BRIDGE SESSIONS

Innovative Bridge Applications
AND
Physical Testing for Bridge Load Rating

ICEA Midyear Meeting
July 10, 2003
Session Speakers

- Justin Doornink, Ph.D. Student
- Travis Konda, Ph.D. Student
- Van Robbins, M.S. Student
- J. S. Ingersoll, WHKS & Co.
- Terry Wipf, ISU
- F. Wayne Klaiber, ISU
- Brent Phares, CTRE
- Scott Neubauer, Iowa DOT
Field and Laboratory Evaluation of Precast Concrete Bridges

J.S. Ingersoll
WHKS & Co.

F.W. Klaiber and T.J. Wipf
Bridge Engineering Center
Iowa State University

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Panel Details

- Grouted Keyway
- Transverse Deck Reinforcement
- Longitudinal Deck Reinforcement
- Stirrup
- 1 in. Dia. Galvanized Bolts
Project Overview

Survey
- Iowa County Engineers

Field Testing
- Service Load Tested Four Deteriorated Bridges

Laboratory Testing
- Ultimate Strength Tested Individual Panels
- Tested Various Joint Configurations on Four Panel Bridge
- Ultimate Strength Tested Laboratory Bridge
- Tested a Strengthening Retrofit

Analytical Analysis
- Finite Element Bridge Model
Deterioration
Deterioration
Deterioration
Field Testing
Field Testing
Field Testing
Field Testing
Results

Field Testing

- Performance Not Affected By Deterioration
- Live Load Deflections More Favorable than AASHTO Design Values
- Performance Affected by the Shear Connectors
- Transverse Load Distribution More Favorable than AASHTO Design Values (With Shear Connectors)
- Transverse Load Distribution Was Equal To or Less Favorable than AASHTO Design Values (Without Shear Connectors)
Ultimate Strength Testing
-Individual Panels
Ultimate Strength Testing
-Individual Panels
Ultimate Strength Testing
-Individual Panels

Deflection (in.) vs. Midspan Moment (ft-kip)

- Butler 1
- Butler 2
- Butler 3
- Butler 4
- HS20
Results

Ultimate Strength Testing of Individual Panels

- Ultimate Strength of 11 of the 12 Panels Exceeded Their Theoretical Strength (Based on design values)

- Ultimate Strength of the Other Panel Was Only Slightly Less Than Its Design Strength

- Hooked Ends on the Primary Longitudinal Reinforcing Ensured Development

- Excessive Deflections Were Observed Prior to Failure
Joint Configuration Testing
Ultimate Strength Testing
-Laboratory Bridge
Ultimate Strength Testing
-Laboratory Bridge
Strengthening Retrofit
Strengthening Retrofit

[Images of construction equipment and materials]