

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

National STIC Network Meeting

October 19, 2017



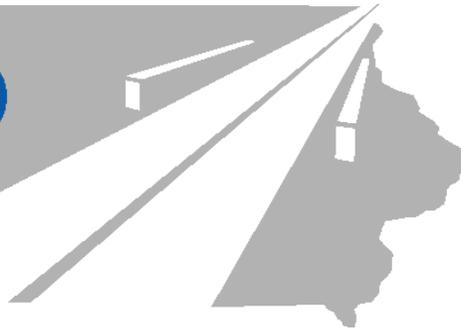
Outline

- History of Iowa **H**ighway **R**esearch **B**oard
- Formation of Iowa **S**tate **T**ransportation **I**nnovation **C**ouncil
- How we operate
- Key to Success - Engaging stakeholders
- Key Innovative Programs and Projects
- Share Success Stories
- Innovation Highlight

IHRB

**IOWA HIGHWAY
RESEARCH BOARD**

1950-2017



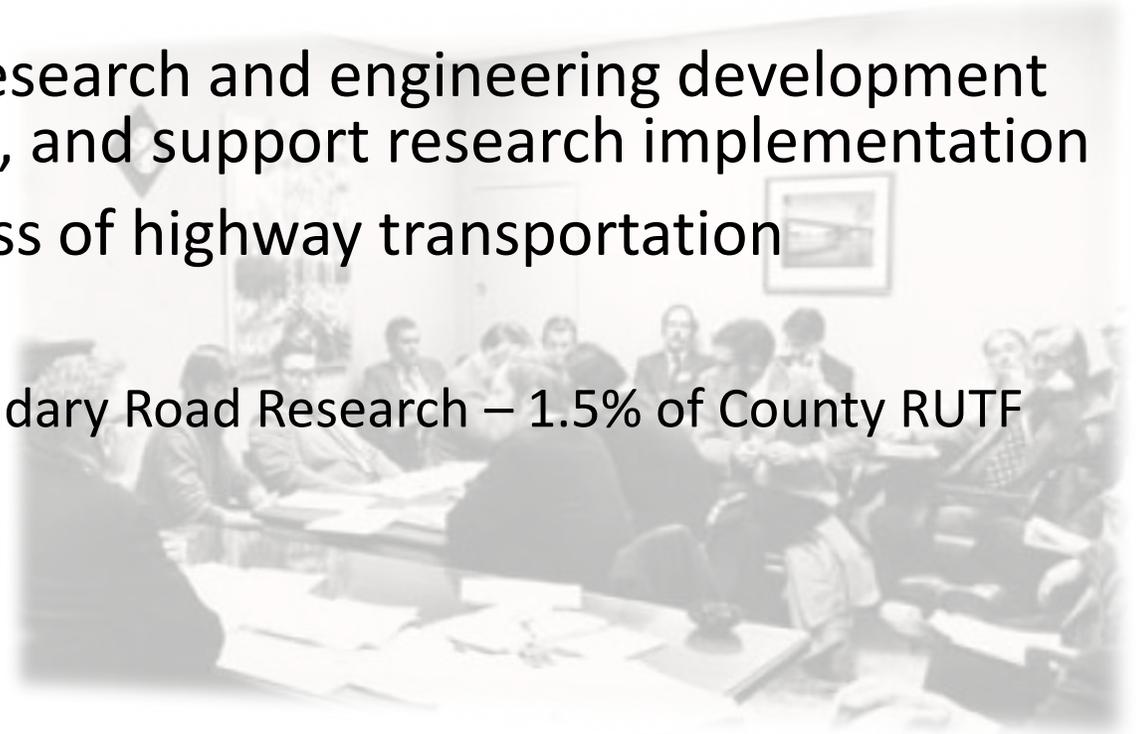
Vision - Research that makes a positive difference to the transportation system in Iowa

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



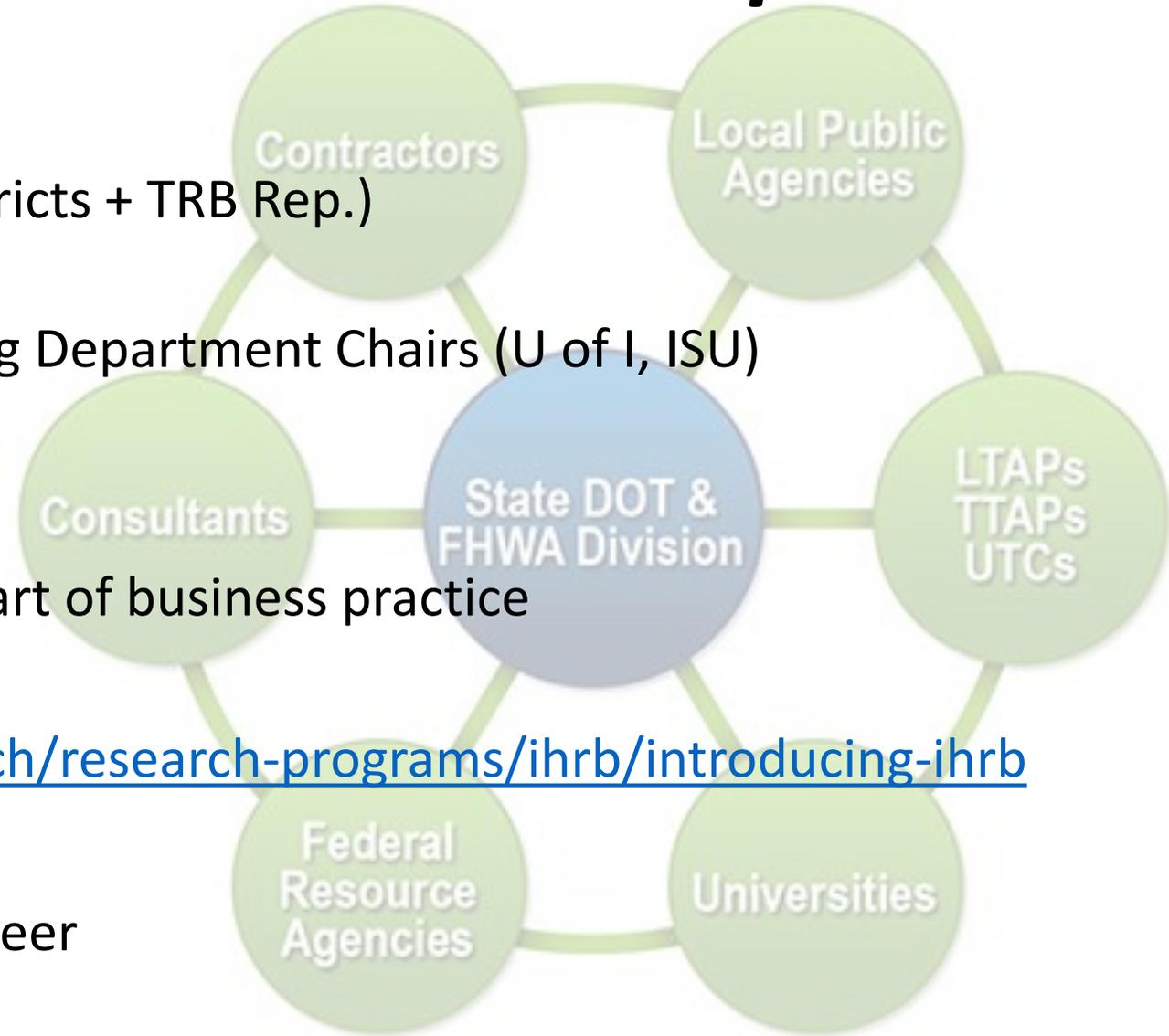
Iowa's State Transportation Innovation Council

- **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>
- 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

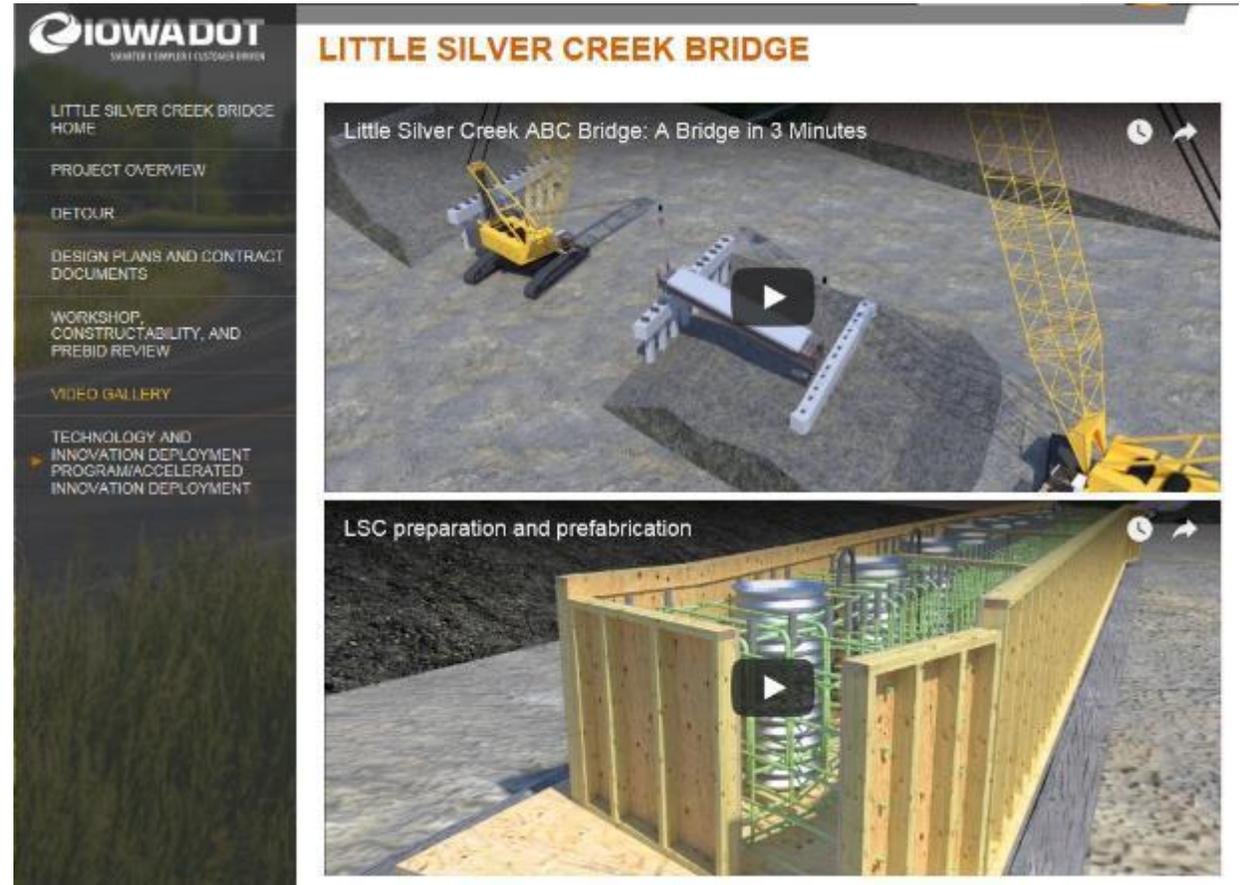
Iowa Highway Research Board
\$2,800,000+

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
- Modulus Measurement Using Automated Plate Load Testing for Statewide Mechanistic-Empirical Design Implementation
- 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

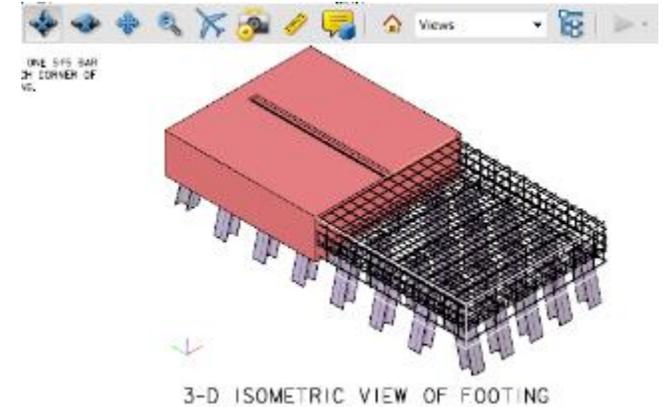
Development of 3D Models

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

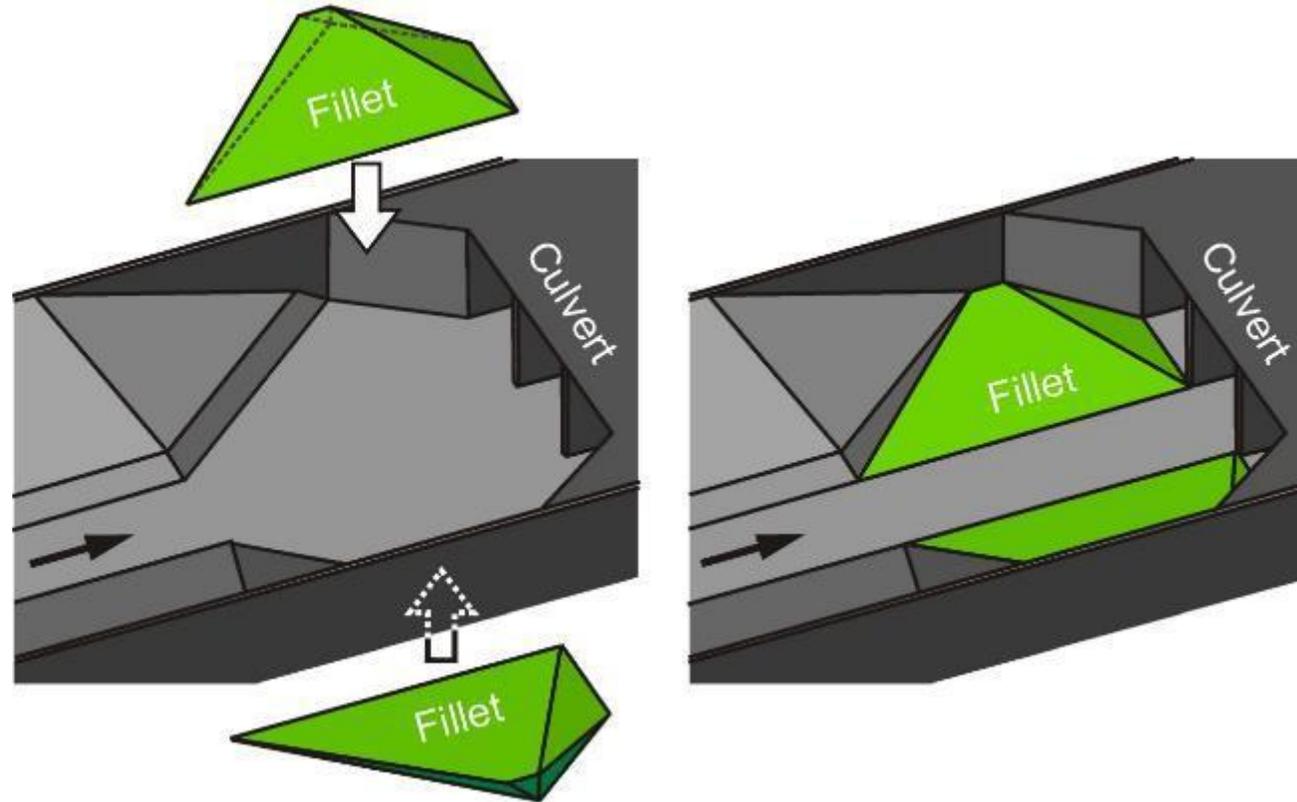
the SOLUTION



THE PROBLEM



The Self-Cleaning Solution: Fillet-based design



- Increased flow velocities in the main channel → increased sediment transport capacity
- Enhanced turbulence in the side barrels → keeps the sediment in suspension

Results

Before



After



- 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



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