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
Beam-in-Slab Low Volume Road Alternative Bridge Design

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Alternative Replacement Design

- Beam-in-Slab Bridge System (BISB)
  - Conservatively Designed
  - In Service For 25 Years +
  - Exists only in Iowa?
Beam-in-Slab Bridge System

- Concrete
- W 12 Girders, 24 in. on Center, Typ.
- Steel Confining Straps
- Plywood
Beam-in-Slab Bridge System

- Conclusions to BISB Testing
  - Adequate System

- Advantages
  - Easy to Construct
  - Cost Competitive

- Limitations
  - Lack of Efficiency
  - Limited Span Length
Increasing Efficiency

- Develop Composite Action
- Reduce Self Weight of the Section
- Increase the Applicability of the System
Composite Action

- Alternative Shear Connector (ASC)
ASC Evaluation

- Push Out Tests
  - Static Load Testing
  - Cyclic Load Testing

- Flexural Beam
  - Static Load Testing
  - Cyclic Load Testing
ASC Conclusions

- **Advantages**
  - Adequate Shear Connection
  - Readily Constructible

- **Complication**
  - Concrete Required Below Top Flange
Reduce Self Weight With Arched Section

- Advantages
  - Wider Girder Spacing
  - Deeper Girder Sections
  - Longer Spans

- Complication
  - Forming the Section
Formwork Investigation

- Various Materials and Configuration
  - Polyethylene Pipe
  - Arched Plywood
  - Corrugated Metal Pipe (CMP)
  - Custom Rolled Corrugated Section
Laboratory Testing

- Specimen # 1 (Preliminary Section)
  - Investigate Feasibility

Diagram:
- 21” Radius, 42” Dia. Poly Pipe
- 2” x 1/4” Strap
- #4 ASC Reinforcement
- W 21 x 62 Girders
- Concrete
- 84”
- 8”
- 8”
- 2.5”
- 19.5”
- 45”
Laboratory Testing

- Specimen # 2 & # 3
  - Investigate Punching Shear
Laboratory Testing

- Specimen # 4
  - Investigate Load Distribution
  - Investigate Flexural Failure Mode
Demonstration Bridge # 1
Demonstration Bridge # 2
Demonstration Bridge # 2
Conclusions

- **BISB System**
  - Alternative Replacement
  - Span Limited to 50 ft due to Structural Inefficiencies

- **Modifications to Improve Efficiency of Design**
  - ASC and Transverse Arched Section
  - Increase Span Length to 75 ft
  - Improved Use of Materials