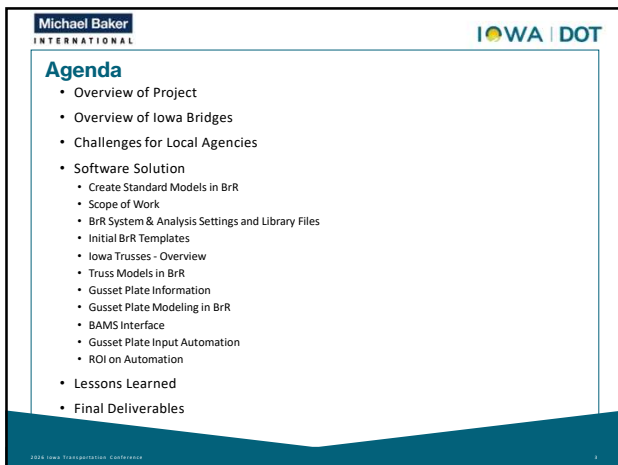




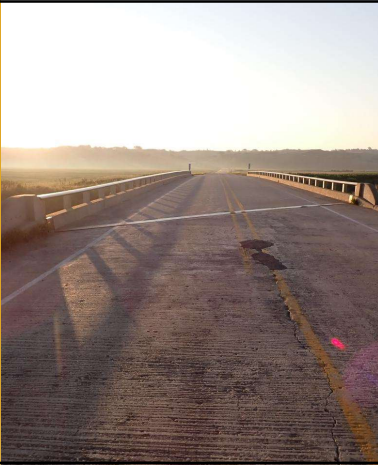




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Overview of Project

What is BrR?
How Can it Help Iowa?
Why Create Standard Templates?



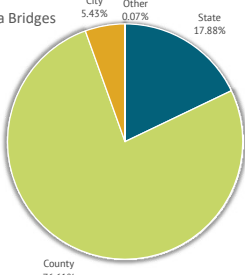
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Overview of Iowa Bridges

- Total = 23,629
- State = 4,188
- Counties = 18,103
 - 99 Counties
- Cities = 1,286
 - 258 Cities
- Other = 17

Each Owner is Responsible for Load Rating Their Bridges



Owner	Percentage
County	76.61%
State	17.88%
City	5.43%
Other	0.07%

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Load Rating Challenges for Locals Public Agencies

- Consultant's Can Use Whatever Load Rating Software They Choose – Many Are Not Capable of Batch Analysis
- Reviewing Permit Requests is Time Consuming
- New Legislation Causes Re-rating for New Truck Configurations
- Statewide Permitting System is Coming in Future

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Solution: Iowa DOT is Offering BrR Licenses to Locals

What is AASHTOWare BrR?

- Load Rating Software Owned by AASHTO and Used Nationwide
- Iowa is Not Requiring Locals Rate with BrR but Encourage It.

How Can it Help?

- Batch Analysis for New Legislation and Permitting
- Get Ratings Quick and Efficiently
- LPA's Have More Ownership Over Their Files
- BrR Can Model Many Different Bridge Types
- Getting LPA's Inventory in BrR Would Help Towards a Statewide Permitting System
- DOT Is Creating Templates for Standard Bridges

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Creating Standard Models for BrR

Iowa DOT has Standards from 1914 - Present

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Research Project TR-832

Implementation of AASHTOWare BrR Program for Rating Iowa Bridges

- Benefits of Standard Templates
 - Adjustable for Deterioration or Repairs
 - Provides Ratings for ALL Members and Locations
 - Can Use in Batch Analysis of Inventory
- January, 2024 – December, 2026
- Research Team
 - Prime: Michael Baker & HGM
 - Sub: Kirkham Michael
- Technical Advisory Committee
 - Iowa DOT
 - ICEA Service Bureau
 - ProMiles
- Over 700 Templates Created
 - With Multiple Skew Options

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hgm

ASSOCIATES INC.

KX KIRKHAM MICHAEL

ProMiles

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IOWA COUNTY

SERVICE

BUREAU

ENGINEERS ASSOCIATION

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Scope of Work

Michael Baker's Scope

- BrR System & Analysis Settings
- BrR Libraries
- Initial Examples for Standard Bridge Models
 - Steel Girder
 - Prestressed I-Beam
 - Reinforced Concrete Slab
 - Triple Concrete Box Culvert
 - Corrugated Metal Pipe
- 70 Truss Templates
- 4 Box Beam Models
- Documentation & Guidance

HGM & Kirkham Michael's Scope

- All Standard Templates
 - 341 Steel Girder
 - 175 Prestressed Beam
 - 84 Reinforced Concrete Slab
 - 40 Reinforced Concrete Beams
- Example Standard Models
 - Single Precast Concrete Box Culvert
 - Twin Concrete Box Culvert

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Scope of Work

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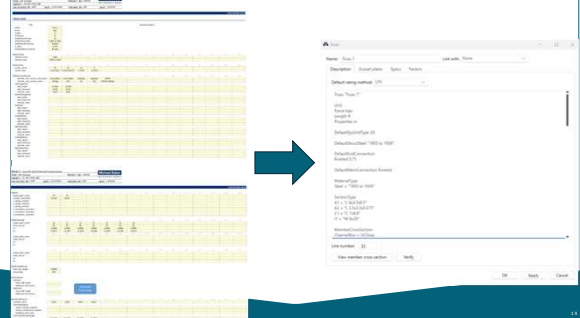
Details of the Project

Michael Baker's Work

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Truss Models in BrR

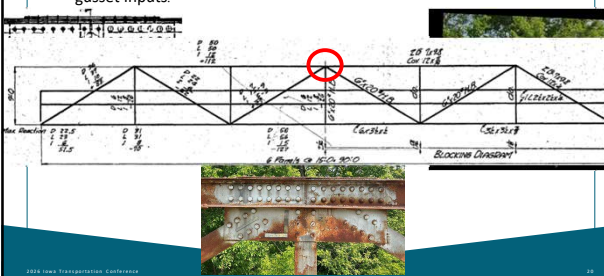
- Use Excel Macro to create BrR truss code



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Gusset Plate Information

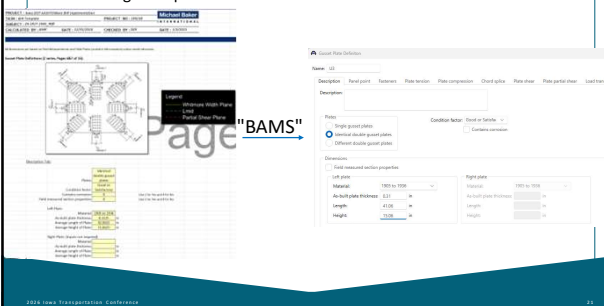
- Obtaining Gusset Plate Information
 - Use iPad/GoPro/Drone to obtain gusset plate information in the field.
 - Use field photos, field measurements, and MicroStation to generate gusset inputs.

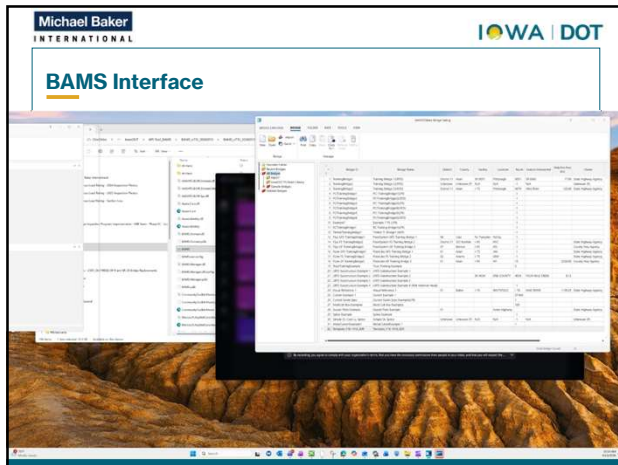


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Gusset Plate Modeling in BrR

- Use BrR Open API tool "BAMS" to auto transfer gusset plate inputs into BrR gusset plate windows.





The screenshot shows the Gusset Plate Input Automation software interface. It includes a data entry form with fields for Description, Plates, Condition Factor, and Field measured section properties. Below the form is a table listing gusset plates with columns for Material, As-built plate thickness, Average length of Plate, and Average height of Plate. The interface also features a section for Challenges with Manual Entry, which lists several issues related to manual data entry.

Gusset Plate Input Automation

- Manual Process Overview
 - Engineers manually enter gusset plate data into BrDR.
 - Up to about 650 data entries per gusset plate.
 - Data is typically sourced from Excel spreadsheets.
- Challenges with Manual Entry
 - Time-consuming and repetitive for each gusset plate.
 - High risk of human error (e.g., typos, misalignment of data).
 - Inefficient for large or complex truss structures.
 - Difficult to scale or standardize across projects.

The screenshot displays the ROI on Automation software interface. It features a bar chart titled "Manual Data Entry vs. Automation" comparing the time required for manual data entry (1,000 hours) versus automated entry (around 100 hours). The chart shows a significant reduction in time when using automation. The interface also includes a list of what the automation does and how it works.

ROI on Automation

- What the automation does:
 - A custom-built tool developed for gusset plate definition
 - Includes a UI for selecting Excel files and displaying warnings or errors
 - Automates the transfer of gusset plate data from Excel into BrDR
 - Reduces repeated QCQA
- How It Works:
 - Reads gusset plate data from Excel
 - Uses BrDR's API to populate the gusset plate automatically
- ROI:
 - Manual data entry: 1,000 hours
 - Automated entry: around 100 hours
 - Time saved: 900 hours

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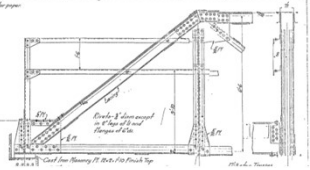
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Lessons Learned

- Initial scope assumed that we would have all information for all the gusset plates for all standards



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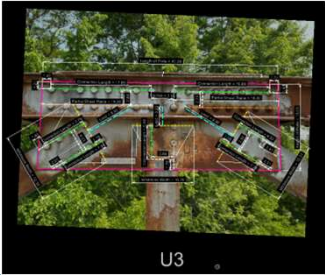
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Lessons Learned

- Needed several inputs for each gusset plate



Legend

- Whitmore Width Plane
- Lmid
- Partial Shear Plane
- Length of Connection
- Gusset Plate
- Spacings and Edge Distances

U3

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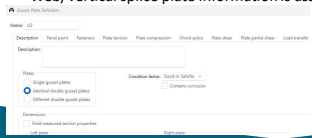
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Lessons Learned

- Assumptions
 - Few standards have multiple years, only modeled the most conservative year.
 - The in-service truss might not match with the template, and it is the responsibility of the user to verify and to make any necessary changes.
 - Fastener type and size is based on the standard drawing and not the field conditions.
 - The option of "Field measured section properties" in the BrR Gusset Plate Definition window is not checked as field measurements are only conducted due to missing gusset plate information in the Standards and the intent of this model is for pristine condition ratings.
 - Web/Vertical splice plate information is assumed.




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Lessons Learned

- BrR Limitations
 - BrR's library doesn't have some of the old rolled shapes, created these manually using old steel manual or manufacturer handbooks.
 - Due to limitations in BrR the timber deck was rated in a separate girder system superstructure definition. Stringers were also rated in this superstructure definition to ensure BrR auto computes the LLDF to account for timber deck.
 - Certain built-up sections cannot be created in BrR, used equivalent sections.
 - Block shear is checked for gusset plates only and not for the member itself.

Bridge

Components

- Template_Z1-1945_45ft
- Components
- Daphragm Definitions
- Lateral Bracing Definitions
- SUPERSTRUCTURE DEFINITIONS
- Truss System_Z1-1945_45ft
- Stringers and Timber Deck_Z1-1945_45ft
- BRIDGE ALTERNATIVES
- Z1-1945_45ft Standard (E) (C)

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Final Deliverables

Final Products for Local Agencies and Load Raters in Iowa

BrR Iowa Standard Templates - Updated June 2026

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Training

- Iowa BrR Virtual Training 1 - General BrR
- Iowa BrR Virtual Training 2 - CMP Culverts and RC Box Culverts
- Iowa BrR Virtual Training 3 - Iowa DOT Template Models
- Iowa BrR Virtual Training 4 - Modeling Steel Bridges
- Iowa BrR Virtual Training 5 - Modeling Precast Bridges
- Iowa BrR Virtual Training 6 - Modeling RC Slab Bridges
- Iowa BrR Virtual Training 7 - Performing Analyses
- AASHTOWare Bridge Rating Training Material

Template Information

- TR-532 Status on Template Completion (178.58 KB)
- TR-532 Load Rating for Standard Bridges (Completed to Date as of 6-22-2024) (10.28 MB)
- BrR Templates
- Library and System Files
- Supporting Codes

SIIMS Resource Page

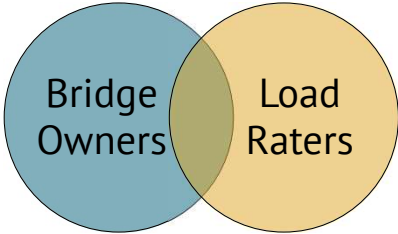
<https://iowadot.gov/consultants-contractors/bridges-structures/structure-inventory-and-inspection-management-system-siims/siims-resources>

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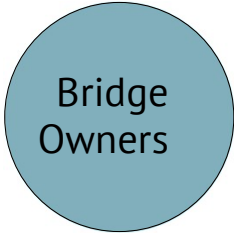
Keep the Following in Mind



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Keep the Following in Mind



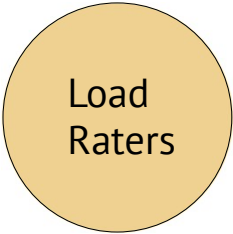
- Be Patient, It Will Take Time To Get All the Models Made
- You Are Legally Required to Have Load Rating Calculations and Models in Your Possession and Readily Available
 - QA Reviews
 - Legal Documentation
 - Future Statewide Permitting
- DOT is Working on Licenses and Training for Permitting Use Only

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Keep the Following in Mind

- Use the BrR Models, Not Just the Load Rating Summaries in the Final Report
- Using the BrR Standard Templates
 - If No Changes Are Needed to The Model – You Are Only Signing the Correct Standard Was Used
 - Changing General Information Like FHWA No., County, Etc. Does Not Count
 - If the Template Is Changed for Repairs/Deterioration/Etc. – You Are Signing The Model Is Correct
 - Truss Templates Will Require Review
- Models and Analysis Templates are Starting Points But Can Be Modified
 - ADTT = 9,999
 - Trucks Are Multilane with Full Impact



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Keep the Following in Mind

- BrR is Not Required But Encouraged
- If You Need Support or a License, Please Contact Shawn Sersland at the Iowa DOT
- Include Calculations & Models with Your Load Ratings
- Iowa Has PCA's With FHWA That Need to Be Completed By the End of the Year

Bridge Owners & Load Raters

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Questions?

Shawn Sersland
515-239-1290
Shawn.Sersland@iowadot.us
iowadot.gov

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