COMMENTARY ON THE NCHRP PROBLEM STATEMENT ON DISC BEARINGS

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For Presentation to the AASHTO Technical Committee for Bearings and Expansion Devices (T2)
Disc Bearing Resume

• Thousands of disc bearings have been installed on structures all over the world dating back to the early 1970’s
Disc Bearing Resume

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- Disc bearings have an outstanding performance history with very few field problems
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• Disc bearings have an outstanding performance history with very few field problems
• R.J. Watson manufactures more disc bearings than any company in the world
Multidirectional
Unidirectional
A Sculptural Bridge: Arches • Water • Reflections
Curved Pier Shape – Option A

A functional sculptural bridge reflecting a series of modern arch forms softly set in the context of the site to maximize openness, light and green space while focusing on the river. River span sweeps 504’ in a parabolic curve of graceful proportions. The pier shape of Concept A creates reflection of curved forms with continuous movement into the bridge superstructure. Strength and elegance combine for a 70’ tall pier.
Issues Raised in NCHRP
Problem Statement

• Design of polyurethane disc
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• Design of shear resisting mechanism (SRM)
Issues Raised in NCHRP

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• Design of polyurethane disc
• Design of shear resisting mechanism (SRM)
• Material tests on polyurethane
Design of Polyurethane Disc

• Adequately covered in AASHTO
Design of Polyurethane Disc

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- Section 14.7.8.2 covers materials
Design of Polyurethane Disc

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- Section 14.7.8.3 covers disc design
Design of Polyurethane Disc

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- Section 14.7.8.2 covers materials
- Section 14.7.8.3 covers disc design
- Section 14.7.8.1 covers limiting ring (if required)
Limiting Ring

• Earlier disc bearing designs used softer polyurethane compound
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• Limiting ring controlled spreading and limited deflection
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- Limiting ring controlled spreading and limited deflection
- Harder compound (62D) eliminates need for limiting ring
- 15 years with no reported field problems
Design of SRM

• Covered in AASHTO Steel Design Section 6
Design of SRM

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• Function of bending, shear and bearing calculations
Design of SRM

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• Function of bending, shear and bearing calculations
• Since SRM is designed for the total horizontal force the shear resistance of the polyurethane is not relevant
Material Tests on Polyurethane

- Basic requirements in AASHTO Construction Specifications Section 18.3.2.8 & 18.3.4.3
Material Tests on Polyurethane

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• Performance is verified by AASHTO testing requirements
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• Performance is verified by AASHTO testing requirements
• Onus is on manufacturer to come up with proper compound
Creep of Polyurethane

• Testing and field evaluations have demonstrated this to be negligible
Design of Polyurethane Disc

• Important to keep in mind that it is incumbent upon the manufacture to develop proper compound stoichiometry
Design of Polyurethane Disc

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• Characteristics such as creep resistance, environmental durability and stiffness all have to be factored into the compound design
Design of Polyurethane Disc

- There are many compounds that will give desired results in accordance with AASHTO
Design of Polyurethane Disc

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- Past experience, testing and quality control measures are required to fine tune design
Conclusions

• Cookbook specification would relieve the liability of the supplier and shift that to the State DOT or Owner
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• It would also result in unqualified suppliers entering into the market resulting in field problems
Conclusions

• Disc bearings have an outstanding field performance history on bridges all over the world
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• Why not spend limited NCHRP dollars on testing bearings with a history of field problems
Conclusions

• If it is determined that a study is warranted it should be focused on expanding the capabilities of the disc bearing