement Ride Quality Adjustment to 18402.125102	Quality Units