Ohio

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. Each NCC state DOT representative will be asked to present their responses to the group during the State Report forum on Thursday morning April 2, 2009.

1. What features of a bridge deck and approach do you consider to have the most impact on ride quality?

The Approach Slab / Pavement transition; Approach Slab / Bridge Deck transitions can result in problems due to settling from poor compaction, erosion, etc. There are also problems at closure pours for phased construction.

2. How does your state measure ride quality for bridge decks?
   a. IRI?
   b. Straight edge?
   c. Other?
   d. Specifications?

Our standard method to control ride quality has been with a 10' straight edge. We recently came up with an IRI trial specification. It's currently a plan note that has been used on 2 projects.

3. What smoothness thresholds does your DOT require for bridge decks?

For the straight edge, we require 1/8" in 10'. For the trial IRI specification, we pay an incentive for values less than 150 inches per mile and require corrective action on values over 150 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 or overlay is usually part of the corrective action.

6. Does your state initiate a penalty/incentive structure for bridge ride quality?

The trial specification provides up to a 20% (of the bid price of the in-place concrete) incentive for the trial specification for results of 80 in/mi or better. This value was used as an incentive for contractors to bid on the jobs, the incentive will most likely not remain that high. There is no disincentive, only corrective action required if results are over 150 in/mi.

7. Does your state consider ride quality as a scoping item for bridge rehabilitation?

Not currently, but may in the future

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?

Not typically, but may on special structures. We do require that they use set retarders in the pier cap if placed simultaneously with the deck.

9. What method and type of texture does your state apply to your bridge deck surface?

Broom drag finish behind the finishing machine, followed by saw cut transverse grooves into the surface with diamond blades after the 7 day water cure.

10. How does your state handle transitions/approaches from pavement on to the bridge deck (approach length, profile, joints)?

Approach slabs are from 15 to 30 feet long based on the amount of excavation behind the abutment. Some times, especially with MSE walls, the approach slab length does not entirely bridge the excavation though. Pressure relief joints with an asphalt strip and sleeper slab are used at the end of the approach slabs when PCC pavement is used. Currently, the Office of Structural Engineering is looking at other types of joints because of the deterioration of the concrete at the asphalt interface.

11. Does your state maintain a database for bridge ride quality?

The Bridge inspections do not include a IRI smoothness rating, but do have a subjective visual appraisal of the ride on the bridge.

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)?

The Interstate, US and State routes are regularly checked using the IRI system with ProVal software. Divided highways are checked every year and undivided highways every other year. Bridges are included.

SURFACE SMOOTHNESS FOR BRIDGES AND BRIDGE APPROACHES

DESCRIPTION: This specification supersedes the requirements of 451.12 and provides the surface smoothness requirements for bridges and bridge approaches.

EQUIPMENT: Equipment for corrective diamond grinding shall meet the requirements of 257.02.

SMOOTHNESS MEASUREMENT: The Department will perform the surface smoothness measurement using the Department's ASTM E 950 Class I inertial non-contact road profiler. Prior to the bridge and adjacent pavement being opened to traffic, contact the Office of Pavement Engineering to schedule smoothness measurement. Allow for sufficient time to perform corrective work that may be required after smoothness measurement. The Department will measure highway surface smoothness in both wheel paths for each marked traffic lane. Wheel paths are located parallel to the centerline of the highway and approximately 3.0 feet (1.0 m) inside all lane edges, measured transversely. The Department will measure the entire length of the bridge encounter which, starts 25 foot (7.6 m) before the beginning of the entry approach slab and stops 25 foot (7.6 m) beyond the end of the exit approach slab and includes approach pavement, entry approach slab, bridge deck, exit approach slab, and exit pavement. The Department will make three measurements per wheel path per lane and average the results for each marked lane.

Prior to smoothness measurement, ensure the pavement has cured for the time specified in 511.17. Notify the Engineer each day prior to performing any measurements. Remove all dirt and debris from the surface to be measured prior to the surface smoothness measurements.

The Department will calculate the International Roughness Index (IRI) according to ASTM E 1926(98) for each marked traffic lane along the measured length of the bridge encounter. The IRI for each marked lane is the average of the IRI for the two wheel paths of the three repeat measurements rounded down to the nearest inch. The Department will provide copies of the results to the Engineer including electronic copies of all longitudinal pavement profiles in ERD format (University of Michigan Transportation Research Institute's Engineering Research Division [ERD] format).

Provide necessary traffic control and survey stationing for all surface smoothness measurements.

MANDATORY CORRECTIVE WORK: Perform corrective work when the IRI exceeds 150 inches per mile (2.37 m/km) for a marked traffic lane along the measured length of the bridge encounter. Submit a corrective work plan to the Engineer for approval prior to performing corrective work. This plan may include AC overlay, PCC

overlay, diamond grinding or combination thereof. Do not perform corrective work before receiving the Engineer's approval.

After performing corrective work, the Department will re-measure each marked traffic lane where corrective work was performed to ensure the IRI is 150 inches per mile (2.37 m/km) or less. Perform additional corrective work until the IRI is 150 inches per mile (2.37 m/km) or less.

BASIS OF PAYMENT: The Department will pay for surface smoothness for each marked traffic lane along the length of the bridge encounter on an incentive basis according to the pay schedule included in the Appendix.

The Department will pay for approach pavement, approach slabs and bridge deck concrete under separate items.

The Department will pay an incentive based only on the measured IRI prior to any mandatory corrective work. The Department will not pay an incentive for a marked traffic lane with an IRI of 150 inches per mile (2.37 m/km) or greater.

Upon approval of a corrective work plan, the Contractor may perform diamond grinding on any traffic lane to collect and/or increase an incentive.

Appendix

Pay Schedule					
IRI		Payment	IRI		Payment
inches/mi	m/km		inches/mi	m/km	
80 or less	1.26 or less	X	116	1.83	0.486X
81	1.28	0.986X	117	1.85	0.471X
82	1.29	0.971X	118	1.86	0.457X
83	1.31	0.957X	119	1.88	0.443X
84	1.33	0.943X	120	1.89	0.429X
85	1.34	0.929X	121	1.91	0.414X
86	1.36	0.914X	122	1.93	0.400X
87	1.37	0.900X	123	1.94	0.386X
88	1.39	0.886X	124	1.96	0.371X
89	1.40	0.871X	125	1.97	0.357X
90	1.42	0.857X	126	1.99	0.343X
91	1.44	0.843X	127	2.00	0.329X
92	1.45	0.829X	128	2.02	0.314X
93	1.47	0.814X	129	2.04	0.300X
94	1.48	0.800X	130	2.05	0.286X
95	1.50	0.786X	131	2.07	0.271X
96	1.52	0.771X	132	2.08	0.257X
97	1.53	0.757X	133	2.10	0.243X
98	1.55	0.743X	134	2.11	0.229X
99	1.56	0.729X	135	2.13	0.214X
100	1.58	0.714X	136	2.15	0.200X
101	1.59	0.700X	137	2.16	0.186X
102	1.61	0.686X	138	2.18	0.171X
103	1.63	0.671X	139	2.19	0.157X
104	1.64	0.657X	140	2.21	0.143X
105	1.66	0.643X	141	2.23	0.129X
106	1.67	0.629X	142	2.24	0.114X
107	1.69	0.614X	143	2.26	0.100X
108	1.70	0.600X	144	2.27	0.086X
109	1.72	0.586X	145	2.29	0.071X
110	1.74	0.571X	146	2.30	0.057X
111	1.75	0.557X	147	2.32	0.043X
112	1.77	0.543X	148	2.34	0.029X
113	1.78	0.529X	149	2.35	0.014X
114	1.80	0.514X	150	2.37	0.000X
115	1.82	0.500X	over 150	over 2.37	Mandatory correction

$$X = \frac{0.20 \times \text{Unit Bid Price} \times \text{Accepted Quantity for Bridge Deck Concrete}}{\text{(Number of Marked Traveled Lanes)}}$$