Section 2428. Smoothness of Bridge Decks and Bridge Deck Overlays

2428.01 DESCRIPTION.

Test and evaluate smoothness of bridge decks and bridge deck overlays. Perform surface correction if required.

2428.02 TESTING AND EVALUATION.

A. General.

1. Except when specifically excluded in the contract documents, evaluate smoothness for all:
- **a.** Interstate and Primary bridge decks, new approaches and bridge deck overlays, and overlaid approaches.
- **b.** Non-Primary bridge decks, new approaches and bridge deck overlays, and overlaid approaches for projects where the Department is the Contracting Authority.

2. If this specification is required by contract documents on non-Primary projects let by the Department, it will be added in its entirety. Selected portions of the specification will not be deleted.

B. Measurement.

Provide and operate an Ames type or California type profilograph to produce a profilogram (profile trace) of the surface tested according to Materials I.M. 341. Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.

C. Profilograph Testing.

1. Remove all objects and foreign material from the deck surface, including protective covers, if used, prior to testing by the Engineer. If appropriate, properly replace protective covers after testing.

2. A profilogram will be made by a test in each wheel path of each traffic lane. The profilogram will include a minimum of 16 feet (5 m) beyond the bridge section when there is adjoining pavement. Bridge decks and bridge deck overlays will be treated as one section. The profilogram will include a minimum of 100 feet (30 m) beyond the approach section when there is adjoining pavement.

3. For bridge lengths of 778 feet (240 m) or less, each traffic lane is a segment. For bridges longer than 778 feet (240 m), a segment shall be 0.1 miles (160 m) of the traffic lane. If the remaining segment is 250 feet (80 m) or less in length, it is included in the adjacent bridge segment. If the remaining segment is more than 250 feet (80 m) in length, it is evaluated on its own. When bridge deck overlay expansion joints are not new or replaced, segments begin and end at the expansion joints.

4. Each bridge approach lane is a separate segment.

5. Perform quality control testing and furnish the profilogram results to the Engineer. Ensure:
- Testing and evaluation are done by a trained and certified person, and
- The evaluation is certified according to Materials I.M. 341.

D. Profile Index.

1. Calculate an average profile index for each segment from the two wheel path profilograms, according to Materials I.M. 341, except for:
- **a.** Bridge decks or bridge deck overlays less than 100 feet (30 m) in length.
- **b.** New bridge approach sections or bridge approach overlays less than 100 feet (30 m) in length.
- **c.** Bridge decks for new concrete slab bridges.
- **d.** The 16 feet (5 m) at the ends of the section.
- **e.** The 16 feet (5 m) on each side of the expansion joints that are not new or replaced.

2. Limits for average profile index per 0.1 mile (160 m) are as follows:

New Bridge Deck	less than 22.1 inches/mile (351 mm/km)
Bridge Deck Overlay	less than 15.1 inches/mile (241 mm/km)
Bridge Approach (New or Overlaid)	less than 22.1 inches/mile (351 mm/km)

3. The Engineer will perform verification testing to validate the Contractor's certified quality control testing. If the Engineer's verification test results validate the Contractor's test results, The Contractor's results will be used for acceptance. Disputes between the Contractor's and the Engineer's test results will be resolved according to Materials I.M. 341. The Engineer may test the entire project length if it is determined the Contractor's certified test results are inaccurate. The Contractor will be charged for this work at a rate of $500 per bridge deck. In addition, providing inaccurate test results may result in decertification.

4. On deck placements less than 100 feet (30 m), test and evaluate each lane of placements. Provide the Engineer with the final trace and index and the final evaluation within 14 calendar days of deck completion.

5. On deck placements of 100 feet (30 m) or more, provide the Engineer with the initial profile trace and index for each lane by noon of the fifth working day following each of the first row placements. On subsequent placements, provide the Engineer with the trace and index following every third placement until the deck is completed. On single-pour bridges, provide the Engineer with the final profile trace and index and the final evaluation within 2 weeks of deck completion.

2428.03 SURFACE CORRECTION.

A. Perform surface correction for the full segment width of the paved surface.

B. Obtain the Engineer's approval for all correction work. After all required correction work is completed, determine the final profile index.

C. Accomplish surface correction by grinding or by other methods the Engineer approves. Perform the work as identified in Section 2532. Use a cutting head that is a minimum of 24 inches (600 mm) wide.

D. Perform surface correction parallel to lane lines or edge lines as directed by the Engineer. Make each pass parallel to the previous passes. Grind the surface to a uniform texture.

E. Do not overlap adjacent passes more than 1 inch (25 mm) or have a vertical difference of more than 1/8 inch (3 mm) as measured from bottom of groove to bottom of groove.

F. Begin and end smoothness correction at lines normal to the lane lines or edge lines within any one corrected area. Proceed from the center line or lane line toward the edge to maintain cross slope.

G. Maintain cross slope throughout the corrected area.

H. Perform corrective grinding prior to longitudinal grooving.

2428.04 BUMPS AND DIPS.

Bumps and dips, including those at headers, on all surfaces for which smoothness is designated will be evaluated. Correction work will be required according to the criteria in Paragraphs B and C below. For areas excluded from profilograph testing, correct deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).

A. Bumps.

1. Correct all bumps exceeding 0.5 inch (12.7 mm) within a 25 foot (7.6 m) span, as indicated on the profilogram, except as stated in Article 2428.04, F.

2. Corrected bumps will be considered satisfactory when profilograph measurement shows that the bumps were 0.3 inch (7.6 mm) or less in a 25 foot (7.6 m) span.

B. Dips.

1. Correct all dips exceeding 0.5 inch (12.7 mm) in a 25 foot (7.6 m) span, as indicated on the profilogram, only when the Engineer requires, except as stated in Article 2428.04, F. The Contractor will be assessed a price adjustment of $900 for each dip exceeding 0.5 inch (12.7 mm) that is not corrected, except as stated in Article 2428.04, C.

2. A dip in both wheel paths at a lane location will be considered a single dip when assessing a price adjustment.

3. Corrected dips will be considered satisfactory when the profilogram shows the dips are less than 0.3 inch (7.6 mm) in a 25 foot (7.6 m) span.

C. Exceptions.
When the Contractor is not responsible for the adjoining surface, the Engineer will evaluate bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section. The Contractor will not receive a price adjustment for bumps and dips in this area. When the Engineer instructs, the Contractor will be paid to repair these bumps and dips according to Article 1109.03, B.

2428.05 SCHEDULE OF PAYMENT.

The cost of certified profilograph testing and associated traffic control is incidental to the contract unit price for the item for which the testing is required.

A. Incentives.

1. New bridge decks or bridge deck overlays which are designated for smoothness will be evaluated for incentives using the initial profile index and the number of segments on the bridge.

2. For each segment of a bridge to be qualified for an incentive payment, the profilogram for that segment before correction must meet the specification requirement so there is no price reduction.

3. For each segment of the bridge deck or bridge deck overlay, the incentive index is 12.0 inches per mile (190 mm/km) for new bridge decks, and 4.0 inches per mile (65 mm/km) for bridge deck overlays. The incentive payment will be according to Table 2428.05-1:

Table 2428.05-1: Incentives

New Bridge Decks		Bridge Deck Overlays	
Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment	Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment
0 - 6.0 (0 - 95)	6000	0 - 2.0 (0 - 32)	2000
6.1 - 12.0 (96 - 190)	3000	2.1 - 4.0 (33 - 65)	1000
12.1 - 22.0 (191 - 350)	Unit Price	4.1 - 15.0 (66 - 240)	Unit Price

B. Price Reduction.

1. New bridge decks or bridge overlays which are designated for smoothness will be evaluated for price reduction assessment using the final profile index and the number of segments.

2. The Contractor may grind the surface of the bridge deck to a final index of 22.0 inches per mile (350 mm/km) or less, or the surface of a bridge deck overlay to a final index of 15.0 inches per mile (240 mm/km) in lieu of a price reduction.

3. Each segment of bridge deck with a final index of 22.1 inches per mile (351 mm/km) or greater or bridge deck overlay with a final index of 15.1 inches per mile (241 mm/km) or greater will be assessed a price reduction according to Table 2428.05-2:

Table 2428.05-2: Price Reduction

New Bridge Decks		Bridge Deck Overlays	
Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment	Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment
22.1 - 30.0 (351 - 470)	2000	15.1 - 20.0 (241 - 315)	1000
30.1 - 35.0 (471 - 550)	4000	20.1 - 25.0 (316 - 390)	2000
35.1 - 40.0 (551-630)	6000	25.1 - 30.0 (391 - 470)	3000
over 40.0 (over 630)	[(a)]	over 30.0 (over 470)	[(a)]

[(a)] Correction is required to an index of 15.0 inches per mile (240 mm/km) for overlays and to an index of 22.0 inches per mile (350 mm/km) for new decks.

C. Bridge Approach Sections and Overlay of Bridge Approach Sections.
Correct bridge approach sections and overlays of bridge approach sections for smoothness as specified in Article 2428.03 in lieu of a price reduction.