CENTER FOR AGING INFRASTRUCTURE

PURDUE UNIVERSITY

FIRST PHASE OF CAI

S-BRITE

Steel

Bridge

Research

Inspection

Training

Engineering

Grand Vision...

To Develop a Unique Center Focused on Extending the Safe Life of Existing Transportation Structures

Need for S-BRITE

- Infrastructure continues to age
  - Avg. age of steel bridge in US is nearly 50 years
- Workforce changing
  - Loss of legacy expertise not being replaced
  - New workforce not versed in older material, structures, design, deterioration, etc. etc. etc
    - E.g., What are issues with T-1 steel?...What is T1 Steel?
- Current available training (all levels) does not seem to meet the needs of owners
- Much $$$ spend on inspection, but no knowledge regarding inspection reliability and POD, etc.

Status of S-BRITE Funding

- INDOT has committed over $1 million for:
  - Research - Underway
  - Training – Short Courses –Underway
  - DEN – Distributed Expertise Network - Underway
  - S-BRITE site development – Final Site Development Underway
- Pooled fund study TPF-5(281)
  - Participants:
    - KS, SD, IL, IA, MN
    - FHWA
    - $400k

Training Program in Indiana

- HS bolting course
  - Two offered, 3rd to be Jan 2014 (tentative)
- Inspecting Steel Bridges for Fatigue
  - Two offered
- Fatigue and Fracture Design of Steel Bridges
  - 1 offered, 2nd TBA
- More to come!
  - Welding, coatings, response and repair of impact & fire damaged to steel bridges, etc.
  - Pooled fund partners to help set future curriculum

Recent Fatigue Insp. Training

Training coming to a town near you

- Members of the pooled fund study can select from courses that will be offered in their state
- In addition, limited number of individuals will be brought to S-BRITE site
  - Offer unique training environment

Coordination of Off-site Training

- Propose to initially offer existing courses in first half of 2014
  - Fatigue design, Fatigue Inspection
  - HS Bolting
- Will be contacting each partner state to coordinate time and location commensurate with level of participation
- Topics for next training courses will be solicited from partners

Distributed Expertise Network (DEN)

- Distributed Expertise Network (DEN)
- Provide readily available expertise related to the existing inventory of structures
  - Provide access to experts around the country
  - When issue arises, treat as “research into practice” events, assist, and issue tech. brief
- Provide “clearing house” of information on NDE, fatigue/fracture, corrosion, retrofit, welding, coatings, etc.

Distributed Expertise Network (DEN)

- INDOT has funded initial phase
- “Experts” identified
  - Means to move their research into practice and provide input on specific issues/questions
- Pooled fund participants have access to DEN
- Will begin to develop FAQ database
  - For DEN Members ONLY

- Topic areas:
  - Fatigue, Fracture, Welding, Coatings, Bolting, Steel Bridge Design, Stability, Fire and Impact Damage, Field Testing, Repair/retrofit, etc.

Proposed DEN Members

Topic	Identified Expert(s)	Notes
Fatigue and Fracture	R.J. Connor / M.D. Bowman	Purdue Faculty
HS Bolting	P. Fish / G. Schrader	Fish and Associates, Inc.
Welding, Connections, Fabrication	K.H. Frank / D. McQuaid / R.J. Connor,	Emeritus UT Austin Professor &independent consultant / Independent Consultant / Purdue Faculty
Coatings Corrosion	R. Kogler	Independent Consultant
Repair and Retrofit of Steel Structures	R.J. Connor / M.D. Bowman / A.H. Varma	Purdue Faculty
Curved & Skewed Steel Bridges	Todd Helwig	Professor, UT Austin
Sign, Signal, and Luminaire Structures	R.J. Connor / M.D. Bowman	Purdue Faculty
Fire damage	A.H. Varma	Purdue Faculty
Impact Damage and Heat Straightening	A.H. Varma / R.J. Connor	Purdue Faculty
Field Instrumentation and Monitoring	R.J. Connor	Purdue Faculty
Non-destructive Testing	G.A. Washer / P Fish	Professor, Univ. of Missouri / Fish and Associates, Inc.

S-BRITE Component Gallery

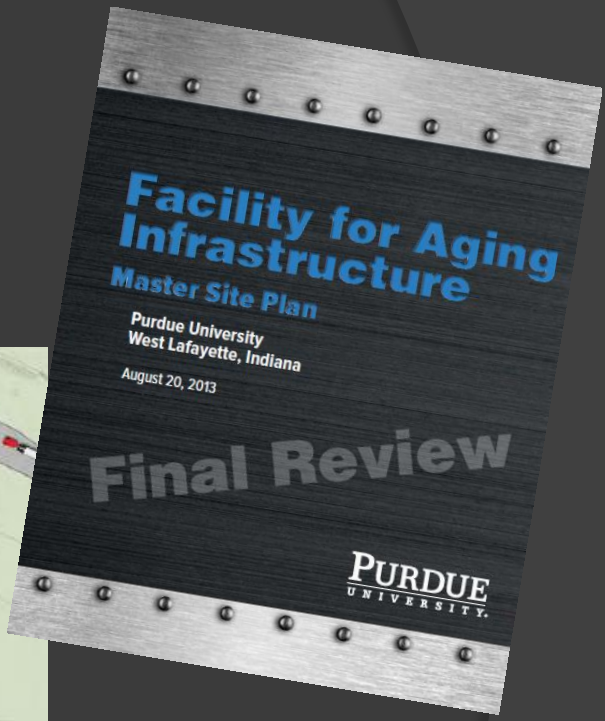
S-BRITE will be 1st "User" of CAI

- Will include full-scale bridge components or structures coming out of service
- Houses/collects specimens for NDE testing/validation
- Provide hands-on education for:
  - Professional Engineers,
  - Inspectors,
  - Managers,
  - Contractors,
  - Students

No such facility exists anywhere in the world

S-BRITE Component Gallery

- Master Site Plan Developed for the 25 Acre Parcel
- Goal to be operational Spring 2014



Status of S-BRITE Gallery

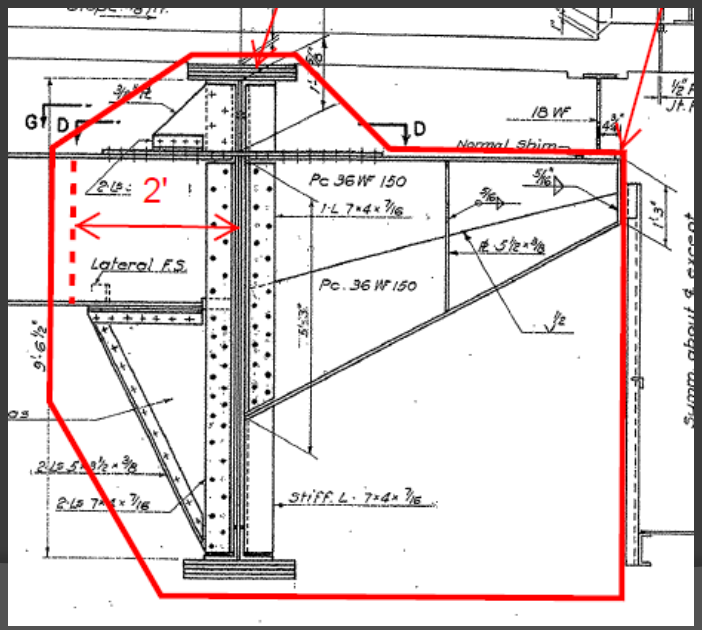
- Moving forward with site Final Design
- Current focus on S-BRITE
- Subsequent phases will included other areas of research:
  - Concrete
  - Pavements
  - Geotechnical
  - Hydraulics
  - Etc.

Specimens Acquired to Date

- Virginia Ave over I-65
  - Impacted girders
  - Bolted repairs of fractures due to impact damage
- Three sections
  - Total length about 100 ft

Specimens Acquired to Date

- Three section of the Quinnipiak River Bridge girders
- Riveted members
- About 10 feet deep



Specimens Acquired to Date

- I-35W
  - Bearings
  - The “U10” & L11 Joints
  - Portion of L7-L8
  - Floortruss components

Other Specimens Acquired to Date

- Various riveted and welded components
- Chords, beams, floorbeams, etc.
- Various failed components
  - Real bridges
  - Sign/signal structures
  - Fatigue/fracture tests

- TTCI (Pueblo) promising an entire 65 foot two-girder welded RR bridge
  - Free delivery via RR
  - S-BRITE to pay for cranes to unload
  - Has a “Hoan” fracture(s), corrosion, fatigue cracks, etc.

Overall Summary

Project “Schedule” for TPF Participants

- Training
  - Begin coordinating training at partner locations now
  - Begin developing “new” courses in spring 2014
- Research
  - POD study – underway
  - Others studies – solicit input today
- DEN
  - Arranging agreements between Purdue and experts
- Bridge Component Gallery
  - Final design underway
  - Break ground spring of 2014

Other Items

- Please keep us in mind as components and bridges come out of service
  - Earlier in the process the better
- Will be developing “Industrial Partner Program”
  - Solicit industry input, Support ($), etc.
  - Consultants, fabricators, producers, equipment producers, etc.
- Website in development
- Moving forward with getting S-BRITE recognized as a “Center” at Purdue

Questions

S-BRITE

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