Iowa STIC: A Successful Collaboration with the Iowa Highway Research Board

National STIC Network Meeting

October 19, 2017
Outline

• History of Iowa Highway Research Board
• Formation of Iowa State Transportation Innovation Council
• How we operate
• Key to Success - Engaging stakeholders
• Key Innovative Programs and Projects
• Share Success Stories
• Innovation Highlight
Vision - Research that makes a positive difference to the transportation system in Iowa

Mission - Lead the identification of needed research and engineering development activity, encourage collaborative involvement, and support research implementation

Goal - Improve the efficiency and effectiveness of highway transportation

Inception:
- Iowa Legislature set aside funding in 1949 for Secondary Road Research – 1.5% of County RUTF
- Iowa DOT Commission allocates funds annually
- City RUTF added in 1989 by legislature
- First meeting - May 18, 1950
Iowa’s State Transportation Innovation Council

- **Goal** - encourage innovation and longer range technological advances in the field of transportation

- Formal resolution adopted in May 2014 to serve as STIC – *IHRB already working well – no need to reinvent the wheel!*

- Collaboration between FHWA, DOT Management, Research Office and IHRB Membership
  - Industry input not formal, but integral to identification of projects

- IHRB role was expanded to oversee
  - STIC Projects
  - AID Projects
Key to Success = Partnerships!

- 15 Members / Alternates
  - 7 County Engineers (Six Districts + TRB Rep.)
  - 2 City Engineers
  - 2 University Civil Engineering Department Chairs (U of I, ISU)
  - 4 Iowa DOT Engineers
- *FHWA involved in STIC process*
- Industry input and discussion part of business practice
- Membership is posted online:
  - [https://iowadot.gov/research/research-programs/ihrb/introducing-ihrb](https://iowadot.gov/research/research-programs/ihrb/introducing-ihrb)
- Executive Secretary
- Secondary Road Research Engineer
Engaging Locals in Research and Innovation

• Conduct Annual Research Focus Group Meetings for County Engineers/City Engineers/Public Works Officials
  “A Forum for exchange of ideas, prioritized research topics for IHRB submittal”

• Fund travel for City and County members to attend TRB Annual Meeting

• Participate in Technical Advisory Committee for Research Projects

• Participate and present at various regional meetings

• Provides the matching funds to the LTAP Grant
IHRB Sustainability

• **Formal Business Plan**
• **Regular Meetings**
  • Set up 4 years in advance
  • Nine meetings per year
• **Annual Report**
• **Chair and Vice-Chair**
  • Selected Annually
  • Vice-Chair moves to Chair position
  • Role rotates between agency types (City, County, DOT, University)
Funding

Street Research Fund
$200,000
From city RUTF

Secondary Road Research Fund
$1,750,000
(1.5% FM-RUTF)

Primary Road Research Fund
$750,000
(50% of Primary Research Fund)

FHWA (STIC/AID)

Matching Funds
varies

Iowa Highway Research Board
$2,800,000+
Project Identification & Selection

• Annual Program of prioritized Research Projects
• Projects with Joint Funding
• Immediate Opportunity or Critical Timing Projects
• Continuation of Previous Funded Projects
• Pilot Projects for Novel or Innovative Ideas and Fundamental Advances
• STIC and AID Projects
How Do We Share Successes?

• Annual Report
• Presentations at Local and National Events
• Webinars, trainings and workshops
• Public Outreach with Videos, etc.
• Final Reports published online
State Transportation Innovation Council Accomplishments

- Implementation of Self-Cleaning Box Culvert solutions
- Implementation of 3D Modeling in Bridge Design
- Implementation of Design for Column/Footing/Pile System for Accelerated Bridge Construction (ABC)
- Implementation of E-Construction at Iowa DOT
- Pilot project for Open Data Services for Smart Work Zone Implementation
- Support for Innovations in Transportation Conference
- NEPA Training
- Virtual Reality
STIC Implementation: 3D Design for Bridges & Structures

Scope: To investigate the feasibility of using 3D tools by Iowa DOT’s Office of Bridges and Structures and to develop an implementation plan.

Tasks:
- Survey of DOTs
- Survey of customers and stakeholders
- State visits
- Structures workshop
- Collaborate with AASHTO SCOBS T-19
- Develop Implementation Plan
- Documentation and technology transfer
Development of 3D Models

Investigate building a BIM model
• Select a demonstration project: I-80/I-380 Ramp bridges
• Conduct extensive review of the capabilities of existing commercial bridge design and detailing software in terms of building a 3D model
• Identify project needs
• Solicit contractors input
• Include models as part of contract documents
Visualization and Animation

• Continued use of 3D visualization techniques
  • 3D PDF inclusion

• Videos of animations
  • https://iowadot.gov/sabulabridge/sabula-bridge-home
  • https://iowadot.gov/MassenaBridge/
  • http://iowadot.gov/us6KegCreek/projectinfo.html
  • http://iowadot.gov/LSCBridge/index.html
Sabula Bridge Animation

Click Below to Watch Video

https://connectdot.connectsolutions.com/p96rg5456z7/
Virtual Reality for Public Engagement

**Scope:** Implement the Iowa DOT investment in VR hardware and VR content development and push them into the public realm; evaluate the efficacy of delivering information through VR; leverage the 3D assets already being created as part of the design process for key projects, and make them fully immersive and highly interactive.

- **Evaluative component** - compare VR to traditional information conveyance techniques
- **Educational component** - include training for Iowa DOT staff in VR publishing processes
- **Deployment opportunities** - explore multiple public interface strategies
Virtual Reality

• I-35/US30 ramp function review
  • Driving simulator
  • After action review
  • Two vehicle types

• Possible new VR projects
  • Work zone safety demonstration
  • I-80/I-380 interchange
  • Safely passing bicycles
  • Flooded roadway safety
  • Driver distraction
  • Don’t crowd the plow
I-35/US30 Drive Through

Click Below to Watch Video

https://connectdot.connectsolutions.com/p43ut0ivejv/
I-74 Fly Through

Click Below to Watch Video

https://connectdot.connectsolutions.com/p71hkbqew7a/
STIC Implementation: Self-Cleaning Culvert

Scope:
To implement innovative self-cleaning culvert technology as standard practice throughout the state of Iowa.

Tasks:
- Development of guidelines for the design and retrofitting of culverts based on the self-cleaning concept tested.
- Delivery of workshops at sites throughout Iowa.
- Demonstration of the use of Iowa DOT Culvert portal for assessment of sedimentation potential at existing and new culvert construction sites.

Currently, MECHANICAL CLEANING is most often the SOLUTION
The Self-Cleaning Solution: Fillet-based design

- Increased flow velocities in the main channel $\Rightarrow$ increased sediment transport capacity
- Enhanced turbulence in the side barrels $\Rightarrow$ keeps the sediment in suspension
The fillet-based self-cleaning culvert design proved its reliability and efficiency throughout the testing and monitoring phases.

The design is simple to implement in any stage of the culvert lifetime. For retrofitting, the fillet-based geometry requires less effort because the existing deposited sand in the culvert area can be used to “build” the fillet base.
Implementation Workshops
IHRB/STIC Contact Information

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