AASHTOWare™
BRIDGE
DESIGN AND RATING

Automating BrR Across Three DOTs

MoDOT · Iowa DOT · MnDOT

Today's Agenda

#	Topic	Presenter
1	MoDOT — NBI datasheet import; update models to DOT conventions	Aaron Kemna and Yashna Chandran
2	Iowa DOT — Gusset plate geometry and properties to BrR	Shawn Sersland and Jenny Raines
3	MnDOT — BrR template files for prestressed Inverted-T beams	Yihong Gao and Hanjin Hu
4	Cross-cutting — AASHTOWare .NET 8, reusable capabilities, looking ahead	Hanjin Hu
—	**Q&A**	All presenters

Each DOT segment follows the same shape — problem → data source → what BAMS does → outcome — so you can compare across DOTs.

MoDOT Routine Bridge Load Rating

Project Overview

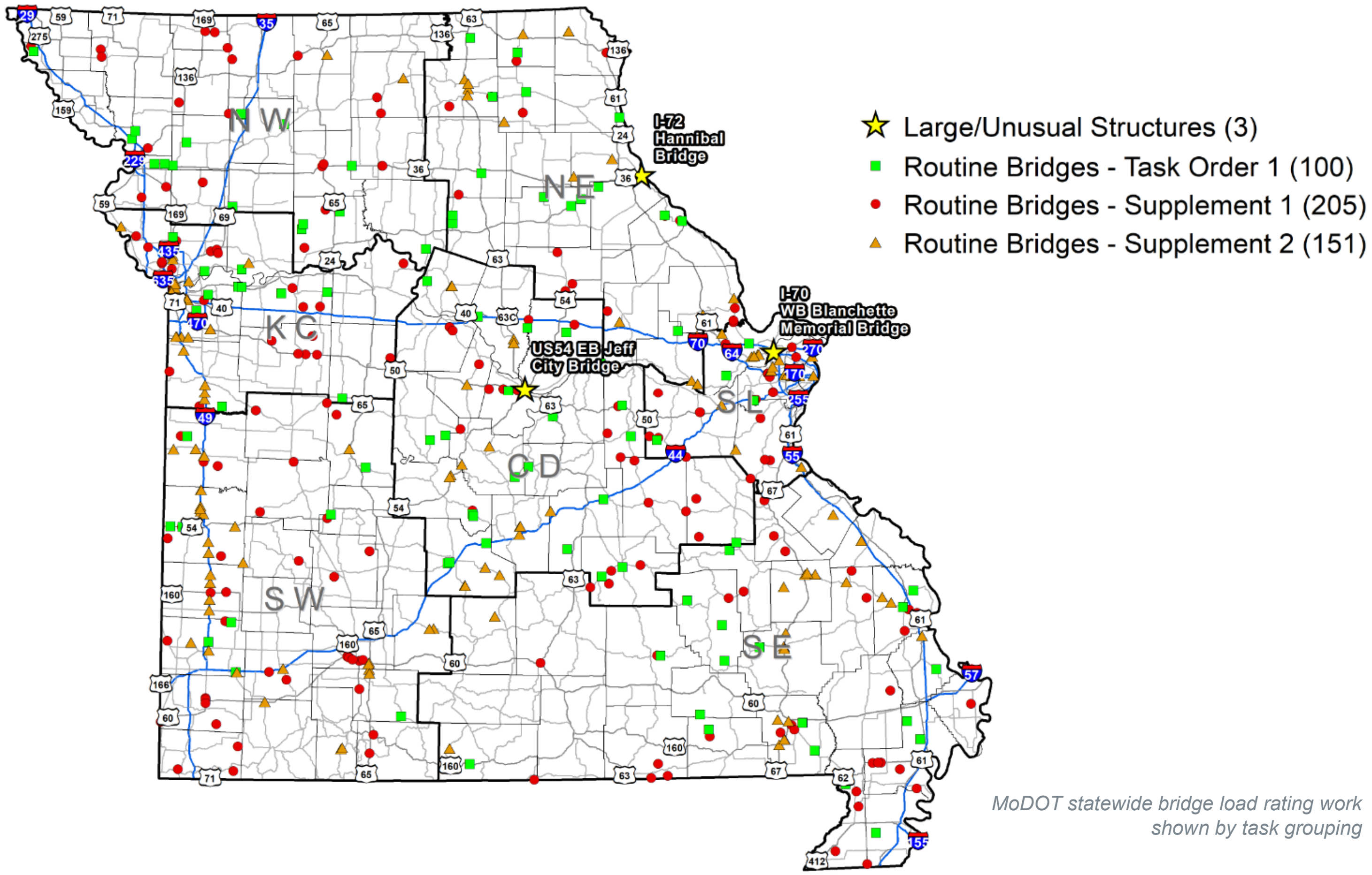
- FHWA and MoDOT agreed on a statewide Rating Update Plan for NBI structures.
- MoDOT assigned the load rating update effort to consultants

Michael Baker Scope

- 456 Routine bridges and 3 truss bridges over the 3 year-program.
- Common structure types include P/S double-tee, P/S I-girder, steel plate girder, and PT concrete bridges.

Automation Focus

- Use NBI-based bridge data and BrR files to reduce repeated setup updates.
- Keep assumptions, engineering review, rating results, posting determination responsibility with the engineering team.



MoDOT statewide bridge load rating work shown by task grouping

Next: MoDOT Workflow

MoDOT Workflow

Inputs, standards, and review expectations

What MoDOT provides?

- MoDOT BrR system, library, and General Preference files.
- Structure-type cheat sheets, model-naming guidance, and summary sheet templates.
- Existing plans and existing BrR models when available.
- NBI / bridge data spreadsheet and traffic information.

What should be consistent in BrR?

- Bridge description, traffic data, and custom agency fields.
- Bridge alternatives, superstructure definitions, and member alternative naming.
- Control options, analysis settings.
- Modeling practice specific to MoDOT.

Record_Number	Bridge_# (Bridge ID)	Federal_ID (NBI Structure ID)	Name	Year_Built	Length	Route (Facility Carried)	Feature Intersected	Log Mile	District	County
5842	A7567	32318	A7567	2008	123	MO 150 W	OIL CR	19.49404	KC	JACKSON
5843	A7568	32319	A7568	2008	122	MO 150 W	LUMPKINS FK	17.24592	KC	JACKSON
5844	A7607	32321	A7607	2008	176.8	MO 6 E	W YELLOW CR	116.55318	NW	SULLIVAN
5848	A7553	32331	A7553	2008	142.7	US 67 N	BENNETT CR	59.12134	SE	WAYNE
5851	A7582	32383	A7582	2008	142	MO 34 E	HUBBLE CR	39.32784	SE	WAYNE
5852	A7585	32384	A7585	2008	87.2	US 67 S	MO 34	143.1394	SE	WAYNE
5860	A8004	32474	A80041	2008	57.4	HANLEY RD S	CST EAGER RD	4.87506	SL	ST. LOUIS
5862	A7602	32501	A7602	2008	290.3	MO 87 S	US 50, RP MO87 TO US50E	56.43302	CD	MONITEAU
5864	A7574	32510	A7574	2009	264	MO 39 S	IS 44	61.68194	SW	LAWRENCE
5841	A7564	32317	A7564	2008	92.8	US 67 N	FRAZIER CR	53.16438	SE	WAYNE
5867	A7625	32582	A7625	2009	255.8	MO 72 E	WHITEWATER CR	156.47126	SE	CAPE GIRARDEAU
5830	A8019	32267	A80191	2008	50.5	IS 64 E	CST CLAYTONIA TER	32.79924	SL	ST. LOUIS
5868	A7600	32585	A7600	2009	108.9	MO 72 E	SALINE CR	127.67598	SE	MADISON

Next: Manual Setup Process

Manual Setup Process

1 Open and check existing model

A rater starts from MoDOT-provided files, then verifies whether the model is checked, unchecked, or no model.

2 Update structured data

Bridge ID, description, traffic, custom agency fields, model names, and settings are copied from spreadsheets and guidance.

3 Document for Review process

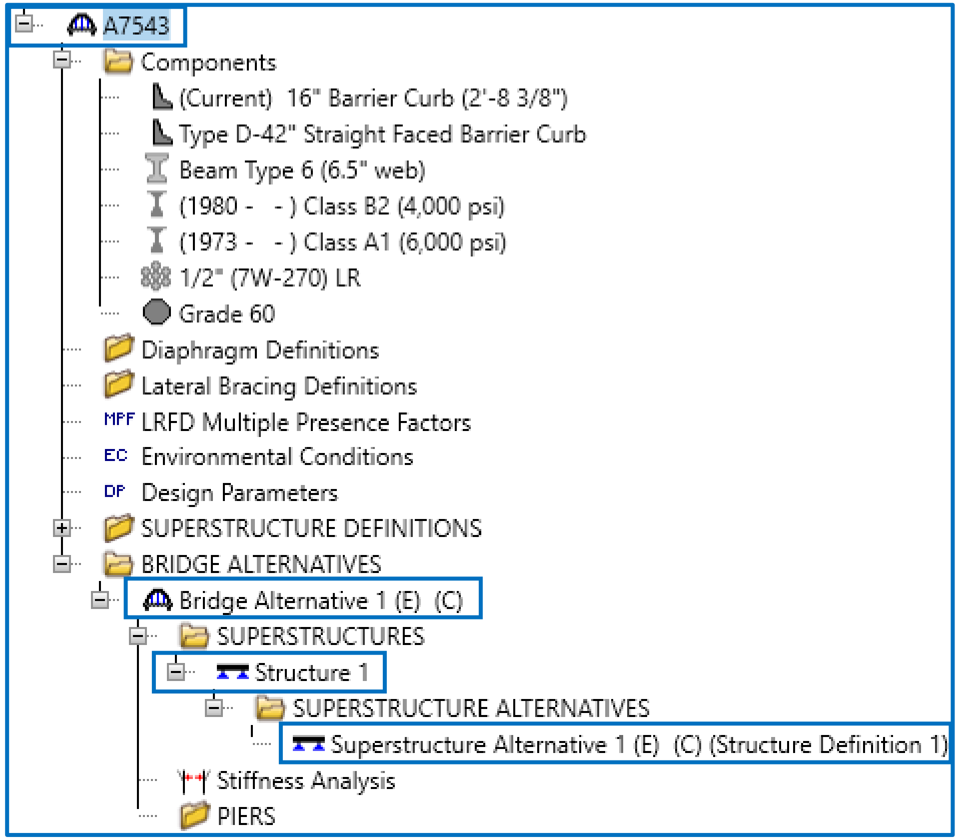
Changes need to be consistent with MoDOT cheat sheets and project expectations.

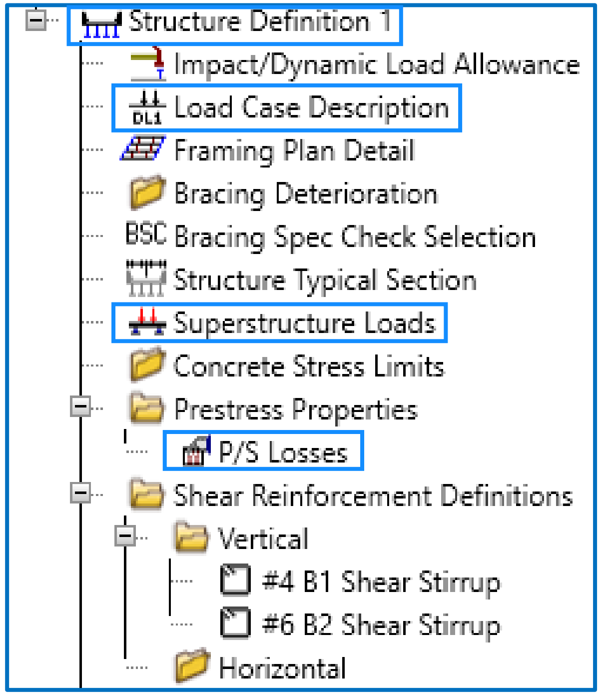
Automation Target

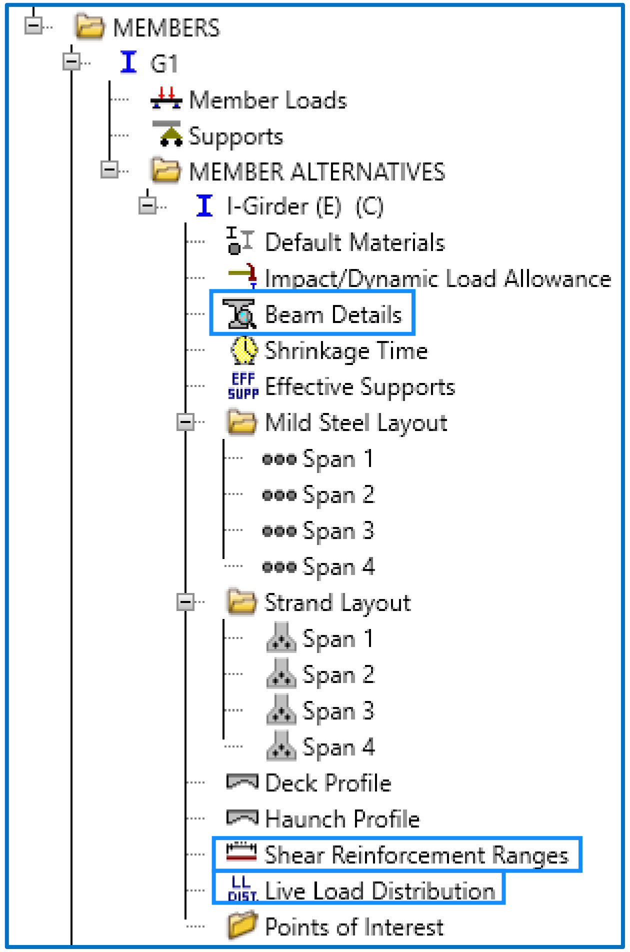
Reduce repeated setup in Step 2, while rest remain for engineering review.

Next: Bridge Example

Bridge Example







Next: Data Spreadsheet

Data spreadsheet

Bridge_# (Bridge ID)	Federal_ID (NBI Structure ID)	Name	Year Built	Description Line 1	Description Line 3	Location	Length	Facility Carried	Route Number	Feature Intersected	Log Mile
A7567	32318	A7567	2008	3-Span Continuous Composite P/S Concrete I-Girders	Copied from: None	NULL	123	MO 150 W	NULL	OIL CR	19.49
A7568	32319	A7568	2008	3-Span Continuous Composite P/S Concrete I-Girders	Copied from: None	NULL	122	MO 150 W	NULL	LUMPKINS FK	17.25
A7607	32321	A7607	2008	3-Span Continuous Composite P/S Concrete I-Girders	Copied from: None	NULL	176.8	MO 6 E	NULL	W YELLOW CR	116.55
A7553	32331	A7553	2008	3-Span Continuous Composite P/S Concrete I-Girders	Copied from: None	NULL	142.7	US 67 N	NULL	BENNETT CR	59.12
A7582	32383	A7582	2008	3-Span Continuous Composite P/S Concrete I-Girders	Copied from: None	NULL	142	MO 34 E	NULL	HUBBLE CR	39.33
A7585	32384	A7585	2008	1-Span Simple Composite P/S Concrete I-Girders	Copied from: None	NULL	87.2	US 67 S	NULL	MO 34	143.14
A8004	32474	A80041	2008	1-Span Simple Composite P/S Concrete I-Girders	Copied from: None	NULL	57.4	HANLEY RD S	NULL	CST EAGER RD	4.88
A7602	32501	A7602	2008	2-Span Continuous Composite P/S Concrete NU-Girders	Copied from: None	NULL	290.3	MO 87 S	NULL	US 50, RP MO87 TO US50E	56.43
A7574	32510	A7574	2009	4-Span Continuous Composite P/S Concrete I-Girders	Copied from: None	NULL	264	MO 39 S	NULL	IS 44	61.68
A7564	32317	A7564	2008	1-Span Simple Composite P/S Concrete I-Girders	Copied from: None	NULL	92.8	US 67 N	NULL	FRAZIER CR	53.16
A7625	32582	A7625	2009	2-Span Continuous Composite P/S Concrete NU-Girders	Copied from: None	NULL	255.8	MO 72 E	NULL	WHITEWATER CR	156.47

Bridge_# (Bridge ID)	District	County	Owner	Maintainer	Admin Area	NHS Indicator	Functional Class	Truck Percent	ADT	Directional PCT	Recent ADTT	Design ADTT	Transfer Time	Age at Deck Placement	Final Age	Member Alternative Description
A7567	KC	Jackson	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	14 Urban Other Princ	7	10500	100	735	735	24	90	9125	I-Girder
A7568	KC	Jackson	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	14 Urban Other Princ	7	12901	100	903	903	24	90	9125	I-Girder
A7607	NW	Sullivan	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	02 Rural Other Principal	22	4823	55	584	584	24	90	9125	I-Girder
A7553	SE	Wayne	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	02 Rural Other Principal	34	5525	100	1879	1879	24	90	9125	I-Girder
A7582	SE	Wayne	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	02 Rural Other Principal	7	2557	55	98	98	24	90	9125	I-Girder
A7585	SE	Wayne	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	02 Rural Other Principal	26	10719	55	1533	1533	24	90	9125	I-Girder
A8004	SL	St. Louis	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	14 Urban Other Princ	5	26194	55	720	720	24	90	9125	I-Girder
A7602	CD	Moniteau	State Highway Agency	State Highway Agency	State Bridge	0 Not on NHS	06 Rural Minor Arterial	5	6802	55	187	187	24	90	9125	NU-Girder
A7574	SW	Lawrence	State Highway Agency	State Highway Agency	State Bridge	0 Not on NHS	06 Rural Minor Arterial	17	12738	55	1191	1191	24	90	9125	I-Girder
A7564	SE	Wayne	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	02 Rural Other Principal	21	6286	100	1320	1320	24	90	9125	I-Girder
A7625	SE	Cape Girardeau	State Highway Agency	State Highway Agency	State Bridge	1 On the NHS	02 Rural Other Principal	16	6236	55	549	549	24	90	9125	NU-Girder

Bridge Data

Traffic Data

Custom Agency Fields

Descriptions and Naming

Prestress Properties

Next: BAMS Automation

BAMS Automation

Existing data in → mapped fields → BrR-ready starting model out

STEP 01
Spreadsheet
The MoDOT NBI datasheet stays as the input.

STEP 02
BAMS
BAMS reads the datasheet and maps fields into BrR.

STEP 03
BrR Model
BAMS creates or updates the starting model automatically.

MoDOT naming and setup conventions are applied during the same process.

The result is a cleaner starting point for review, QA/QC, and rating.

Next: Value of Automation

Value of Automation

Less Setup
Less manual model setup from existing inventory data.

More Consistency
More consistent BrR models across the bridge inventory.

Easier QA
Easier QA when models follow the same setup logic.

Repeatable Updates
Repeatable updates when models need to be regenerated.

Time Back to Engineers
More engineer time spent on review instead of setup.

Takeaway: BAMS is framed as a repeatable model-update accelerator before engineering review.

Iowa DOT BrR Automation

From Repetitive Gusset Inputs to Rating-Ready Models

Using BAMS to streamline gusset plate data transfer from Excel into BrR

> For Iowa's standard truss templates, the modeling challenge was not just analysis. It was getting hundreds of repetitive gusset plate inputs into BrR consistently, accurately, and efficiently.

Fig. 1 Typical Iowa standard truss gusset connection

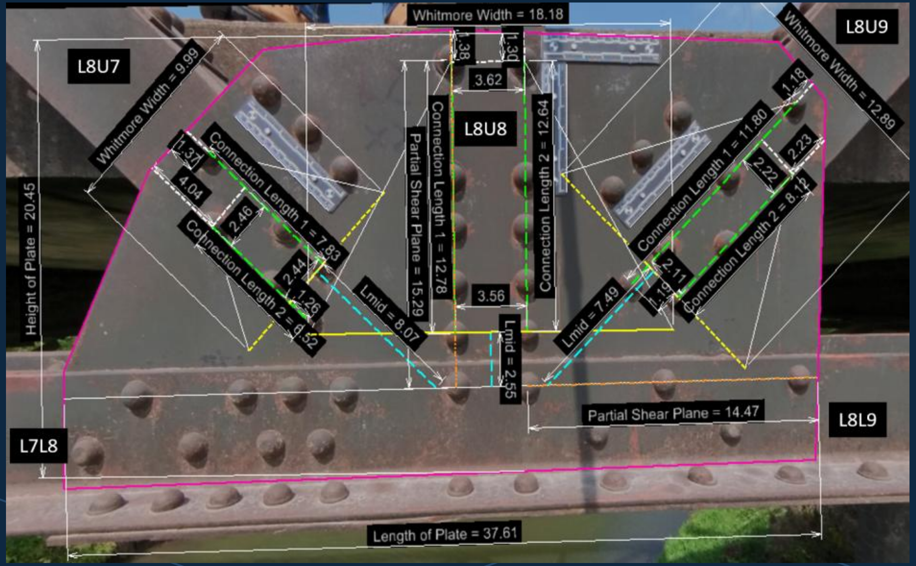


Fig. 2 Gusset load rating inputs for the BrR model

Spreadsheet Inputs → **BAMS Reads + Maps + Writes** → **Rating-Ready BrR Model**

900 hours saved

Project Background: BrR Templates for Iowa Local Agencies

Creating consistent starting-point models for Iowa standard trusses

> Iowa DOT is implementing BrR templates to help local agencies start from consistent, reviewable baseline models rather than building each structure from scratch.

Iowa DOT
Program owner

→ **Standard Bridge Templates** → **Local Agency BrR Users**

Consultant-developed BrR models, libraries, settings, and baseline ratings

IOWA TRUSS STANDARDS

Pony Truss

Straight High Truss

Arched High Truss

1914–1945
standard truss series

~70
truss standards modeled in BrR

Iowa standard pony truss X27

Iowa standard high truss U7

Iowa standard high arch truss Z9

Why Truss Templates Were Challenging

"Standard" trusses still required significant engineering effort

Although Iowa's truss bridges follow standard plans, their gusset plate details, geometry, and historical variations made template development far more complex than expected.

Historical Standards

Truss standards span multiple decades and design eras.

Multiple Truss Configurations

Templates include Pony Trusses, Straight High Trusses, and Arched High Trusses.

Non-Uniform Gusset Plates

Gusset details often vary within a series, and plans may reference shop drawings instead of complete gusset information.

Standard truss could be modeled using a template

Gusset plate modeling could not due to nonstandard details, even in the same series or in the same standard.

Nonstandard gusset plate details at L2 for the Iowa standard S-series trusses—S1, S2, S3, S4 and S6

The Gusset Plate Bottleneck

Where template development became a manual data-entry problem

> The challenge was not creating the truss model itself. It was repeatedly entering and revising large amounts of gusset plate data in BrR.

Engineering Data Source

- Field Measurements
- Photos
- MicroStation Details
- Excel Calculations

Excel Gusset Input Spreadsheet

→

MANUAL TRANSFER GAP

- Manual Copy / Paste
- Manual Verification
- Repeated QA / QC Revisions

→

BrR Gusset Inputs

- Gusset Plate Windows
- Connection Definitions
- Member Assignments
- Rating-Ready Model

BrR Gusset Input Window

≈30 hours per truss model
spent generating gusset inputs and revisions

Repetitive Inputs

Each gusset plate required manual data entry across nine BrR tabs, with 8 to more than 80 fields per tab.

High Revision Volume

QA/QC comments often required updates and re-entry of gusset data throughout development.

Error Risk

Manual transfer increases the likelihood of missing, misplaced, or inconsistent inputs.

Manual Workflow Before Automation

Multiple steps, multiple handoffs, multiple opportunities for rework

Before BAMS, engineers manually transformed field and plan information into gusset plate inputs and then entered those values into BrR one connection at a time.

~30 Hours Per Truss Model

Multiple QA/QC Cycles Per Template Development Effort

01 Field Information
- Field measurements
- Photos
- Inspection notes

Collect gusset dimensions and connection details.

02 Engineering Development
- MicroStation
- Plan review

Interpret details and determine gusset geometry.

03 Excel Gusset Workbook
- Spreadsheet workbook
- Structured input tables

Develop and organize gusset plate input data.

04 Manual BrR Entry
- Keystroke-by-keystroke entry
- BrR gusset input screens

Copy, paste, verify, and re-enter values.

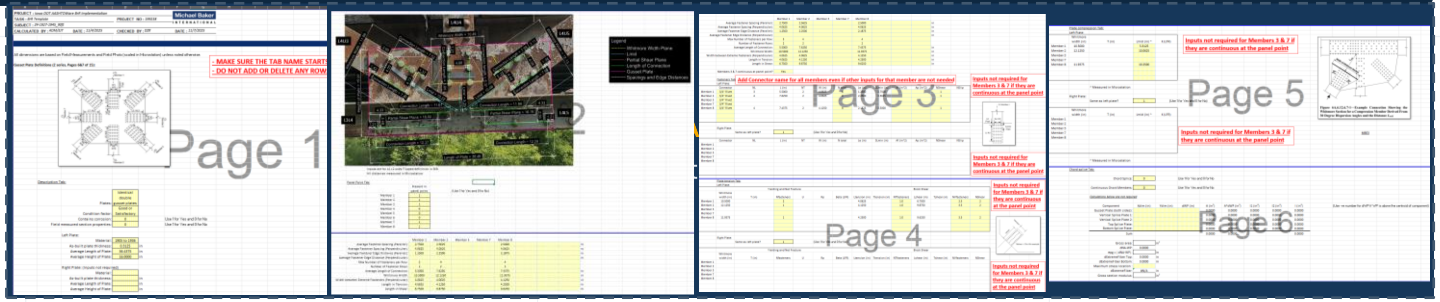
05 QA/QC Review
- Review checklist
- Comment markup

Address review comments and update inputs.

Each revision required engineers to revisit and verify the data transfer process.

REVISION LOOPS

- QA/QC Review ← back to ← Manual BrR Entry
- QA/QC Review ← back to ← Excel Gusset Workbook



Turning Field and Plan Information into Structured Inputs

Transforming scattered engineering information into a consistent gusset data set

Before automation could occur, gusset plate information had to be collected, interpreted, verified, and organized into a structured format suitable for BrR.

01 RAW INFORMATION

Field Photos
Document existing gusset geometry and connection details.

Field Measurements
Capture dimensions and member relationships.

Historic Plans
Review original details and connection layouts.

MicroStation Development
Interpret and refine gusset geometry.

02 ENGINEERING INTERPRETATION

Engineering Review & Validation

Interpret

Verify

Organize

Engineering judgment converts field and historical information into usable gusset parameters.

03 STRUCTURED DATA

Structured Gusset Input Workbook

NODE	PLATE	THICKNESS	FASTENERS
L0	GP-1	0.375 in	14
U1	GP-2	0.375 in	18
L2	GP-3	0.500 in	20
U3	GP-4	0.500 in	22

All gusset information is standardized into a repeatable format before import.

Single Source of Truth

Automation was only possible because the engineering data was first organized into a structured, repeatable format.

Revisions, QA/QC, and Repeatability

The challenge was not entering data once. It was entering it correctly every time.

> As template development progressed, repeated updates, QA/QC comments, and consistency requirements exposed an opportunity to automate the most repetitive part of the workflow.

WHY AUTOMATION?

Frequent Revisions
Template development required multiple iterations and updates throughout review.

QA/QC Effort
Every change required verification to ensure BrR inputs remained aligned with source data.

Time Consumption
Repetitive data transfer consumed valuable engineering hours.

THE RECURRING QA/QC CYCLE

Develop Gusset Inputs

Enter Data into BrR

QA/QC Review

Revise Inputs

Re-enter Data into BrR

QA/QC Review

Repetition, not complexity, became the bottleneck

WHAT AUTOMATION ENABLES

Consistency
Apply structured inputs the same way every time.

Repeatability
Process revisions without repeating manual entry work.

Scalability
Support multiple templates and future updates efficiently.

AUTOMATION OPPORTUNITY

"We weren't trying to automate engineering judgment. We were trying to automate repetitive data transfer."

What BAMS Does

Automatically transferring structured gusset inputs into BrR

Once gusset data was organized in a structured Excel format, BAMS eliminated the need for repetitive manual entry by transferring those inputs directly into BrR.

EXCEL → BAMS → BrR

01 READ

GUSSET INPUT WORKBOOK

BAMS reads structured gusset plate inputs from the standardized workbook.

EXCEL WORKBOOK SCREENSHOT

02 MAP

Spreadsheet Fields → BrR Gusset Parameters

BAMS interprets and aligns source data with the appropriate BrR input locations.

03 WRITE

BrR GUSSET INPUT WINDOW

BAMS automatically populates gusset plate input windows inside BrR.

BAMS UI / BrR SCREENSHOT

Read. Map. Write.

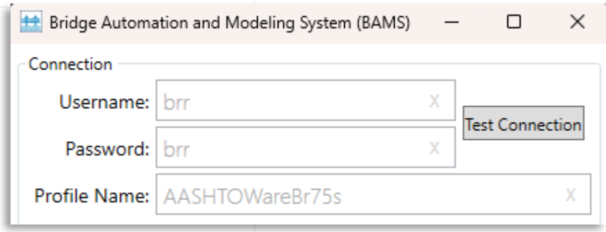
The same engineering data moves into BrR consistently every time.

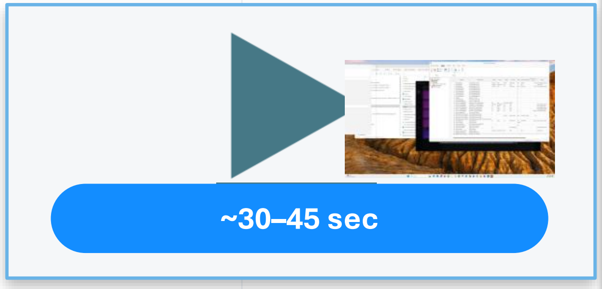
- Consistent Inputs
- Faster Revisions
- Reduced Rework
- Rating-Ready Models

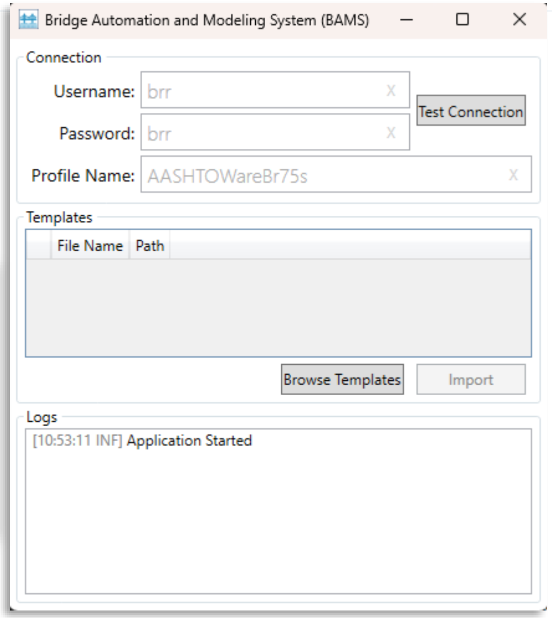
Outcome: Hours Saved and Rating-Ready Models

BAMS turned repetitive gusset plate entry into a repeatable automation workflow

> By automating the transfer of structured gusset plate data from Excel into BrR, the team significantly reduced manual entry effort while improving consistency across Iowa DOT truss templates.







900 HOURS SAVED

Manual gusset plate data entry effort removed from the truss template workflow

MANUAL DATA ENTRY
1,000 hours

AUTOMATED ENTRY WITH BAMS
Around 100 hours

1,000 hrs manual – 100 hrs automated = **900 hrs saved**

Reduced Manual Entry
Repetitive gusset plate inputs no longer had to be copied manually into BrR.

Improved Consistency
Structured data was transferred the same way across models and revisions.

Rating-Ready Models
BrR models had gusset inputs populated and ready for the rating workflow.

*The value was not just faster data entry. It was a **more repeatable path from engineering inputs to rating-ready BrR models.***

Key Takeaways and Next Steps

Lessons learned from automating gusset plate modeling in BrR

> The Iowa DOT truss program demonstrated that structured engineering data and targeted automation can significantly improve efficiency without replacing engineering judgment.

The Bottleneck Was Data Transfer

Gusset plate modeling required repetitive movement of information between Excel and BrR.

Automation Improved Repeatability

BAMS reads, maps, and writes structured gusset inputs consistently across revisions and models.

Engineering Remains Central

Engineers still collect, interpret, validate, and review the information. Automation simply removes repetitive entry work.

900 Hours Saved

From spreadsheet-based gusset inputs to rating-ready BrR models

“We did not automate the engineering.
We automated the repetition.”

COMPLETED IOWA DOT TRUSS TEMPLATE / BrR MODEL

LOOKING AHEAD

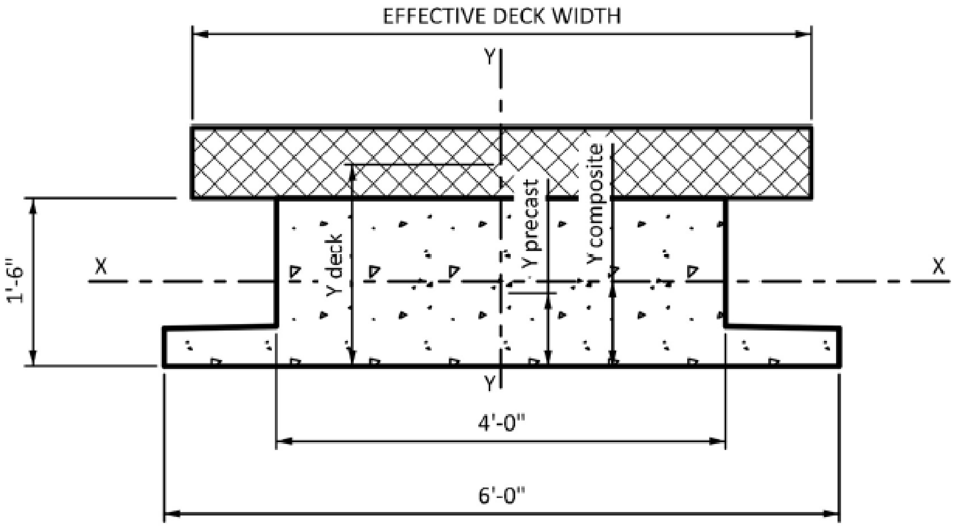
- Future Template Updates
- Additional Truss Applications
- Expanded BrR Automation

EXCEL → BAMS → BrR

Next: MnDOT automation

MnDOT Inverted-T Standard Bridges

A standardized design family — and its load-rating counterpart.



Prestressed concrete Inverted-T beam bridge — MnDOT standard family.

Standardized Design

Geometry, strand patterns, details across span ranges.

Why It Exists

Faster design, consistent detailing, easier fabrication and inspection.

Where It Fits

Short- and medium-span bridges across MnDOT's new builds.

Where BAMS Fits

Automates the models that match every standard configuration.

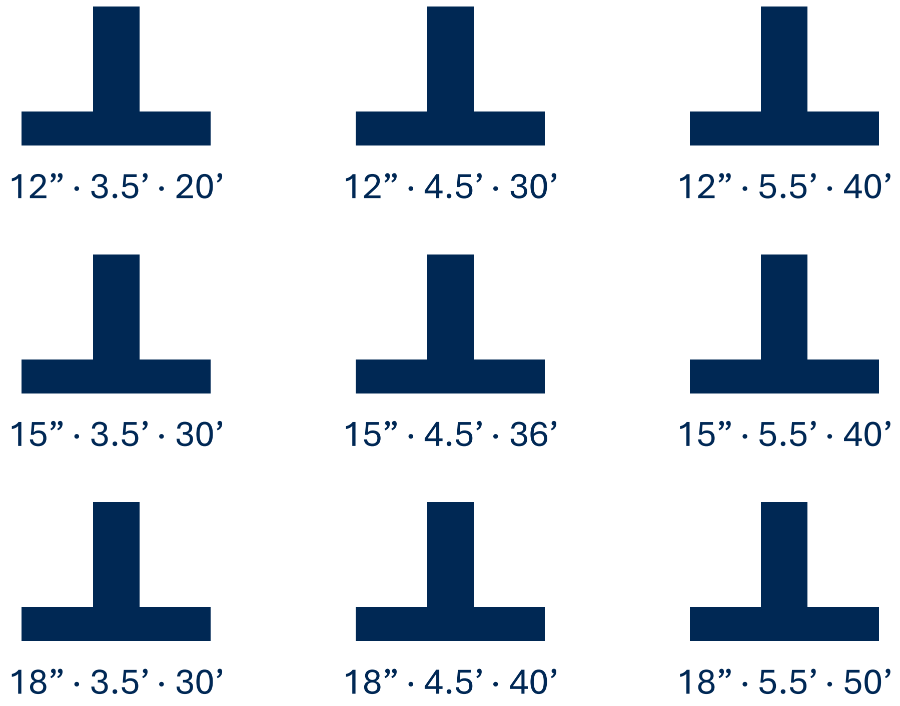
Next: how the automation works — Hanjin Hu.

One family.

Many variations.

Hours of manual work.

Every Inverted-T standard girder — different girder height, fascia girder width, span length, every time.



One design family → dozens of rateable configurations.

One Row = One Bridge

The spreadsheet is the interface. Engineers don't touch code.

BrR File Number	BrR File Name	Bridge ID	NBI structure ID	Description	Ext Girder Shape	Int Girder Shape
1	Inverted T_12in_3.5ft_18ft	12in_3.5ft_18ft	12in_3.5ft_18ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders ar[illegible]a 18ft span length.	12in Edge Beam 3.5	12in Interior
2	Inverted T_12in_3.5ft_20ft	12in_3.5ft_20ft	12in_3.5ft_20ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders an[illegible] a 20ft span length.	12in Edge Beam 3.5	12in Interior
3	Inverted T_12in_3.5ft_22ft	12in_3.5ft_22ft	12in_3.5ft_22ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders an[illegible] a 22ft span length.	12in Edge Beam 3.5	12in Interior
4	Inverted T_12in_3.5ft_24ft	12in_3.5ft_24ft	12in_3.5ft_24ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 24ft span length.	12in Edge Beam 3.5	12in Interior
5	Inverted T_12in_3.5ft_26ft	12in_3.5ft_26ft	12in_3.5ft_26ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 26ft span length.	12in Edge Beam 3.5	12in Interior
6	Inverted T_12in_3.5ft_28ft	12in_3.5ft_28ft	12in_3.5ft_28ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 28ft span length.	12in Edge Beam 3.5	12in Interior
7	Inverted T_12in_3.5ft_30ft	12in_3.5ft_30ft	12in_3.5ft_30ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 30ft span length.	12in Edge Beam 3.5	12in Interior
8	Inverted T_12in_3.5ft_32ft	12in_3.5ft_32ft	12in_3.5ft_32ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 32ft span length.	12in Edge Beam 3.5	12in Interior
9	Inverted T_12in_3.5ft_34ft	12in_3.5ft_34ft	12in_3.5ft_34ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 34ft span length.	12in Edge Beam 3.5	12in Interior
10	Inverted T_12in_3.5ft_36ft	12in_3.5ft_36ft	12in_3.5ft_36ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 36ft span length.	12in Edge Beam 3.5	12in Interior
11	Inverted T_12in_3.5ft_38ft	12in_3.5ft_38ft	12in_3.5ft_38ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 38ft span length.	12in Edge Beam 3.5	12in Interior
12	Inverted T_12in_4.5ft_18ft	12in_4.5ft_18ft	12in_4.5ft_18ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 18ft span length.	12in Edge Beam 4.5	12in Interior
13	Inverted T_12in_4.5ft_20ft	12in_4.5ft_20ft	12in_4.5ft_20ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 20ft span length.	12in Edge Beam 4.5	12in Interior
14	Inverted T_12in_4.5ft_22ft	12in_4.5ft_22ft	12in_4.5ft_22ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 22ft span length.	12in Edge Beam 4.5	12in Interior

One row = one bridge configuration.

Span length
→
BrR span layout

Girder spacing
→
BrR girder spacing

Left overhang
→
BrR deck layout

Uniform load
→
BrR member load

Deck thickness
→
BrR deck profile

LRFD LLDFs
→
BrR LRFD LLDFs

Same input pattern MBI uses for MoDOT and Iowa DOT.

Spreadsheet → BrR Model, in Seconds

One command line. Every convention applied automatically.

Excel Input
Master spreadsheet row

→

BAMS
C# .NET automation tool

→

BrR API
Programmatic modeling

→

BrR Model
Ready to rate

What you get.

MnDOT Conventions Applied
Naming, materials, deck config, girder definition — all baked in.

Clean Model
Unused beam shapes stripped so the file stays lean.

Runs Locally
Engineer's desktop — no server, no cloud dependency.

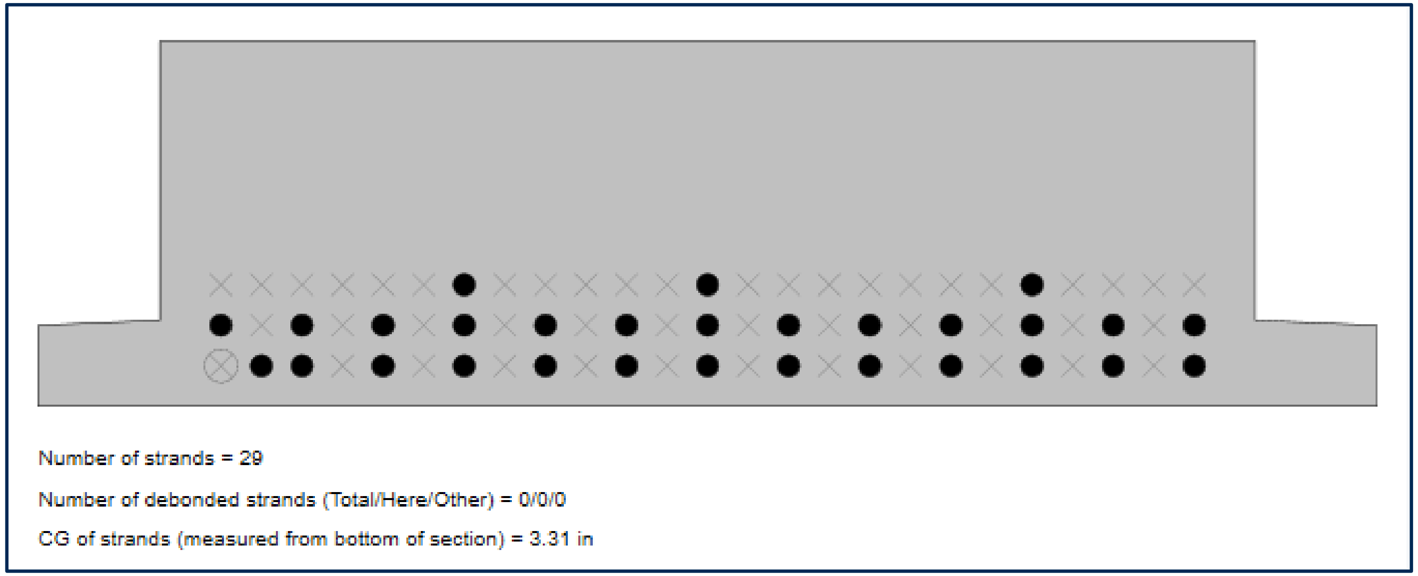
Prestressed Strand Modeling

Strand-by-strand geometry, straight from the spreadsheet.

Input

Girder	Strand	Row	Column
1	1	1	2
1	2	1	3
1	3	1	5
1	4	1	7
1	5	1	9
1	6	1	11
1	7	1	13
1	8	1	15
1	9	1	17
1	10	1	19
1	11	1	21
1	12	1	23
1	13	1	25

Output — BrR Model Geometry



● **Straight** ● **Harped** ● **Debonded** ● **Mild steel**

Standards define the allowable patterns per span.

BrR File Number	BrR File Name	Bridge ID	NBI structure ID	Description	Ext Girder Shape	Int Girder Shape	Superstructure Name	Span Length	Ext Girder spacing	Distance from left edge of deck to superstructure definition reference line	Distance fro edge of dec superstruc definition ref line
1	Inverted T_12in_3.5ft_18ft	12in_3.5ft_18ft	12in_3.5ft_18ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 18ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_18ft	18	4.75	15.5	15.5
2	Inverted T_12in_3.5ft_20ft	12in_3.5ft_20ft	12in_3.5ft_20ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 20ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_20ft	20	4.75	15.5	15.5
3	Inverted T_12in_3.5ft_22ft	12in_3.5ft_22ft	12in_3.5ft_22ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 22ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_22ft	22	4.75	15.5	15.5
4	Inverted T_12in_3.5ft_24ft	12in_3.5ft_24ft	12in_3.5ft_24ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 24ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_24ft	24	4.75	15.5	15.5
5	Inverted T_12in_3.5ft_26ft	12in_3.5ft_26ft	12in_3.5ft_26ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 26ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_26ft	26	4.75	15.5	15.5
6	Inverted T_12in_3.5ft_28ft	12in_3.5ft_28ft	12in_3.5ft_28ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 28ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_28ft	28	4.75	15.5	15.5
7	Inverted T_12in_3.5ft_30ft	12in_3.5ft_30ft	12in_3.5ft_30ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 30ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_30ft	30	4.75	15.5	15.5
8	Inverted T_12in_3.5ft_32ft	12in_3.5ft_32ft	12in_3.5ft_32ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 32ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_32ft	32	4.75	15.5	15.5
9	Inverted T_12in_3.5ft_34ft	12in_3.5ft_34ft	12in_3.5ft_34ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 34ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_34ft	34	4.75	15.5	15.5
10	Inverted T_12in_3.5ft_36ft	12in_3.5ft_36ft	12in_3.5ft_36ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 36ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_36ft	36	4.75	15.5	15.5
11	Inverted T_12in_3.5ft_38ft	12in_3.5ft_38ft	12in_3.5ft_38ft	Load Rating for 12in deep inverted t girders with 3.5ft wide fascia girders and a 38ft span length.	12in Edge Beam 3.5	12in Interior	12in_3.5ft_38ft	38	4.75	15.5	15.5
12	Inverted T_12in_4.5ft_18ft	12in_4.5ft_18ft	12in_4.5ft_18ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 18ft span length.	12in Edge Beam 4.5	12in Interior	12in_4.5ft_18ft	18	5.25	16.5	16.5
13	Inverted T_12in_4.5ft_20ft	12in_4.5ft_20ft	12in_4.5ft_20ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 20ft span length.	12in Edge Beam 4.5	12in Interior	12in_4.5ft_20ft	20	5.25	16.5	16.5
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15	Inverted T_12in_4.5ft_24ft	12in_4.5ft_24ft	12in_4.5ft_24ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 24ft span length.	12in Edge Beam 4.5	12in Interior	12in_4.5ft_24ft	24	5.25	16.5	16.5
16	Inverted T_12in_4.5ft_26ft	12in_4.5ft_26ft	12in_4.5ft_26ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 26ft span length.	12in Edge Beam 4.5	12in Interior	12in_4.5ft_26ft	26	5.25	16.5	16.5
17	Inverted T_12in_4.5ft_28ft	12in_4.5ft_28ft	12in_4.5ft_28ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 28ft span length.	12in Edge Beam 4.5	12in Interior	12in_4.5ft_28ft	28	5.25	16.5	16.5
18	Inverted T_12in_4.5ft_30ft	12in_4.5ft_30ft	12in_4.5ft_30ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 30ft span length.	12in Edge Beam 4.5	12in Interior	12in_4.5ft_30ft	30	5.25	16.5	16.5
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23	Inverted T_12in_4.5ft_40ft	12in_4.5ft_40ft	12in_4.5ft_40ft	Load Rating for 12in deep inverted t girders with 4.5ft wide fascia girders and a 40ft span length.	12in Edge Beam 4.5	12in Interior	12in_4.5ft_40ft	40	5.25	16.5	16.5
24	Inverted T_12in_5.5ft_18ft	12in_5.5ft_18ft	12in_5.5ft_18ft	Load Rating for 12in deep inverted t girders with 5.5ft wide fascia girders and a 18ft span length.	12in Edge Beam 5.5	12in Interior	12in_5.5ft_18ft	18	5.75	17.5	17.5
25	Inverted T_12in_5.5ft_20ft	12in_5.5ft_20ft	12in_5.5ft_20ft	Load Rating for 12in deep inverted t girders with 5.5ft wide fascia girders and a 20ft span length.	12in Edge Beam 5.5	12in Interior	12in_5.5ft_20ft	20	5.75	17.5	17.5
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Delivered & In Use

The result

>500 hrs

saved · ~83% less manual effort

Hours per bridge

6 Hours of hand modeling

Unattended

Consistency

Varies by engineer

Same code path, every model

Reproducibility

Hard to re-verify

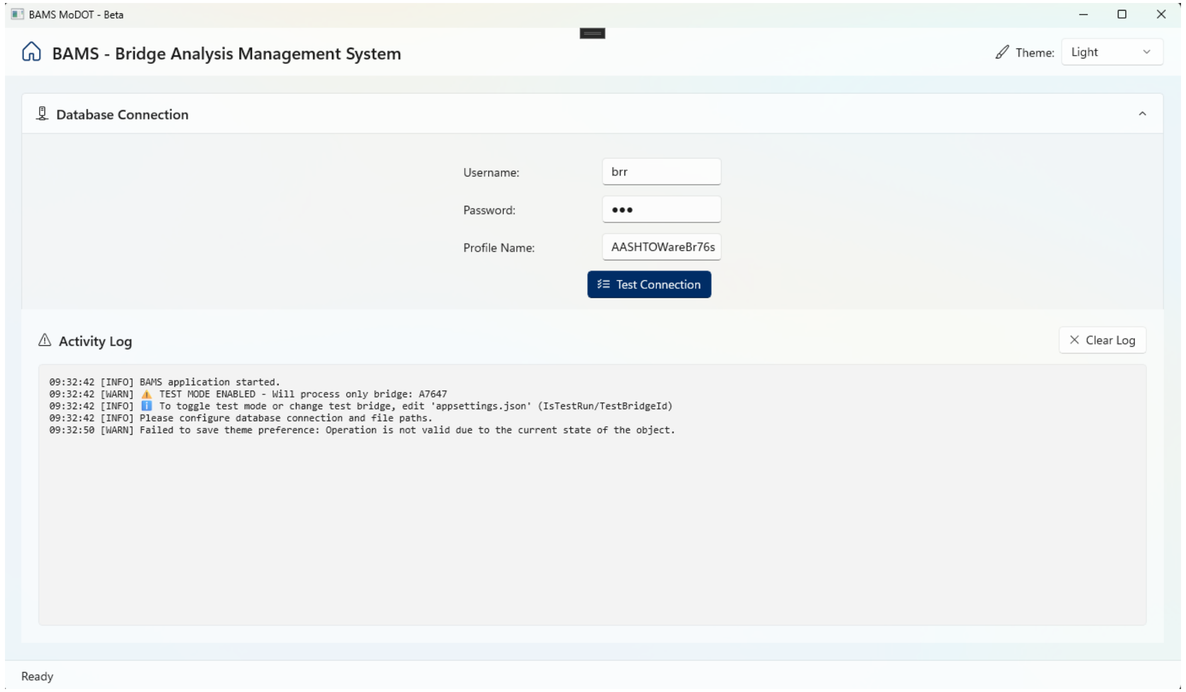
Re-run any time from the spreadsheet

Why This Is Possible Now — BrDR on .NET 8

.NET Framework 4.8 → **.NET 8**

AASHTOWare's platform shift — invisible to the engineer, transformative for third-party tools.

Modern UI Frameworks



Cross-Platform Runtime

Docker, cloud hosting of BrR-connected services. Framework 4.8 was Windows-only.

Faster Startup · Lower Memory

Leaner runtime — tools feel snappy, not sluggish.

Richer NuGet Ecosystem

Modern libraries for Excel, PDF, cloud, logging, testing — all current, all easy to pull in.

One Toolkit, Many Uses

BAMS — MBI's BrR Automation Toolkit

Batch Model Updates

Apply schema or convention changes across large sets of existing models in a single run.

MoDOT | MnDOT | Iowa DOT

Library Item Population

Auto-populate BrR libraries — materials, appurtenances, load configurations — from DOT standards, so every model starts from the same source of truth.

MoDOT | MnDOT | Iowa DOT

Automated QA/QC

Validation rules that catch modeling inconsistencies before ratings are run — unit mismatches, missing load cases, geometry sanity checks.

Internal

Custom Reports

Pull directly from BrR results to generate DOT-formatted rating summaries — tailored to each DOT's report spec.

Video Links

- https://aashtowarebrdr.org/wp-content/uploads/2026/08/Hanjin_Hu_RADBUG-2026-MBI-BrR-Automation-MnDOT.mp4

- https://aashtowarebrdr.org/wp-content/uploads/2026/08/Hanjin_Hu_RADBUG-2026-MBI-BrR-Automation-IowaDOT.mp4

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Thank you!
Questions?