BrR Load Rating Tools and Tips
Overview

Per INDOT Bridge Inspection Memorandum No. 16-06

DATE: May 26, 2016
SUBJECT: Load Rating Requirement for New County Bridges
EFFECTIVE: Immediately

“...load ratings are to be performed using AASHTOWare BrR...”
Counties and Consultants are on the same expedited learning curve, with respect to BrR. There is a need to understand what BrR is doing compared to other programs and codes.

How Can I Help?

Provide tips on the following topics to help speed up the learning process:

- Creating the Model
- Generating Output
- Help and Technical Support
AASHTOWare Bridge Design and Rating Software

- BrR = Bridge Rating *(Formally known as Virtis)*
- BrD = Bridge Design
- BrDR = Bridge Design and Rating

The Workspace “Tree” is Similar for All

The input fields in BrR and BrD are similar by design. For this reason, there may be input fields in BrR that don’t get used at all.

*Tip:* Use the help command to determine whether or not a feature is used by BrR.
Creating the Model
BrR Load Rating Tools and Tips

BrR Bridge Workspace “Tree”

Part 1: Define
- Project
- Materials
- Shapes
Bridge Description

The BrR model should best represent the available plans and BIAS data.

- Bridge ID = BIAS Asset Name
- NBI = BIAS Asset Code
- Name should include method for analysis (LFR or LRFR)
- Description should include:
  - Name of individual responsible for the load rating
  - Name of individual responsible for review
  - Dates for each of the above
Materials

The BrR model should best represent the available plans and BIAS data.

- **BrR Library includes material data for most**
  - Structural Steel
  - Reinforcing Steel
  - Prestressing Strands
  - Reinforced Concrete

- If material data is not available in the plans, use Year Built Date in BIAS along with MBE guidelines
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BrR Bridge Workspace “Tree”

Part 2: Define
- Geometry
- Assign Materials
- Structural Features
Superstructure Definitions

The most commonly used Superstructure Definitions

- Girder System Superstructure
- Girder Line Superstructure
- Reinforced Concrete Slab System Superstructure

The model should represent all members in the superstructure system. This allows for future modifications to specific members due to deterioration and or collision.
Framing Plan Details
Framing Plan Details

This section is used to define beam spacing, skew and diaphragm location and loads.
Structure Typical Section
Structure Typical Section

This section is used to define cross section geometry and assign dead loads.

- Deck: Geometry and Thickness - DC1
- Parapet (etc): Position Rail & Assign Load - DC1 or DC2
- Lane Position: Compute Travel Lanes
- Wearing Surface: Added concrete for overlay - WS

Tip: Load rating model should include only what is on the bridge. Add values for wearing surface only if an overlay exists.
The BrR model should best represent the available plans and BIAS data. Use the View Schematic Icon as a quick check to confirm the model created matches the plans.
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Member Loads

This section is used to apply member loads outside those defined in the typical section and the member self weight.

- SIP Load:
  Add SIP member load if photos in BIAS show stay in place forms.

- Parapet:
  At this time BrR distributes parapet loads evenly to all members. A member load could be used to evaluate 60/40 application.
Control Options

Steel:

Allow plastic analysis for A36 and Grade 50
Control Options

- Prestress Concrete:
  
  LRFR use General Procedure

  LFR Use current AASHTO for Shear Computation Method.
Control Options

- Single Span Concrete:
  - Generate at 10th points except at supports
  - Generate at support face & critical shear points
  - Provide information for Effective Supports within model

Tip: Using this approach eliminates all checks over the support. This can be used for single span only when model produces low shear values over the supports.
Steel Tips

- **Equivalent Cover Plates:** Older structures may splice beams at the piers with cover plates extending beyond the splice limits. An equivalent cover plate, equal to the thickness in excess of the needed splice may be added to the model.
Concrete Tips

- **Equivalent Stirrup Spacing**: Bent bars in reinforced concrete girders provide additional shear capacity as defined by AASHTO. BrR produces errors when modeling bent bars. An equivalent bar spacing can be computed for the typical shear reinforcement to provide added benefit of the bent bars.
Concrete Tips

- **Effective Supports**: Utilize effective supports when possible for single span analysis.

- **Shear Stirrup Ranges**: When defining stirrups, BrR does not place a stirrup at the start of a range.

*The first line above locates the first stirrup, the second line places the rest of the stirrups in the series*
Generating Output
Generating Output

BrR has several options to generate output that can be used for comparison with other software and AASHTO:

- Review Input File
- View Analysis Results
- Report Tool
- Spec Check
- Analysis Charts
- Analysis Output

Tip: The model used to produce the HL-93 results in the following example is “TrainingBridge1”, which is included in the BrR installation.
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BrR Review Input File

To create a report of all input for review:

- Select the Superstructure Definition to be reviewed

- Go to Bridge > Review

- Go to File > Print for pdf or hard copy of report
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BrR View Analysis Results

After performing a load rating analysis, the View Analysis Results Icon produces an overview of the rating:

- **Controlling Rating** \((HL-93 \text{ Inv } = 0.477)\)
- **Limiting Condition** \((Strength-I \text{ Steel Flexure Stress})\)
- **Location** \((80.50 \text{ ft, or 50\% of Span 1})\)
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BrR Report Tool

BrR Report Tools uses Internet Explorer to create reports.

Set up is required to use BrR’s Report Tool icon.

- Go to VIEW > PREFERENCES
BrR Load Rating Tools and Tips

BrR Report Tool

- Go to ANALYSIS TAB
- Select BROWSE to pick a folder that has been created for storing output files.

Tip: Analysis is quicker if this folder resides on the local drive.
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BrR Report Tool

- Go to Location of the Analysis Output Folder as defined
- Choose the “Default Program to Open With” to be Internet Explorer

Tip: Every time a bridge is analyzed several reports are created. This folder can get to be quite large and take up a lot of space. Periodic file removal is recommended.
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BrR Report Tool

After setup is complete, perform HL-93 LRFR analysis and use Report Tool Icon to generate report.

- Select Member in BrR Tree
- Select BrR Report Tool Icon
- Select Report Type
- Click “Generate” Button
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BrR Report Tool

BrR will launch Internet Explorer and create a new tab for a report displaying load rating summary, reactions, moments, shears and detailed rating results at requested locations.

Tip: Check boxes in the report are helpful to isolate controlling condition.
After the controlling location and condition is identified, use the View Spec Check icon to identify the limiting AASHTO Code reference.

Tip: Select individual Specification References and dial in to additional detailed computations.
Spec Check 6A.4.2.1: Steel Flexure Stress General, shows that the HL-93 Inventory rating is controlled by stress in the bottom flange.
Data from analysis charts can be cut and pasted into MS Excel.
Several of the reports using this icon are generated using Internet Explorer. Options will vary based on structure type.

Tip: The Log File created contains the same information produced during analysis. This can be helpful when trying to identify run-time errors.
Help and Technical Support
BrR Help

Set Engine Help Configuration to the appropriate AASHTO Code. When questions arise, place cursor in the field in question and click the Help Icon. BrR will provide information on the specific field in question. To determine if the field is used in BrR, select “Engine Related Help”.
Help and Technical Support

The website for AASHTOWare Support contains a lot of helpful information

https://aashto.mbakercorp.com/Pages/Support.aspx

- Technical Notes
- Downloads for Service Pack Releases
- Tutorials
- JIRA Support
- email Support

Tip: Subscribe to the End-user Mailing List-eNotifications to receive Technical Notes and Service Pack Releases.
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Tutorials

Training tutorials on the AASHTOWare Support site include xmls that can be imported into BrR and pdfs for guidance.
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JIRA Support

All licensed users have read only access to open and resolved issues with BrR and BrD.

- Keyword searchable
- Priority for resolution
- Potential work around
- Issues to be resolved in upcoming releases

Tip: Select JIRA Support Center link on website to access JIRA Support. Use username: brd and password: brr
email Support

If the technical notes, tutorials and JIRA Support don’t provide a solution, support questions may be emailed to:

BrDR@mbakerintl.com

Special Consultant/Agency License and Agency Sponsored Consultant License includes limited support for installation issues only. Primary technical support must go through the sponsoring agency.

Tip: AASHTOWare will only respond to email support requests if INDOT is cc’d.
RADBUG Meeting
(Rating And Design Bridge Users Group)

Annual Meeting first week in August

http://aashtobr.org/

A link to all presentations since the 2010 Annual RADBUG meeting can be found on the website. Including Fundamentals Workshop tutorial, Library Training and guidance from other DOTs facing the same Federal mandates.
Thank You!

For additional questions, please contact:

**Jennifer Hart**
O: 317-895-2585  
E: Jennifer.hart@ucindy.com

1625 N Post Rd  
Indianapolis, IN 46219  
www.ucindy.com