Ohio DOT
Bridge Rideability Investigations & Spec Development

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Overview

- Impacts of Poor Ride at Bridges
- How Bridges affect Network Rideability
- Causes of Poor Ride at Bridges
- Steps ODOT is taking to improve ride across Bridges
  - Other Policy/Design/Construction Issues
- Questions
How does Ohio compare to other states?

- 35th in geographical size
- 4th largest interstate mileage
- 2nd highest bridge inventory
- 4th largest freight volume
- 4th in truck VMT
- 5th in total VMT
Impacts of Poor Bridge Ride

**User Costs**
- ↓ User Satisfaction
- ↑ Vehicle Wear/Damage
- ↑ Cargo Damage
- ↑ Freight Costs
- ↓ Safety
  - ↓ handling/grip

**Agency Costs**
- ↓ Pavement Life
- ↓ Bridge Life
- ↑ Maintenance Costs
  -↑ Snow/Ice Removal
  -↓ efficiency
  -↑ costs
Where do we start?

Understanding the problem

Support

Communicating
Old Dilemma: Bridge Ride

- We experience poor ride over most of our bridge encounters
- Bridges 2 ½ X rougher than pavements by IRI
- Bridges increase system IRI by 7.5%
  - Bridges are less than 4% of system by length
- Smoothness specs on decks & pavement
- No smoothness specs on transition
Desired State after Construction

CONTINUITY

Lack of Height Deviations through bridge encounter

Pavement  Approach Slab  Bridge Deck  Approach Slab  Pavement
Causes of Poor Ride Across Bridges

Decks are higher/lower than pavement

lack of continuity

Pavement  Approach Slab  Bridge Deck  Approach Slab  Pavement
Causes of Poor Ride Across Bridges

Residual Camber in structure

lack of continuity

Pavement  Approach Slab  Bridge Deck  Approach Slab  Pavement
Causes of Poor Ride Across Bridges

- Approach slab settlement
- Deep fill settlement
- lack of continuity
Leading Causes of Poor Ride Across Bridges

Discontinuity
- Decks higher/lower than surrounding pavement
- Settlement
  - Approach Slabs
  - Deep Fills
- Residual Camber in Spans
Where do we start?

SUPPORT (it’s the right thing to do!)

- Internal
  - Public expects/accepts rough ride at bridges?
  - Big concern w/ bridges is safety/carrying the load not rideability
  - Responsibility/Ownership: structures, construction, pavements, districts, etc?
  - Everybody’s plate is already full
Where do we start?

SUPPORT (it’s the right thing to do!)

- External
  - Construction Industry: AC, PCC, Bridge construction industry
  - Understanding down to the construction crew level
  - Responsibility/Ownership: primes vs. subs; pavement vs. bridge
  - Pride in final product
Where do we start?

Communication

- Winter Construction conferences
- Industry meetings
- Smooth Paving Workshop (March 2006)
“Rideability”

Seeing the surface of a highway the way motor vehicles do. 

*that means:*

Collecting and interpreting road profiles.
International Roughness Index (IRI)
Using profiles to simulate vehicle response (What the public “feels”)
10 ft Rolling Straightedge
Current Situation/Specs

- Smoothness specs *(where’s rideability?*)
  1. 10’ Rolling Straightedge – bridge decks
  2. CA Profilograph - pavement
  3. No specification at transitions

- Need to consider Ride Quality in design, *construction*, maintenance processes

- DOT
Exp Spec for New Projects or Major Rehabs (pave & bridge)

Can we build them smooth to begin with?

- Pilot Bridge Ride Specification
  - ODOT Structures
  - ODOT Construction
  - ODOT Pavement Engineering
  - Industry

- (25’ pavement, approach slab, deck, approach slab, 25’ pavement) = ??? IRI
Exp Spec for New Projects or Major Rehabs (pave & bridge)

- Each lane of encounter must have an IRI below 150 in/mile (*proper threshold?*)
  (25’ pavement, approach slab, deck, approach slab, 25’ pavement) IRI <= 150”/mi

- **Achievable** – communication
  - IRI from recent bridge projects
  - pre construction meetings

- **Incentive** – max of 20% with IRI <= 80”/mi paid on price concrete in deck
  (*carrot the right size?*)
Considerations

- Length of bridge, (decks & approaches)
- What if bridge encounter isn’t below 150 inches/mile?
- Incentive increments
Bridge spec link
Bridge Rideability

It's not hopeless!
"Ability to safely carry loads and good rideability are NOT mutually exclusive goals for our structures!"
Policy/Design/Construction ideas

- Future Maintenance
- Maximum allowable skew angles
- Closure pours
- Approach Slab Design
  - Integral/Semi-integral approach slabs
  - Lowering approach slabs 3-4”
  - Trapezoidal – perpendicular to pavement
- Reconsider Taboos
  1. AC overlays
  2. Diamond grinding decks
Future Considerations

- Evaluate initial pilot projects
  - Baselength/continuous reporting methodology?

- Additional specs
  1. Just replacing decks/approach slabs
  2. Just resurfacing but not touching bridges
     - Problem with multiple overlays

- Can IRI specs improve bridge rideability? If so, do we gain anything else?
RQ gun

unBEARable bridge roughness

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Any questions?
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THANK YOU