

Iowa

State DOT Representative Report Questions
National Concrete Consortium
San Antonio, Texas
April 2, 2009

Theme: Ride Quality for Bridges

Please provide your state DOT's perspective regarding the following theme questions.

1. What features of a bridge deck and approach do you consider to have the most impact on ride quality? [EF Joint & approaches](#)
2. How does your state measure ride quality for bridge decks?
 - a. IRI?
 - b. Straight edge?
 - c. Other? [25 ft profilograph each wheel path](#)
 - d. Specifications? [Article 2428 \(attached\)](#)
3. What smoothness thresholds does your DOT require for bridge decks?
[½ bumps corrected. 22 inches per mile.](#)
4. How are transitions near localized features (drainage basins, joints) treated in efforts to ensure acceptable ride quality?
5. What corrective actions are required for substandard bridge deck/approach ride quality? [Diamond grinding](#)
6. Does your state initiate a penalty/incentive structure for bridge ride quality? [Yes](#)
7. Does your state consider ride quality as a scoping item for bridge rehabilitation?
8. Does your state require sequencing (casting positive moment regions prior to negative moment regions) of deck pours during placement of bridge deck concrete for continuously designed decks? [Required in plans, but contractor can propose full width placement.](#)
9. What method and type of texture does your state apply to your bridge deck surface? [Diamond grooving](#)
10. How does your state handle transitions/approaches from pavement on to the bridge deck (approach length, profile, joints)? [See 2428.03 attached](#)
11. Does your state maintain a database for bridge ride quality? [NO](#)
12. How does your state report its network ride quality for pavements and bridges to the Highway Performance Monitoring System (HPMS) database (network report excludes or includes bridges with pavements)? [Bridges are excluded](#)

Section 2428. Smoothness of Bridge Decks and Bridge Deck Overlays.

2428.01 GENERAL.

Smoothness shall be evaluated for all Interstate and Primary bridge decks, new approaches and bridge deck overlays, and overlaid approaches except when specifically excluded by the contract documents. Smoothness shall also be evaluated for all non-Primary bridge decks, new approaches and bridge deck overlays, and overlaid approaches for projects where the Department is the Contracting Authority, except when specifically excluded in the contract documents.

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.

2428.02 EQUIPMENT.

The Contractor shall provide and operate an Ames type or California type profilograph to produce a profilogram (profile trace) of the surface tested in accordance with [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.

2428.03 PROFILOGRAPH TESTING.

The Contractor shall 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.

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.

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

Each bridge approach lane shall be a separate segment.

The Contractor shall perform quality control testing and furnish the profilogram results to the Engineer. The testing and evaluation shall be done by a trained and certified person, and the evaluation shall be certified in accordance with [Materials I.M. 341](#).

2428.04 PROFILE INDEX.

An average profile index shall be calculated for each segment from the two wheel path profilograms in accordance with [Materials I.M. 341](#) except for:

1. Bridge decks or bridge deck overlays less than 100 feet (30 m) in length.
2. New bridge approach sections or bridge approach overlays less than 100 feet (30 m) in length.
3. Bridge decks for new concrete slab bridges.
4. The 16 feet (5 m) at the ends of the section.
5. The 16 feet (5 m) on each side of the expansion joints that are not new or replaced.

Limits for average profile index per 0.1 mile (160 m) segment shall be 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)

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 Engineer's test results will be resolved in accordance with [Materials I.M. 341](#). The Engineer may test the entire project length if it is determined that the Contractor's certified test results are inaccurate, and 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.

If the placements are less than 100 feet (30 m), each lane shall be tested and evaluated. The Contractor shall provide the Engineer with the final trace and index and the final evaluation within 14 calendar days of the completion of the deck.

On deck placements of 100 feet (30 m) and greater, the Contractor shall 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 two placements. On subsequent placements, the Contractor shall provide the Engineer with the trace and index following every third placement until completion of the deck. On single-pour bridges, the Contractor shall

provide the Engineer with the final profile trace and index and the final evaluation within 2 weeks of the completion of the deck.

2428.05 SURFACE CORRECTION.

Surface correction work shall be for the full segment width of the paved surface.

All correction work shall be subject to the approval by the Engineer. After all required correction work is completed, the final profile index shall be determined.

Surface correction shall be accomplished by grinding or by other methods approved by the Engineer. This work shall be as identified in [Section 2532](#), Pavement Surface Repair (Diamond Grinding), except the cutting head shall have a minimum width of 24 inches (600 mm). Surface correction shall be performed parallel to lane lines or edge lines as directed by the Engineer and each pass shall be parallel to the previous passes. The ground surface shall be of uniform texture.

Adjacent passes shall not overlap more than 1 inch (25 mm) and they shall not have a vertical difference of more than 1/8 inch (3 mm) as measured from bottom of groove to bottom of groove. Smoothness correction shall begin and end at lines normal to the lane lines or edge lines within any one corrected area. The grinding shall proceed from the center line or lane line toward the edge to maintain cross slope.

Cross slope must be maintained throughout the corrected area.

Corrective grinding shall be done before longitudinal grooving.

2428.06 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 in accordance with the following criteria. Areas excluded from profilograph testing shall be corrected for deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).

A. Bumps.

All bumps exceeding 0.5 inch (12.7 mm) within a 25 foot (7.6 m) span, as indicated on the profilogram, shall be corrected except as stated in [Article 2428.06, C](#).

Corrected bumps will be considered satisfactory when measurement by the profilograph shows that the bumps were 0.3 inch (8 mm) or less in a 25 foot (7.6 m) span.

B. Dips.

All dips exceeding 0.5 inch (12.7 mm) in a 25 foot (7.6 m) span, as indicated on the profilogram, shall be corrected only when required by the Engineer except as stated in [Article 2428.06, C](#). 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 2428.06, C](#). A dip in both wheel paths at a lane location will be considered a single dip when assessing a price adjustment. Corrected dips will be considered satisfactory when the profilogram shows the dips are less than 0.3 inch (8 mm) in a 25 foot (7.6 m) span.

C. Exceptions.

When the Contractor is not responsible for the adjoining surface, bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section will be evaluated by the Engineer. The Contractor will not receive a price adjustment for bumps and dips in this area. When instructed by the Engineer, the contractor will be paid to repair these bumps and dips in accordance with [Article 1109.03, B](#).

2428.07 SCHEDULE OF PAYMENT.

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

A. Incentives

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

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.

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 in accordance with the following schedule:

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

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

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.

For 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, the Contractor shall accept a price reduction in accordance with the following schedule:

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)	*	over 30.0 (over 470)	*
* Correction shall be 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.

Bridge approach sections and overlay of bridge approach sections shall be corrected for smoothness as specified in [Article 2428.05](#) in lieu of a price reduction.