

disturbed. All concrete on top of the joint filler shall be completely removed.

All joints shall be tested with a straightedge before the concrete has set, and correction made if one side of the joint is higher than the other, or if they are higher or lower than the adjacent slabs.

501.03.19--Surface Test. It is the intent of these specifications that the finished surface will have good riding qualities.

The smoothness of the surface will be determined by using an Inertial Profiling System (IPS) that meets the requirements of Subsection 401.02.6.9 to measure and record roughness data in each designated location. Roughness data for each longitudinal profile will be reported as a mean roughness index (MRI). MRI is calculated by averaging the international roughness index (IRI) values from the two wheelpath profiles. The surface shall be tested and corrected to a smoothness index as described herein with the exception of those locations or specific projects that are excluded from smoothness testing with an IPS.

The smoothness of the surface will be determined for traffic lanes, auxiliary lanes, climbing lane and two-way turn lanes. Areas excluded from a smoothness test with the IPS are acceleration and deceleration lanes, tapered sections, transition sections for width, shoulders, crossovers, ramps, side street returns, etc. The roadway pavement on bridge replacement projects having 1,000 feet or less of pavement on each side of the structure will be excluded from a smoothness test. Pavement on horizontal curves having a radius of less than 1,000 feet at the centerline and pavement within the super elevation transition of such curves are excluded from smoothness testing. Smoothness testing shall terminate 15 feet from each transverse joint that separates the pavement from a bridge deck, bridge approach slab or existing pavement not constructed under the contract.

During initial paving operations, either when starting up or after a long shut down period, the pavement surface will be tested with profilograph as soon as the concrete has cured sufficiently to allow testing. Membrane curing damaged during the testing operation shall be repaired by the Contractor. The purpose of this testing is to aid the Contractor and the Engineer in evaluating the paving methods and equipment. Smoothness measurements must be performed at the posted speed limit or 50 miles per hour (± 5 miles per hour), whichever is lower. This speed requirement will be waived for all lightweight profilers. Measurements will be made in both wheel paths of exterior and interior lanes. The wheel paths shall be designated as being located three feet (3') and nine feet (9') from centerline or longitudinal joint, respectively. Beginning and ending latitude and longitude coordinates shall be required on each smoothness test. Testing will also be required on sections that have been surface corrected. No smoothness testing shall be performed when there is moisture of any kind on the pavement surface.

The surface will be accepted on a continuous basis for pavement smoothness. Continuous reporting is based upon all MRI values for a specified running interval. These values are averaged and presented at the midpoint of the specified running interval. The last 15 feet of a day's work may not be obtainable until the work is continued and for this reason may be included in the subsequent section.

Smoothness tolerances shall be applied to concrete pavements based on the following pavement categories:

Category A applies to the following pavement constructions.

- New construction projects

Category B applies to the following pavement constructions.

- Rehabilitation projects

For all projects, the surface smoothness data shall be reported by two MRI methods.

1. A continuous 528-foot long interval MRI report
2. A continuous 25-foot short interval MRI report

Category A projects shall have a long interval surface MRI of not more than 60 inches per mile. Areas of the surface with localized roughness greater than 130 inches per mile as determined by the continuous short interval report will be identified for correction by the Project Engineer.

Category B projects shall have a long interval surface MRI of not more than 70 inches per mile. Areas of the surface with localized roughness greater than 140 inches per mile as determined by the continuous short interval report will be identified for correction by the Project Engineer.

Areas of localized roughness exceeding the continuous 25-foot interval thresholds shall be corrected regardless of the 528-foot interval MRI value of the section. Surface correction by grinding shall be performed in accordance with Subsection 401.02.6.7. The Contractor shall also make other necessary surface corrections to ensure that the final mean roughness index of the section meets the above requirements.

Corrections shall be made using an approved profiling device or by removing and replacing the pavement as directed by the Engineer. Corrective work shall be performed at no additional cost to the State.

Each area or section of pavement removed shall be at least 10 feet in length and at least the full width of the lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints that is less than 10 feet in length shall also be removed and replaced. The new surface shall be textured as specified in the contract.

Where surface corrections are made, the Contractor shall reestablish the surface texture to a uniform texture equal in roughness to the surrounding uncorrected pavement. This work shall be at no additional cost to the State.

Corrective work shall be completed prior to determining pavement thickness.

501.03.20--Curing and Protection. Immediately after the finishing operations have been completed and as soon as marring of the concrete will not occur, the entire surface of the newly placed concrete shall be covered and cured in accordance with one of the following methods. On hot or windy days, and when directed by the Engineer, the surface of the fresh concrete shall be kept damp by fogging with water until the normal curing operation

When the thickness of an area of pavement is deficient by more than 1.0 inch and, in the judgment of the Engineer, the deficient area should be removed, the area shall be removed and replaced at no additional costs the State with pavement of the specified thicknesses. If, in the judgment of the Engineer, the deficiency does not warrant removal, the deficient area may be left in place with no payment to the Contractor, or may be removed and replaced at no additional cost to the Department, at the Contractor's option.

501.05.3--Price Adjustments for Smoothness. For all concrete projects, when the MRI for the final surface is less than or equal to forty-five inches per mile (45.0 inches / mile) on the long interval report, a unit price increase will be added. The adjusted unit price will be computed using the contract unit price of the concrete pavement. This adjusted unit price will apply to the total area for the lane width represented by given segment. Projects will be considered for incentive pay based on the following guidelines for the long interval surface lift MRI.

Mean Roughness Index (inches / mile)	Contract Price Adjustment (Per Square Yard of PCC Pavement)
less than 30.0	plus 0.64 percent
30.0 to 35.0	plus 0.48 percent
35.1 to 40.0	plus 0.32 percent
40.1 to 45.0	plus 0.16 percent
45.1 to 50.0	100 percent
Over 50.0	100 percent (With Correction to Required MRI)

In addition to the above pay incentive factors, a project may be subject to a disincentive when the MRI for the final surface exceeds the allowable tolerance. This applies to all project categories and will correlate to the maximum allowed long interval MRI.

Mean Roughness Index (inches / mile)	Adjustment Price (Per Square Yard of PCC Pavement)
Above 20.1 Over	REMOVE AND REPLACE
15.1 to 20.0 Over	minus 3.2 percent
10.1 to 15.0 Over	minus 2.4 percent
5.1 to 10.0 Over	minus 1.6 percent
0.1 to 5.0 Over	minus 0.8 percent
Required Surface MRI	100 percent

Note: All incentives and disincentives will be based on a single smoothness test, following all required localized roughness (short interval) corrective action, of the newly paved surface.

Corrective action must be taken on those sections that exceed the 'Remove and Replace' threshold on the Long Continuous Interval as directed by the Project Engineer. Additional smoothness testing shall be required on sections following replacement and will be required to meet *at least* the maximum surface MRI short of 'Remove and Replace' tolerance.

For concrete pavement other than main-line pavement, the surface will be tested using a

10-foot straightedge at locations selected by the Engineer. The variation of the surface from the testing edge of the straightedge between any two contacts, longitudinal or transverse with the surface, shall not exceed 1/4 inch. Irregularities exceeding the specified tolerances shall be corrected, at no additional cost to the State, by the Contractor with an approved profiling device or by other means as directed by the Engineer. Following correction, the area will be retested to verify compliance with the specified tolerances.

SECTION 502 - CONCRETE BRIDGE END PAVEMENT

502.01--Description. This work consists of bridge end pavement of concrete with reinforcement as shown on the plans, constructed in one course on a prepared base in accordance with these specifications, and in reasonably close conformity with the lines, grades, thickness, and cross section shown on the plans or as directed.

502.02--Materials. On bituminous paving contracts, concrete for this work may be Class "B" Structural Concrete meeting the applicable requirements of Subsection 804.02. Sampling and testing of concrete for acceptance and control purposes shall be in accordance with Subsection 804.02.3.

Reinforcing steel shall meet the requirements of Subsection 711.02.

502.03--Construction Requirements.

502.03.1--General. The requirements specified for concrete pavement in Section 501, shall apply in all respects to bridge end pavement except where otherwise indicated in the specific requirements below, or on the plans.

When the plans specify a certain thickness of asphalt under the bridge end pavement, the Contractor may substitute Class "B" Structural Concrete base in lieu of the asphalt. The concrete base shall be constructed in one course on a prepared base in accordance with these specifications, and in reasonably close conformity with the lines, grades, thickness, and typical cross-sections as shown on the plans or as directed. The concrete base will be allowed to cure 24 hours prior to placement of the bridge end pavement. A one-inch premolded expansion joint will be required along the face of the paving bracket. See Section 403 for measurement and payment of substituted concrete base material.

502.03.2--Specific Requirements.

502.03.2.1--Final Screeding and Finishing. The final screeding shall be performed by hand methods. The concrete shall be screeded longitudinally using the bridge floor for a gauge on one end, and a temporary bulkhead cut and securely installed true to crown and grade on the other end. In the event the concrete pavement, adjacent to the bridge end pavement, has been previously poured, the end of the pavement shall be used as a gauge in lieu of the temporary bulkhead. The final finish of the bridge end pavement shall be that designated on the plans. If a finish is not designed, the finish shall be transverse tined finish.

502.03.2.2--Joints. Concrete bridge end pavement shall be constructed monolithically, unless construction joints are specifically indicated on the plans.