

Implementation of AASHTOWare BrR Program for Rating Iowa Bridges

BrR System and Library Data Summary

Prepared for: Iowa Department of Transportation

24 June, 2024

Project No. 199238



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1.0 Iowa DOT BrR System and Library Files

The AASHTOWare BrR (BrR) version used to create the files is BrR Version 7.5.0.3001.



The following files are provided and will be used to import the Iowa DOT System and Library files into the program.

- IowaDOT_System_BrR_V750.brsx
- IowaDOT_Library_BrR_V750.brlx

Download and save the above files to the user's desired location for import. In this example, the files are saved in the "Downloads" folder.

Import of the system and library files can only be accomplished by an BrR Administrator in your organization. Refer to ProMiles training material for group license setup and appropriate privilege.

| 🖊 💆 📴 🗧 Downloads | |
|---------------------------------|-----|
| File Home Share View | |
| ← → × ↑ 🕹 > This PC > Downloads | √ Č |
| lowaDOT_Library_BrR_V750.brlx | |
| lowaDOT_System_BrR_V750.brsx | |
| | |

2.0 Configuration Browser in BrR

To access the Configuration browser, click on "VIEW" in the top ribbon and select "Configuration".

| BRIDGE EXPLORER BRIDGE FO | DLDER RATE TOOLS VIEW | | | | | |
|---|---|------------------|------|---|--------------|---|
| Import New Open D Batch ✓ Find | Copy Paste Copy Remove Delete | | | | | |
| Bridge | BRIDGE EXPLORER BRIDGE FOLD | ER | RATE | TOOLS | VIEW | |
| ←☆ Favorites Folder ←ジ Recent Bridges ➡ ジ All Bridges ➡ ジ Templates ← ジ Deleted Bridges | Refresh Retrieve All C Select 1 Refresh Retrieve Next C Select 1 Invert S Bridge | Vone Selectio | So | ✓ Columns | US Customary | Library Configuration |
| | | | BID | Br | idge ID | Bridge Name |
| | - ₩ All Bridges - ₩ P Templates ₩ Deleted Bridges | | 2 | TrainingBride TrainingBride TrainingBride | ge2 | Training Bridge 1(LRFD) Training Bridge 2(LRFD) Training Bridge 3(LRFD) |



The Configuration browser provides access to the configuration features of BrR. The following items are available in the configuration tree.

- Users: Add/modify users and user groups
- Access Privileges: Specify access privileges for each group of users defined in the Users tree
- Parameters: Edit names of counties, districts, etc
- System Defaults: Specify default settings and the analysis engine for the Bridge Workspace
- Engine Defaults: Specify analysis and rating methods for the different superstructure types

"IowaDOT_System_BrR_V750.brsx" contains the following modified data specific for Iowa DOT:

- Analysis Event Template
- System Defaults
- Unit Tolerance
- Parameters
- Custom Agency Fields Labels

Appendix A provides a detailed documentation of the data, specific for Iowa DOT, listed above.

If a consultant performs BrR ratings for multiple states, submit a ticket with ProMiles to set up multiple BrR system data for different clients. This will prevent Iowa DOT's system preferences from conflicting with other states.

2.1 Import Configuration System File

Step 1: After opening and logging into the BrR program, navigate to the Bridge Explorer window. Select "Import" and locate the "IowaDOT_System_BrR_V750.brsx" file in the folder where the file is saved at. Select the file and click "Open".

| BRIDGE EXPLORER BR | | | | | | |
|--------------------------------------|---|---|--------------------------------------|-------------------|------------------|-----------------|
| Bridge | Preferences Database information Export | Support System Data Import $\leftarrow \rightarrow \lor \uparrow \checkmark $ This PC > Organize \checkmark New folder | Downloads | ڻ ~ | Search Downloads | × |
| B P Templates → P Deleted Bridges | Import Help License Exit | Abo | Date modified x 3/27/2024 4:02 PM | Type BRSX File | Size | |
| | | File name: | | ~ | | brsx) ~ ncel |

| CONFIGURATION | |
|--|----------|
| BRIDGE EXPLORER CONFIGURATION | |
| Image: New Rename Group Image: New Group New Rename Group New User Open Delete User Close User | |
| Manage | |
| 🖶 🍰 Users | User ID |
| - M All Users | BrDUser |
| H Administrators H Design Engineers | Bridge |
| - Managers | - |
| - A Rating Engineers | BrR |
| - A Routing Engineers | BrRAdmin |
| - Control Access Privileges | BrRMgr |
| 😭 Access Rights 🛱 Bridge Administration | BrRUser |
| Bridge Check-Out | |
| Bridge Description | |
| 🔂 Bridge Description Custom Agency Field Lal | |
| 🔂 Bridge Exchange | |
| 🙆 Bridge List | |
| 🙆 Bridge Locking and Unlocking | |
| - 🙆 BrM Rating Events | |
| - 🔂 BrM Rating Vehicles | |
| G Configuration | |
| 🔂 Design Events 🛱 General Preferences | |
| - General Preferences | |
| - 1 Library Import | |
| - 1 Link to BrM Bridges | |
| - 🔂 Load Rating Tool | |
| - 🙆 Log Events | |
| Parameters | |
| - 🛱 Private Analysis Setting Template Administr. | |
| - 🛱 Private Analysis Setting Templates | |
| 🔂 Private Bridge Folders | |
| 🔂 Private Folder Administration | |
| 🔒 Public Analysis Setting Templates | |
| 🔂 Public Bridge Folders | |
| 🔂 Rating Events | |
| 🟠 System Data Export/Import | |
| 🙆 System Defaults | |
| - 🙆 User Profile Settings | |
| - 😭 User-Owned Library Entries | |
| System Defaults | |
| - Defaults | |



Step 2: : The left pane of the Import window under "System data items" shows the different configuration data categories. Clicking on these categories will show the available configuration system files in the middle pane under "Details". To import all the configuration data at once, click on "System Data" to highlight it. Then click on the double arrow button ">>". This selects all the configuration data available under the "System Data" tree for import.

| | Details: | Selected to import: |
|---|------------------|---------------------|
| System Data Analysis Event Template Load Combination Settings Template System Defaults Unit Tolerance General Preference Template Parameters Custom Agency Fields Labels | Name Description | |

To import a specific configuration data, select the appropriate category under the "System data items" pane and select the setting item under the "Details" pane to highlight it. Then, click on the single arrow button ">" to move the setting into the right pane under "Selected to Import". Multiple setting items can be selected and imported at the same time.

| 🔢 System Data Import | | | | | | × |
|--|----|-----------------|-----------------|----|---------------------|---|
| System data items: | De | tails: | | | Selected to import: | |
| 🖻 🗁 System Data | | Name | Description | | | |
| Analysis Event Template Dod Combination Settings Template | > | System Defaults | System Defaults | < | | |
| Boar Patete Template System Defaults Unit Tolerance General Preference Template Pareal Preference Template Pareameters Custom Agency Fields Labels | |]4 | , | >> | Import Close | |

Step 3: Click on the "Import" button on the bottom right to import the configuration data. Once you've imported the data, a dialog box will pop up indicating the import is successful.

| System Data Import | | | | × |
|--|----------|-------------|---|---------------------------------|
| System data items: | Details: | | Selected to import: | |
| System Data Analysis Event Template Load Combination Settings Template Load Palette Template System Defaults Unit Tolerance General Preference Template Parameters Custom Agency Fields Labels | Name | Description | ⇒ Uni Tota → ft → ft → mn → mn | vefaults m Defaults rance |

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3.0 Library Explorer in BrR

To access the Library Explorer, click on "VIEW" in the top ribbon and select "Library".

| BRIDGE EXPLORER BRID DEPENDENT New Open Batch ~ | 66 🗗 | RATE TOOLS | VIEW | | | | | | | | |
|--|------|---|-------------------------------------|--|------|-------------|---|-----------------------------|---------|-------------------------------------|---------------|
| Bridge Favorites Folder Bridges All Bridges Bridges Deleted Bridges | | BRIDGE EXPLORER | All 🚺 Sele Next 🗱 Sele 💓 Inve | DLDER ect All ect None ert Selec dge Exp | tion | Sort By~ | Select | VIEW US Customary | ~ | Library | Configuration |
| | | ← ☆ Favorites Folder ← ∅ Recent Bridges ➡ ∅ All Bridges ➡ ∅ Templates ← ∅ Deleted Bridges | | | > E | 2 1 | Brid TrainingBridg TrainingBridg TrainingBridg | e2 | Trainir | ng Bridge ng Bridge ng Bridge | 2(LRFD) |

The Library Explorer is used to navigate the library module to access the various library windows. The library is used to save commonly used items in the program and eliminate the need to define the same items repeatedly. Library Items can be created, duplicated, modified, and deleted.

There are three types of library items:

- Standard: Default AASHTO database that cannot be modified
- Agency Defined: Items added to the library by a user
- User Defined: Currently only available for vehicles that are added by a user.

"IowaDOT_Library_BrR_V750.brlx" contains Iowa DOT specific data for:

- Appurtenances
- Materials
- Prestress Shapes
- Vehicles

Appendix B provides a detailed documentation of the library data, specific for Iowa DOT, listed above.

Notes:

- 1. Updating a library item or importing a new library file does not automatically update the bridge model that used the previous library data. As such, the library data in the bridge model will need to be reselected from the updated library to have the most up-to-date library definition inputs & properties.
- 2. The vehicles in the Library File that are used in the Analysis Event Templates will not be imported if the System File is imported first as the vehicles' names are not unique. These vehicles have been imported into the library as part of the System File Import. The rest of the vehicles in this library will be imported with the Library File.





INTERNATIONAL 3.1 Import Library File

Step 1: In the Library Explorer, click on "Bridge Explorer". Select "Import" and locate the "IowaDOT_Library_BrR_V750.brlx" file in the folder where the file is saved at, select the file and click "Open".

| BRIDGE EXPLORER | | | | |
|---|-----------------------------------|--|--|-------------|
| New Duplicate Open Delete Manage | Preferences Database information | Support Help Topics Getting help using the software | | |
| Pactors Control LRFD DF Applicability Ranges LRFD Substructure Design Settings Materials Metal Box Culvert Metal Pipe Culvert Porstress Shapes Steel Shapes Por Timber Shapes Porticles | Export Help Extense Kat | Library Import ← → ~ ↑ ↓ → This PC → Downloads Organize ▼ New folder Last month (1) IowaDOT_Library_BrR_V750.brlx | | × • • |
| | | File name: | Library export file (*.brlx) Open Cancel | × |

Step 2: The left pane of the Import window under "Library items" shows the different library folders for all the bridge elements. Clicking on the folder will show the contents of each folder under the middle pane under Details. To import all the library data at once, click on "Library" under the left pane to highlight it. Then click on the double arrow button ">>". This selects all the library files available under the "Library" tree for import.

| 📴 Library Import | | | | × |
|---|----------|-------------|-------------|--------------|
| Library items: | Details: | | Selected to | import: |
| Cubrany Appurtenances Appurtenances Generic Median Parapet Railing Connectors Nail Corrugated Metal Panel Factors LFD LFD LFD LFD LFD LFD Materials Materials Auminum | Name | Description | > | Import Close |



To import a specific library item, select the appropriate library folder under the "Library items" pane and select the item under Details box to highlight it. Then, click on the single arrow button ">" to move the item into the right pane under "Selected to Import". Multiple items can be selected and imported at the same time.

| orary items: | De | tails: | _ | | Selected to import: | |
|---|----|---|---------------|----|---------------------|--|
| 🗄 🗁 Library 💧 | | Name | Description | > | | |
| E- 🗁 Appurtenances | > | Curb_8" x 2'-1 1/2" w/ 6" Overhang | lowaDOT Stand | 4 | | |
| Median | | ConcRail_Aesthetic | IowaDOT Aesth | | | |
| - 📁 Parapet | | ConcRail_Open_2'-8" x 1'-3" (20" Block) | IowaDOT Stand | | | |
| 📁 Railing 🗁 Connectors | | ConcRail_Open_2'-8" x 1'-3" (19" Block) | IowaDOT Stand | | | |
| 📁 Bolt | | ConcRail_Open_2'-5" x 1'-3" (15" Block) | lowaDOT Stand | | | |
| 🗭 Nail | | ConcRail_Open_2'-5" x 1'-3" (19" Block) | IowaDOT Stand | | | |
| Corrugated Metal Panel | | ConcRail_3'-6" Median Barrier | lowaDOT Stand | | | |
| LFD LRFD LRFR | | ConcRail_2'-10" Straight Barrier | IowaDOT Stand | | | |
| LRFR LRFD DF Applicability Ranges LRFD Substructure Design Settings | | | | >> | | |
| Aluminum | | | | << | | |

Step 3: Click on the "Import" button on the bottom right to import the library data. Once you've imported the data, a dialog box will pop up indicating the import is successful.

| orary items: | Details: | | Selecte | d to import: |
|--------------|----------|-------------|---------|--|
| | Name | Description | | Library → Appurtenances → Generic → Courb_8" x 2'-1 1/2" w/ 6" Ove → Courb_8" x 2'-1 1/2" w/ 6" Ove → Courbail_Open_2'-8" x 1'-3" (→ ConcRail_Open_2'-8" x 1'-3" (→ ConcRail_Open_2'-8" x 1'-3" (→ ConcRail_Open_2'-5" x 1'-3" (→ ConcRail_Open_2'-5" x 1'-3" (→ ConcRail_Open_2'-5" x 1'-3" (→ ConcRail_Open_2'-5" x 1'-3" (→ ConcRail_2'-6" Median Barrie → Median → ConcRail_2'-5" Temporary Barri → ConcRail_2'-5" Temporary Barri |

3.2 Import Historic Steel Rolled Beam Shapes Library File

The historic steel rolled beam shapes library file is provided by AASHTOWare but is not imported into BrR library by default. It is optional but if required, contact the BrR Administrator in your organization for import guidance. Below are instructions to import and use these historic shapes.

Step 1: In the Library Explorer, click on "Bridge Explorer". Select "Import", navigate to "C:\Program Files\AASHTOWare\BrDR75" and select the file named "OldRolledShapes.brlx". Select the file and click "Open". A dialog box will appear to confirm import, select "Yes".

| BRIDGE EXPLORER UBRAR DERIDGE EXPLORER UBRAR UBRAR UBRAR UBRAR UBRAR UBRAR UBRAR UBRAR | | | | | | | |
|---|-----------|--|---|--|----------|------------------------------|--------|
| Manage | 📳 Export | | ws (C.) > Program Files > A | ASHTOWare > BrDR75 | ڻ ~ | Search BrDR75 | × م |
| 🖶 📁 Metal Pipe Culvert | 🚆 Import | Organize New folder | | | | | ? |
| | Help | Name | Date modified | Туре | Size | | |
| Image: Steel Shapes Image: Shapes I | E License | ArcTool Engines Help Migration Wizard | 2/15/2024 10:12 AM 2/15/2024 10:11 AM 4/12/2024 3:21 PM 2/15/2024 10:12 AM | File folder File folder File folder File folder | | | |
| | | OldRolledShapes.brix | 10/30/2023 10:57 AM | BRLX File | 2,166 KB | Library export file (*.brkx) | ~ |
| | | | | | | Open Cancel | |

Step 2: To import historic shapes data, click on "Rolled Beam" under the left pane to highlight it. Then click on the double arrow button ">>". This selects all the historic shapes data available under the "Rolled Beam" branch for import.

| rary items: | | Det | ails: | | | Selected to import: |
|--|----|-----|------------------------|---------------|-----|---------------------|
| Spiral Rib Metal Pipe | | | Name | Description | > | |
| 📁 😥 Structural Plate Pipe | | > | 10WF(B10),10X5.75x21 | 10WF(B10),10X | < | |
| Prestress Shapes Box Beams | | | 10WF(B10),10X5.75x23 | 10WF(B10),10X | | |
| Circular Void | | | 10WF(B10),10X5.75x25 | 10WF(B10),10X | | |
| 🖉 Rectangular Void | | | 10WF(B10),10X5.75x26 | 10WF(B10),10X | | |
| i Beams i | | | 10WF(B10),10X5.75x29 | 10WF(B10),10X | | |
| - Division op Hange | | | 10WF(B10a),10X8x33 | 10WF(B10a),10 | | |
| ···· 📁 Tee Beams | | | 10WF(B10a),10X8x37 | 10WF(B10a),10 | | |
| U Beams | | | 10WF(B10a),10X8x39 | 10WF(B10a),10 | | |
| 🧭 Angle | | | 10WF(B10a),10X8x41 | 10WF(B10a),10 | | |
| 🧭 Channel 🗭 Rolled Beam | 11 | | 10WF(B10a),10X8x45 | 10WF(B10a),10 | | |
| inter beam | 11 | | 10WF(B10b),10X10x49 | 10WF(B10b),10 | | |
| 🖃 🗁 Timber Shapes | 11 | | 10WF(B10b),10X10x54 | 10WF(B10b),10 | | |
| Rectangular | 11 | | 10WF(B10b), 10X10x60 | 10WF(B10b),10 | >> | |
| 📁 Non Standard Gage | 11 | | 10WF(B10b),10X10x66 | 10WF(B10b),10 | | 4 |
| 🦳 🎾 Standard Gage | ÷ | | 10WF(CB101) 10X5.75x21 | 10WF(CB101) 1 | < < | |



Step 3: Click on the "Import" button on the bottom right to import the historic shapes data. Once you've imported the data, a dialog box will pop up indicating the import was successful.



After the import, the historic steel rolled beam shapes are saved in BrR library. The next three steps demonstrates the steps to copy these shapes from BrR library into the Bridge Workspace.

Step 4: In the Bridge Workspace, under "Components" -> "Beam Shapes" -> "Steel Shapes", double click on "I Shapes" or click on "New" in the top ribbon to open the "Steel I Shape" definition window.





Step 5: Select "Copy from Library" at the bottom of the window to open up the "Steel Shape Selection window".

| A Steel I Shape | | Rolled shape type |
|-----------------|-----------------------------------|--|
| Description: | | W shape M shape S shape HP shape |
| Dimensions | Properties | |
| | Copy to library Copy from library | OK Apply Cancel |

Step 6: The historic shapes data can be found by selecting the "Agency Defined" button under the "Library" box. Select the appropriate shape and select "OK" to copy the shape information into the "Steel I Shape" definition window. Select "OK" to save the definition in the Bridge Workspace.

| St | eel Shape Selection | | | | | × | L | | | Rolled shape type |
|----|----------------------|------|------------|----------------------------------|------------|--------------------|--------------|--|-------------|-------------------------------------|
| | | | | | | | Name: | 10WF(B10),10X5.75x21 | | |
| | | | | brary Standard Agency defi | | system SI US | Description: | 10WF(B10),10X5.75x21 (Last Year Rolled | d 1948) | S shape M shape S shape HP shape |
| | | | | | | | Dimension | ns Properties | | |
| | Shape | Year | Depth (in) | Load (lb/ft) | Sxx (in^3) | | | | | |
| | 10WF(B10),10X5.75x21 | 1938 | 9.9000 | 21.000 | 21.475 | | | in | - [in | |
| | 10WF(B10),10X5.75x23 | 1938 | 10.0000 | 23.000 | 24.120 | | | 0.3400 in | | |
| | 10WF(B10),10X5.75x25 | 1946 | 10.0800 | 25.000 | 26.429 | | | | × 9.9000 in | |
| | 10WF(B10),10X5.75x26 | 1938 | 10.1200 | 26.000 | 27.609 | | | 0.2400 in 🕨 | + [| |
| | 10WF(B10),10X5.75x29 | 1938 | 10.2200 | 29.000 | 30.783 | | | | =_ ± | |
| | 10WF(B10a),10X8x33 | 1938 | 9.7500 | 33.000 | 35.056 | | | 5.7500 in | | |
| | | | | | ок с | ancel | | | | |
| | | | | | | | | | | |

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3.3 Modify and Delete Library Items

Step 1: In the Library Explorer, select a library folder on the left window pane and a list of library items will show on the right window pane. In this example, select "Appurtenances" -> "Generic" on the left window pane and all Generic appurtenances created under this category will be shown on the right window pane.

| New Duplicate Open Delete Schematic | | | | | | |
|---|---------|--|------------------------------------|---|--|--|
| Manage | | | | | | |
| Appurtenances | Library | Units | Name | Description | | |
| - 🔁 Generic - 🧭 Median | Agency | US Customary | Curb_8" H x 2'-1.5" W (6" Overha | lowa DOT Standard curb with 6" overhang (Area 231 | | |
| Parapet | Agency | US Customary | ConcRail_3'-2" Aesthetic | Iowa DOT Aesthetic concrete railing | | |
| | Agency | US Customary | ConcRail_2'-8" Open (20" Block) | lowa DOT Standard Open Rail w/ 1'-8" top rail block | | |
| ← 🧭 Railing ← 🎾 Connectors ← Corrugated Metal Panel ← 🎯 Factors | Agency | US Customary | ConcRail_2'-8" Open (19" Block) | lowa DOT Standard Open Rail w/ 1'-7" top rail block | | |
| | Agency | US Customary | ConcRail_2'-5" Open (15" Block) | lowa DOT Standard Open Rail w/ 1'-3" top rail block | | |
| ⊢∅ Factors −∅ LRFD DF Applicability Ranges −∅ LRFD Substructure Design Settings | Agency | US Customary | ConcRail_2'-5" Open (19" Block) | lowa DOT Standard Open Rail w/ 1'-7" top rail block | | |
| Materials | Agency | US Customary | ConcRail_3'-6" Median Barrier | Iowa DOT Standard Median Rail | | |
| Metal Box Culvert | Agency | US Customary | ConcRail_2'-10" Separation Barrier | Iowa DOT Standard Separation Barrier | | |
| Ø Metal Pipe Culvert Prestress Shapes | Agency | Agency US Customary ConcRail_2'-10" Aesthetic Iowa DOT Aesthetic concrete railir | | | | |
| 📁 Steel Shapes | Agency | US Customary | ConcRail_3'-6" Open (1'-1" Windo | Iowa DOT Standard Open Rail w/ 1'-1" windows | | |
| Timber Shapes Vehicles | | , | | | | |

Step 2: Double-click on a library item or click on "Open" in the top ribbon and the library item definition window pane will open below the right window pane.

| New Duplicate Open Delete Schematic Close | | | | | | | |
|--|----|---------|--------------|------------------------------------|--|--|--|
| Manage | | | | | | | |
| Appurtenances | 11 | Library | Units | Name | Description | | |
| 🗁 Generic 🧭 Median | > | Agency | US Customary | Curb_8" H x 2'-1.5" W (6" Overha | lowa DOT Standard curb with 6" overhang (Area 231 | | |
| 📁 Parapet | | Agency | US Customary | ConcRail_3'-2" Aesthetic | Iowa DOT Aesthetic concrete railing | | |
| Railing | | Agency | US Customary | ConcRail_2'-8" Open (20" Block) | Iowa DOT Standard Open Rail w/ 1'-8" top rail block | | |
| Connectors Corrugated Metal Panel | | Agency | US Customary | ConcRail_2'-8" Open (19" Block) | Iowa DOT Standard Open Rail w/ 1'-7" top rail block. | | |
| Pactors | | Agency | US Customary | ConcRail_2'-5" Open (15" Block) | lowa DOT Standard Open Rail w/ 1'-3" top rail block | | |
| Factors Factors LRFD DF Applicability Ranges LRFD Substructure Design Settings Metarials Metal Box Culvert | | Agency | US Customary | ConcRail_2'-5" Open (19" Block) | lowa DOT Standard Open Rail w/ 1'-7" top rail block | | |
| | | Agency | US Customary | ConcRail_3'-6" Median Barrier | Iowa DOT Standard Median Rail | | |
| | | Agency | US Customary | ConcRail_2'-10" Separation Barrier | Iowa DOT Standard Separation Barrier | | |
| ■ 🧭 Metal Pipe Culvert ■ 🧭 Prestress Shapes | | Agency | US Customary | ConcRail_2'-10" Aesthetic | Iowa DOT Aesthetic concrete railing w/ 3/4" panels | | |
| 🖗 📁 Steel Shapes | | Agency | US Customary | ConcRail_3'-6" Open (1'-1" Windo | Iowa DOT Standard Open Rail w/ 1'-1" windows | | |
| ∎Ø Timber Shapes ≞Ø Vehicles | | | , | J | | | |



Modfying Library Items: In the library item definition pane, the item's name, description, dimensions and properties can be modified. Once the item information has been updated, click on "Save" on the bottom right corner to save the information in BrR library.



Note:

- 1. Any updates made to the library items in the Library Explorer will not affect the items used in a bridge model. The items in the bridge model will need to be reselected from the updated library to have the most up-to-date library definition inputs & properties.
- 2. If the library item needs to be modified for a specific bridge (modifying dimensions, weight of rail etc.), the rater should copy the library item to the specific bridge and modifying the copy instead of modifying the actual library item.

Deleting Library Items: On the right window pane, select a library item to highlight it. In the top ribbon, click on "Delete" to delete the library item and a confirmation dialog box will appear. Click on "Yes" to delete the selected library item. Only one library item can be deleted at one time. Only Agency Defined or User Defined library items can be deleted.

| New Duplicate Open Delete Manage | | | | |
|--|---------|--------------|----------------------------------|---|
| Appurtenances | Library | Units | Name | Description |
| - 2 Generic | > Agenc | US Customary | Curb_8" H x 2'-1.5" W (6" Overha | Iowa DOT Standard curb with 6" overhang (Area 231 |
| 📁 Parapet | Agenc | US Customary | ConcRail_3'-2" Aesthetic | Iowa DOT Aesthetic concrete railing |
| Railing Connectors | Agenc | US Customary | ConcRail_2'-8" Open (20" Block) | lowa DOT Standard Open Rail w/ 1'-8" top rail block |
| Connectors | Agenc | US Customary | ConcRail_2'-8" Open (19" Block) | Iowa DOT Standard Open Rail w/ 1'-7* top rail block |
| Pactors | Agenc | US Customary | ConcRail_2'-5" Open (15" Block) | Iowa DOT Standard Open Rail w/ 1'-3" top rail block |
| LRFD DF Applicability Ranges LRFD Substructure Design Settings | Agenc | US Customary | ConcRail 2'-5" Open (19" Block) | Iowa DOT Standard Open Rail w/ 1'-7* top rail block |
| Materials | Agenc | US Customary | ConcRail, Bridge Rating | |
| Detail Box Culvert | Agenc | US Customary | ConcRail | |
| 2 Metal Pipe Culvert 2 Prestress Shapes | Agenc | US Customary | ConcRail | |
| 🗭 Steel Shapes | Agenc | US Customary | ConcRail ConcRail | sure you want to delete Curb_8" H x 2'-1.5" W (6" |
| Timber Shapes Vehicles | | | | ، بون |
| | | | | Yes No |

Note: Deleting a library item does not delete the same item in a bridge model. The item in the bridge model will remain in the Bridge Workspace and will need to be deleted manually if that is the intent. Additionally, once a library item is deleted from the BrR library, the only way to retrieve it back is to re-import the library file. See Section 3.1 for details on importing library files.

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INTERNATIONAL

4.0 Analysis Event Templates

The following analysis event templates are imported into the BrR library after completing Section 2.1, which contain the necessary live load vehicles and analysis settings, specific to Iowa DOT, used to load rate bridge structures in BrR.

- LFR Analysis Template
- LRFR Analysis Template

Assumptions and restrictions for Iowa DOT BrR LFR & LRFR Analysis Templates:

- Set up for multilane and with full impact for all vehicles.
- Set up for bridges with span lengths equal to or less than 200 ft.
- Fluid Milk Truck should be used for state routes only. For LPAs bridges, it is up to the rater to remove the truck in the analysis template when appropriate.
- State specific restrictions of the legal and permit load analysis were not included.

"Advanced" settings in the "Analysis Settings" window allows the rater to override vehicle properties. Refer to the BrR Help Manual for details.

4.1 LFR Analysis Template

Template Name: Iowa DOT LFR

Live loads included in the "lowa DOT LFR" analysis template are listed below, per Iowa DOT Bridge Rating Manual (BRM), and Instructional Memorandum (IM).

- 1. Rating Live Load (Inventory & Operating Level)
 - a. HS20-44
- 2. Legal Loads (Legal Operating Level)
 - a. Routine Commercial Traffic
 - i. Type 4
 - ii. Type 3S3A
 - iii. Type 3-3 (IowaDOT)
 - iv. Type 3S3B
 - v. Type 4S3
 - vi. Type 5-2
 - b. Specialized Hauling Vehicles (SHVs)
 - i. SU4
 - ii. SU5
 - iii. SU6
 - iv. SU7
 - c. Emergency Vehicles
 - i. Type EV2
 - ii. Type EV3
- 3. Permit Trucks (Permit Operating Level)
 - a. 90 kip Six-Axle Vehicle
 - b. 136 kip (A) Seven-Axle Truck with Triple-Axle Configuration
 - c. 136 kip (B) Seven-Axle Truck with a Quad-Axle Configuration
 - d. 156 kip Eight-Axle Truck with a Quad-Axle Configuration
 - e. Fluid Milk Truck
 - f. Quint Axle Crane Truck
 - g. Small Annual Crane Truck

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| Design review O Rating | Rating meth | od: LFR | × |
|--|-----------------------------------|-----------------------|--|
| | Save an | alysis results | |
| alysis type: Line Girder 🗸 🗸 | | | li |
| ne / Impact loading type: As Requested V | Apply prefer | ence setting: None | ~ |
| Vehicles Output Engine Description | | | |
| Traffic direction: Both directions | | Refresh Temporary ver | hicles Advanced |
| Vehicle selection | | Vehicle summary | - |
| ➡ Vehicles ➡ Standard ➡ Alternate Military Loading ➡ EV2 ➡ EV3 ➡ H 15-44 ➡ H 5-44 ➡ H5 15-44 ➡ H5 20 (SI) ➡ H5 20 (SI) ➡ SU4 ➡ SU5 ➡ SU4 ➡ SU5 ➡ SU6 ➡ SU7 ➡ Type 3 ➡ Type 33 ➡ Type 3S2 ➡ Agency ➡ 136k Truck "A" ➡ 136k Truck "B" ➡ 156k Truck ➡ 90k Truck ➡ Guint Axle Crane Truck ➡ SU4 OW ➡ SU5 OW ➡ SU5 OW ➡ SU6 OW ➡ SU7 OW ➡ Type 3-3 (lowa DOT) | Add to >> Remove from << | Rating vehicles | Permit inventory Permit operating Adjacent vehicle Adjacent vehicle |

Figure 1: "Analysis Settings" window for the "Iowa DOT LFR" analysis template

| Michael Baker |
|---------------|
|---------------|

| Vehicle | Tandem train | Scale factor | Impact | Single lane loaded | |
|--------------------------|-----------------|-----------------|--------|--------------------------|--|
| 136k Truck "A" | | 1.000 | | | |
| 136k Truck "B" | | 1.000 | | | |
| 156k Truck | | 1.000 | | | |
| 90k Truck | | 1.000 | | | |
| EV2 | | 1.000 | | | |
| EV3 | | 1.000 | | | |
| luid Milk Truck | | 1.000 | | | |
| HS 20-44 | | 1.000 | | | |
| Quint Axle Crane Truck | | 1.000 | | | |
| Small Annual Crane Truck | | 1.000 | | | |
| SU4 | | 1.000 | | | |
| SU5 | | 1.000 | | | |
| SU6 | | 1.000 | | | |
| SU7 | | 1.000 | | | |
| Гуре 3-3 (Iowa DOT) | | 1.000 | | | |
| Гуре 3S3A | | 1.000 | | | |
| Гуре 3S3B | | 1.000 | | | |
| Гуре 4 | | 1.000 | | | |
| Гуре 4S3 | | 1.000 | | | |
| Гуре 5-2 | | 1.000 | | | |

Figure 2: "Advanced" settings window for the "Iowa DOT LFR" analysis template

Template Name: Iowa DOT LRFR

Live loads included in the "lowa DOT LRFR" analysis template are listed below, per lowa DOT Bridge Rating Manual (BRM), and Instructional Memorandum (IM).

- 1. Design Live Load
 - a. HL-93 (Inventory & Operating Level)
- 2. Legal Loads
 - a. Routine Commercial Traffic Trucks (RCTT)
 - i. Type 4
 - ii. Type 3S3A
 - iii. Type 3-3 (IowaDOT)
 - iv. Type 3S3B
 - v. Type 4S3
 - i. Type 5-2
 - vi. Lane-Type Legal Load
 - vii. Type 4 Lane-Type
 - viii. Type 3S3A Lane-Type
 - ix. Type 3-3 Lane-Type (Iowa DOT)
 - x. Type 3S3B Lane-Type
 - xi. Type 4S3 Lane-Type
 - xii. Type 5-2 Lane-Type
 - b. Specialized Hauling Vehicles
 - i. SU4
 - ii. SU5
 - iii. SU6
 - iv. SU7
 - c. Emergency Vehicle
 - i. Type EV2
 - ii. Type EV3
- 3. Permit Trucks
 - a. 90 kip Six-Axle Vehicle
 - b. 136 kip (A) Seven-Axle Truck with Triple-Axle Configuration
 - c. 136 kip (B) Seven-Axle Truck with a Quad-Axle Configuration
 - d. 156 kip Eight-Axle Truck with a Quad-Axle Configuration
 - e. Fluid Milk Truck
 - f. Quint Axle Crane Truck
 - g. Small Annual Crane Truck

RCTT (Item 2.a.vii to 2.a.vii) are created for lane-type load and added to the BrR library and the LRFR analysis template for analyzing negative moments and reactions at interior supports per BRM and AASHTO MBE 6A.4.2.1a

Modifications include:

- Added "Lane-Type" to Truck Naming to differentiate from the regular RCTT
- Axle weights reduced by a factor of 0.75
- Additional uniform lane load of 0.2 kips/ft
- Selected Legal pair in "Advanced" analysis settings





Figure 3: "Analysis Settings" window for the "Iowa DOT LRFR" analysis template

| Vehicle | Tandem train | Scale factor | Impact | Single lane loaded | Legal pair | Override | Legal live load factor | Frequency | Loading condition | | Override | Permit live load factor | |
|-------------------------------|-----------------|-----------------|-------------|--------------------------|---------------|----------|------------------------------|--------------------|--------------------|---|----------|-------------------------------|--|
| 136k Truck "A" | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| 136k Truck "B" | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| 156k Truck | | 1.000 | | | | | | Single Trip 🗸 🗸 🗸 | Mixed with traffic | ~ | | | |
| 90k Truck | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| EV2 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| EV3 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Fluid Milk Truck | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| HL-93 (US) | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Lane-Type Legal Load | | 1.000 | | | ~ | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Quint Axle Crane Truck | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Small Annual Crane Truck | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| SU4 | | 1.000 | | | | | | Single Trip $$ | Mixed with traffic | ~ | | | |
| SU5 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| SU6 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| SU7 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 3-3 (lowa DOT) | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 3-3 Lane-Type (lowa DOT) | | 1.000 | | | \sim | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 3S3A | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 3S3A Lane-Type | | 1.000 | | | \sim | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 3S3B | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 3S3B Lane-Type | | 1.000 | | | \sim | | | Single Trip \sim | Mixed with traffic | ~ | | | |
| Type 4 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 4 Lane-Type | | 1.000 | | | \sim | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 4S3 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 4S3 Lane-Type | | 1.000 | | | ~ | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 5-2 | | 1.000 | | | | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| Type 5-2 Lane-Type | | 1.000 | | | \sim | | | Single Trip 🗸 🗸 | Mixed with traffic | ~ | | | |
| it lane load: kip/ft | Adjacent | | re load fao | tor: | | ,] | | , | | | | | |

Figure 4: "Advanced" settings window for the "Iowa DOT LRFR" analysis template

4.3 Perform Rating Analysis

There are two ways to perform the rating analysis of a bridge model using the analysis templates – one is in the Bridge Explorer and the other is in the Bridge Workspace.

4.3.1 Perform Rating Analysis In Bridge Explorer

To perform a rating analysis in Bridge Explorer:

- 1. After logging into BrR, In the Bridge Explorer, "AASHTOWare Bridge Rating" window is opened showing the Bridge Explorer.
- 2. In the left pane of Bridge Explorer, a tree view contains multiple folders and subfolders, select the approproate folder that contains the specific bridge for analysis.
- 3. In the right pane of Bridge Explorer, click and highlight the specific bridge model.
- 4. In the top ribbon, select "RATE" and click on the "Rate" icon to bring up the "Analysis Settings" window.

| Britt | | | | | | | A | ASHTOWare B | ridge Rating | |
|--|-----------|------|-------|--------------------|--------------------------|----------|-------------|-------------|--------------|-------|
| BRIDGE EXPLORER BRID | GE FOLDER | R | RATE | TOOLS VIEW | | | | | | |
| New Open Batch V | Find Copy | Past | | py Remove Delete | | | | | | |
| Bridge | | | Manag | je | | | | | | |
| | | | BID | Bridge ID | Bridge Name | District | County | Facility | Location | Route |
| 🖹 🏓 All Bridges | | > | 1 | TrainingBridge1 | Training Bridge 1(LRFD) | Unknown | Unknown (P) | SR 0051 | Pittsburgh | 0051 |
| IowaDOT | | | 2 | TrainingBridge2 | Training Bridge 2(LRFD) | Unknown | Unknown (P) | N/A | N/A | -1 |
| Image: Image | | | 3 | TrainingBridge3 | Training Bridge 3(LRFD) | Unknown | Unknown (P) | 1-79 | Pittsburgh | 0079 |
| | | | 4 | PCITrainingBridge1 | PCI TrainingBridge1(LFR) | | | | | -1 |
| | | | - | DOLT 1 D D D D | | | | | | |

| 6 R | | | | | | A | ASHTOWare E | Bridge Rating | |
|--|--------------|--------|-------------------------------------|--------------------------|----------|-------------|-------------|---------------|-------|
| BRIDGE EXPLORER BRIDGE FOLDE | R | RATE | TOOLS VIEW | | | | | | |
| Rate BrM Results | anage Eve | Analys | is Open Route Routing Rating Tor | Tool | | | | | |
| ····☆ Favorites Folder ····∅ Recent Bridges | | BID | Bridge ID | Bridge Name | District | County | Facility | Location | Route |
| 🖻 🎾 All Bridges | > | 1 | TrainingBridge1 | Training Bridge 1(LRFD) | Unknown | Unknown (P) | SR 0051 | Pittsburgh | 0051 |
| IowaDOT | | 2 | TrainingBridge2 | Training Bridge 2(LRFD) | Unknown | Unknown (P) | N/A | N/A | -1 |
| Image: Image and the second secon | | 3 | TrainingBridge3 | Training Bridge 3(LRFD) | Unknown | Unknown (P) | 1-79 | Pittsburgh | 0079 |
| Deleted bridges | | 4 | PCITrainingBridge1 | PCI TrainingBridge1(LFR) | | | | | -1 |



5. In the "Analysis Settings" window, click on "Open template" at the bottom.

| Design review O Rating | Rating method: LFR V |
|--|-------------------------------------|
| | Save analysis results |
| Line Girder | × |
| ne / Impact loading type: Detailed by Scaling | Apply preference setting: None |
| Vehicles Output Engine Description | |
| Traffic direction: Both directions | Refresh Temporary vehicles Advanced |
| Vehicle selection | Vehicle summary |
| → -Vehicles → Standard → Alternate Military Loading → EV2 → EV3 → H 15-44 → H 20-44 → HS 15-44 → HS 20-44 → NRL → SU4 → SU5 | Add to Add to Semove from |

6. Select "Iowa DOT LFR" template fo LFR analysis or "Iowa DOT LRFR" for LRFR analysis and click "Open". In this example, "Iowa DOT LFR" is selected.

| Templates | Description | Analysis | Owner | Public / Private | |
|-------------------------|-------------------------|----------|-------|------------------|--|
| HL 93 Design Review | HL 93 Design Review | LRFD | | Public | |
| HS 20 LFR Rating | HS 20 LFR Rating | LFR | | Public | |
| LRFR Design Load Rating | LRFR Design Load Rating | LRFR | | Public | |
| LRFR Legal Load Rating | LRFR Legal Load Rating | LRFR | | Public | |
| Iowa DOT LFR | BrR new analysis event. | LFR | | Public | |
| Iowa DOT LRFR | BrR new analysis event. | LRFR | | Public | |
| | | | | | |
| | | | | | |



7. The "Vehicle Summary" pane on the "Analysis Settings" window will show all the rating vehicles under their respective rating levels. Click "OK" to begin load rating analysis.

| O Design review | Rating | Rating method: | LFR V | |
|---|-----------------------|---------------------|--|--|
| | | Save analysis re | esults | |
| alysis type: | Line Girder 🗸 🗸 | | | |
| ne / Impact loading type: | Detailed by Scaling ~ | Apply preference se | etting: None v | |
| Vehicles Output Eng | gine Description | | | |
| Traffic direction: Both dire | ections ~ | Refres | h Temporary vehicles Advanced | |
| Vehicle selection | | Vehicle su | ummary | |
| - Alternate Milit - EV2 - EV3 - H 15-44 - H 20-44 - HS 15-44 - HS 20 (51) - HS 20 (44 - NRL - SU4 - SU5 - SU6 - SU7 - Type 3-3 - Type 3 | k DD IOD sek | Add to | - HS 20-44 operating - HS 20-44 egal operating - SU4 - SU5 - SU6 - SU7 - Type 3-3 (lowaDOT) - Type 333A - Type 333A - Type 333A - Type 4 - Type 453 - Type 453 - Type 453 - Type 5-2 - ermit inventory ermit operating - 136k Truck "A" - 136k Truck "B" - 136k Truck "B" - 136k Truck - Suff T | |



8. Once the analysis begins, a "Analysis Progress" window will appear. When the analysis is completed, select "Ok" on the bottom right of the window to bring up the "Bridge Rating Results" window.

| Analysis Progress | | |
|-----------------------------------|--|------|
| | | |
| A | - Location - 96.2500 (ft) | |
| 🥝 Analysis Event | - Location - 97.5000 (ft) | |
| | - Location - 101.2500 (ft) | |
| A @ Template_V16-70_250ft | - Location - 104.4583 (ft) | |
| | - Location - 105.5000 (ft) | |
| STRUCTURES | - Location - 115.2500 (ft) | |
| | - Location - 125.0000 (ft) | |
| Implate_V16-70_250ft [4 Beam Syst | - Location - 134.7500 (ft) | |
| | - Location - 144.5000 (ft) | |
| GIRDER-SYSTEM MEMBERS | - Location - 145,5416 (ft) | |
| | - Location - 148.7500 (ft) | |
| 🕑 SB1 [SB1] | - Location - 152,5000 (ft) | |
| / | - Location - 153.7500 (ft) | |
| SB2 [SB2] | - Location - 154.2500 (ft) | |
| [302] | - Location - 162.2500 (ft) | |
| SB3 [SB3] | - Location - 164.0000 (ft) | |
| 0 202 [202] | - Location - 169.7500 (ft) | |
| SB4 [SB4] | - Location - 173.7500 (ft) | |
| SB4 [SB4] | - Location - 177.7500 (ft) | |
| | - Location - 181.3750 (ft) | |
| | - Location - 185.2500 (ft) | |
| | - Location - 189.0000 (ft) | |
| | - Location - 193.7500 (ft) | |
| | - Location - 195.0000 (ft) | |
| | - Location - 196.6250 (ft) | |
| | - Location - 198.7500 (ft) | |
| | - Location - 201.8750 (ft) | |
| | - Location - 204.2500 (ft) | |
| | - Location - 211.8750 (ft) | |
| | - Location - 219.5000 (ft) | |
| | - Location - 227.1250 (ft) | |
| | - Location - 234.7500 (ft) | |
| | - Location - 242.3750 (ft) | |
| | - Location - 249.0000 (ft) | |
| | - Location - 250.0000 (ft) | |
| | Completed Specification Check. | |
| | Info - LFR analysis successfully completed! | |
| | Info - Populating dead load results for non-composite (stage 1) | |
| | Info - Populating dead load results for composite (stage 1) | |
| | Info - Populating live load results for composite (long term) (stage 2). | |
| | Info - Populating LFR rating summary | |
| | Info - Analysis completed! | |
| | nno - Anarysis completeu: | |
| | | - |
| | | - |
| shed processing 1 of 1 bridges: | OK | Cane |

9. The "Bridge Rating Results" window provides the controlling rating results for the bidge model. The rating results can be copied out by highlighting the appropriate (or all) rows and using "Ctrl" + "C" command. Additionally, the rating results can be printed out by clicking on "Print" on the bottom right of the window.

| ystem of units OUS customary OSI / metric | Lane/impact loa | | Display | format: le rating levels per | | | | | | | | | | | |
|--|--------------------|---------------------------------|----------------------------|----------------------------------|------------------------|-----------------------------------|-----------------------------------|-------------------------|----------------------------|----------------------------|----------------------------------|------------------------|-----------------------------------|-----------------------------------|----------------------|
| Us customary U SI / metric | As request | | Multip | ie rating ieveis per | row 🗸 | | | | | | | | | | |
| Bridge ID | Vehicle | Inventory rating ~ factor | Operating rating factor | Legal operating rating factor | Legal rating factor | Permit inventory rating factor | Permit operating rating factor | Permit rating factor | Inventory rating method | Operating rating method | Legal operating rating method | Legal rating method | Permit inventory rating method | Permit operating rating method | Permit rating met |
| Template_V16-70_250ft | HS 20-44 | 1.008 | 1.683 | | | | | | LFR | LFR | | | | | |
| Template_V16-70_250ft | Type 5-2 | | | 1.785 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 4S3 | | | 2.013 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 4 | | | 2.054 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 3S3B | | | 2.257 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 3S3A | | | 1.972 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 3-3 (Iowa DO | | | 1.893 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | SU7 | | | 1.530 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | SU6 | | | 1.661 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | SU5 | | | 1.843 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | SU4 | | | 2.039 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Small Annual Cran | | | | | | 1.391 | | | | | | | LFR | |
| Template_V16-70_250ft | Quint Axle Crane T | | | | | | 1.199 | | | | | | | LFR | |
| Template_V16-70_250ft | Fluid Milk Truck | | | | | | 1.239 | | | | | | | LFR | |
| Template_V16-70_250ft | EV3 | | | 1.309 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | EV2 | | | 1.980 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | 90k Truck | | | | | | 1.803 | | | | | | | LFR | |
| Template_V16-70_250ft | 156k Truck | | | | | | 1.241 | | | | | | | LFR | |
| Template_V16-70_250ft | 136k Truck "B" | | | | | | 1.278 | | | | | | | LFR | |
| Template_V16-70_250ft | 136k Truck "A" | | | | | | 1.353 | | | | | | | LFR | |

10. To obtain additional rating results for each superstructure member, select the appropriate row and click on "View structure rating results" at the bottom left corner of the "Bridge rating Results Window" to bring up the "Structure Rating Results" Window. Select "View member rating results" at the bottom left corner of the window to bring up the "Member Rating Results" window.

| ystem of units | Lane/impact loa | iding type | Display | format: | | | | | | | | | | | |
|---|--------------------|---------------------------------|----------------------------|----------------------------------|----------------------------|-----------------------------------|-----------------------------------|-------------------------|----------------------------|----------------------------|----------------------------------|------------------------|-----------------------------------|-----------------------------------|---------------------|
| OUS customary OSI / metric | As request | ed 🕖 Detaile | d Multipl | e rating levels per | row 🗸 | | | | | | | | | | |
| Bridge ID | Vehicle | Inventory rating ~ factor | Operating rating factor | Legal operating rating factor | Legal rating factor | Permit inventory rating factor | Permit operating rating factor | Permit rating factor | Inventory rating method | Operating rating method | Legal operating rating method | Legal rating method | Permit inventory rating method | Permit operating rating method | Permit rating me |
| Template_V16-70_250ft | HS 20-44 | 1.008 | 1.683 | | | | | | LFR | LFR | | | | | |
| Template_V16-70_250ft | Type 5-2 | | | 1.785 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 4S3 | | | 2.013 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 4 | | | 2.054 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 3S3B | | | 2.257 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | Type 3S3A | | | 1.972 | | | | | | | LFR | 1 | | | |
| Template_V16-70_250ft | Type 3-3 (lowa DO | | | 1.893 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | SU7 | | | 1.530 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | SU6 | | | 1.661 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | SU5 | | | 1.843 | | | | | | | LFR | | | | |
| Template_V16-70_250ft | | | | | | | | | | | | | | | |
| Template_V16-70_250ft | Structure Rate | ting Results | | | | | | | | | | | - | | |
| | | | | | | | | | | | | | | | |
| | Contrast of | | | 1 6 | | | | | | | | | | | |
| Template_V16-70_250ft | System of uni | | | | mpact loadi | | Display f | | | | | | | | |
| Template_V16-70_250ft (Template_V16-70_250ft | System of uni | | SI / metric | | mpact loadi s requested | | | | els per row | ~ | | | | | |
| Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft | | | SI / metric | | | | | | els per row | ~ | | | | | |
| Template_V16-70_250ft (Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft | O US custo | omary | | O A | s requested | d Detaile | d Multiple | rating leve | | | Legal | Permit invent | tory Permit o | operating | |
| Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft | O US custo | | | | s requested | | | operation | ing Legal | operating | Legal ating factor | Permit invent | | operating factor | |
| Template_V16-70_250ft (Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft Template_V16-70_250ft | O US custo Bric | omary O | | O A Structure | s requested | Vehicle | d Multiple | Operati r rating fa | ing Legal actor ratin | operating | | | | | |
| Template_V16-70_250ft (Template_V16-70_250ft (Template_V16-70_250ft (Template_V16-70_250ft (Template_V16-70_250ft (Template_V16-70_250ft (| O US custo | omary O | | 0 4 | s requested | Vehicle | d Multiple | Operati r rating fa | ing Legal | operating | | | | factor | |
| Template_V16-70_250R Template_V16-70_250R Template_V16-70_250R Template_V16-70_250R Template_V16-70_250R Template_V16-70_250R Template_V16-70_250R Show work-to-date results.copy w thructure rating results Sk | O US custo Bric | omary O | | O A Structure | s requested | Vehicle | d Multiple | Operati r rating fa | ing Legal actor ratin | operating | | | | factor | |
| Template, V16-70, 250h Template, V16-70, 250h | O US custo Bric | omary dge id | ft Templa | O A Structure | s requested | Vehicle | d Multiple | Operati r rating fa | ing Legal actor ratin | operating | | | | factor |) |

11. The "Member Rating Results" window shows the rating results for each member of the selected truck from the "Bridge Rating Results" window.

| System of units | Lane/imp | act loading | type | Display format: | | | | | |
|-----------------------|-----------------------|-------------|----------|----------------------------|----------------------------|----------------------------------|------------------------|-----------------------------------|-----------------------------|
| O US customary O SI | / metric O As n | equested | Detailed | Multiple rating levels | per row v | | | | |
| Bridge id | Structure | Member | Vehicle | Inventory rating factor | Operating rating factor | Legal operating rating factor | Legal rating factor | Permit inventory rating factor | Permit opera rating fact |
| Template_V16-70_250ft | Template_V16-70_250ft | SB1 | HS 20-44 | 1.060 | 1.985 | | | | |
| Template_V16-70_250ft | Template_V16-70_250ft | SB2 | HS 20-44 | 1.008 | 1.683 | | | | |
| Template_V16-70_250ft | Template_V16-70_250ft | SB3 | HS 20-44 | 1.008 | 1.683 | | | | |
| | | | | | | | | | |
| Template_V16-70_250ft | Template_V16-70_250ft | SB4 | HS 20-44 | 1.060 | 1.985 | | | | |
| Template_V16-70_250ft | Template_V16-70_250ft | SB4 | HS 20-44 | 1.060 | 1.985 | | | | |
| Template_V16-70,250ft | Template_V16-70_250ft | SB4 | HS 20-44 | 1.060 | 1.985 | | | | |
| Template_V16-70_250ft | Template_V16-70_250ft | SB4 | HS 20-44 | 1.060 | 1.985 | | | | |

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4.3.2 Perform Rating Analysis In Bridge Workspace

The analysis can also be performed within the Bridge Workspace. Additional specific details of the analysis can be retrieved such as controlling limit states and locations, Specification Check Detail, and Results Graph of each individual member.

- 1. After logging into BrR, In the Bridge Explorer, "AASHTOWare Bridge Rating" window is opened showing the Bridge Explorer.
- 2. In the left pane of Bridge Explorer, a tree view contains multiple folders and subfolders, select the approproate folder that contains the specific bridge for analysis.
- 3. In the right pane of Bridge Explorer, double-click the specific bridge model to open the model in the Bridge Workspace window.
- 4. Click on the Model Name at the top of the workspace tree to highlight and select the entire model, including all members of the model, for analysis.

| Bridge W | /orkspace - Trainin | gBridge1 | | ANALY | SIS | REPORTS | | | | |
|------------------|---|------------|--------|---------------------|----------------------|-----------|--------|-----------|-------------|-----------|
| BRIDGE WORKSPACE | WORKSPACE | TOOLS | VIEW | DESIGN/I | RATE | REPORTING | | | | |
| A Check Out | | vert Close | Export | P Refresh | Copen (Construction) | New Copy | Paste | Duplicate |) Delete | Schematic |
| | Bridge | | | | | Ν | lanage | | | |
| Workspace | | \$ X | Sche | ematic | | | | | ☆ × | Report |
| 🗄 🖷 🖬 Simple Spa | finitions 9 Definitions URE DEFINITIONS an Structure | 3 | | | | | | | | |



Or select a specific member under the Member Alternative tree to analyze one specific member. In this example, "G1" -> "Plate Girder" is selected for analysis.

| Bridge Workspace - TrainingBridge1 BRIDGE WORKSPACE TOOLS | VIEW DESIGN/RATE REPORTING | ? – 🗆 X |
|--|--|------------------|
| Check Dut 💣 💾 🚳 Restore 🗙 Restore A Close Revert Revert Close Revert Revert Revert Close Revert Re | xport Refresh Copen New Copy Paste Duplicate Delete Manage | |
| Workspace ☆ × | Schematic & X Report | × & |
| Bridge Components | | |
| ## Superstructure Loads Ø Shear Connector Definitions | Analysis | $\times \approx$ |
| B B B B B B B B B B B B B B | | |

5. In the top ribbon, select "DESIGN/RATE" and click on the "Analysis Settings". Note that the "Analyze" icon is greyed out.

| | NORKSPACE TOOLS | | | REPORTS | |
|--|---|-------------|-------|-----------|--|
| BRIDGE WORKSPACE | WORKSPACE TOOLS | VIEW DESIGN | /KATE | REPORTING | |
| Analysis Settings | Tabular Specification Eng Results Check Detail Out | | ; | | |
| Analysis | Result | 5 | | | |
| Workspace | | \$ > | C Sch | iematic | |
| Bridge Components | | | | | |
| 🖃 📣 TrainingBridge1 | | | | | |
| Image: Components Image: Components< | -1 | | | | |
| 🖉 Lateral Bracing (| | | | | |
| 🖶 🗁 SUPERSTRUCTU | | | | | |
| 🖹 🖷 🖬 Simple Span | | | | | |
| | ynamic Load Allowance | | | | |
| ····· 哉 Load Cas | | | | | |



6. In the "Analysis Settings" window, click on "Open template" at the bottom.

| Design review 🔘 Rating | Rating method: LFR \checkmark | |
|---|-------------------------------------|---|
| | Save analysis results | |
| alysis type: Line Girder | \sim | |
| ne / Impact loading type: Detailed by Scaling | | |
| /ehicles Output Engine Description | | |
| Traffic direction: Both directions | Refresh Temporary vehicles Advanced | I |
| Vehicle selection | Vehicle summary | |
| Bi-Vehicles → Standard - Alternate Military Loading - EV2 - EV3 - H 15-44 - H 20-44 - HS 15-44 - HS 20-44 - HS 20 (51) - HS 20-44 - NRL - SU5 | Add to | |

7. Select the appropriate analysis template and click "Open". In this example, "Iowa DOT LFR" is selected.

| Templates | Description | Analysis | Owner | Public / Private | |
|-------------------------|-------------------------|----------|-------|------------------|---|
| HL 93 Design Review | HL 93 Design Review | LRFD | | Public | |
| HS 20 LFR Rating | HS 20 LFR Rating | LFR | | Public | |
| LRFR Design Load Rating | LRFR Design Load Rating | LRFR | | Public | |
| LRFR Legal Load Rating | LRFR Legal Load Rating | LRFR | | Public | _ |
| Iowa DOT LFR | BrR new analysis event. | LFR | | Public | |
| Iowa DOT LRFR | BrR new analysis event. | LRFR | | Public | |
| | | | | | |

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- INTERNATIONAL
 - 8. In the "Analysis Settings" window, the "Vehicle Summary" pane will show all the rating vehicles under their respective rating levels. Click "OK".

| Analysis Settings | | | | | |
|---|------------------------|-----------------------------------|-------------|---|----------|
| O Design review | Rating | Rating method: | | LFR | ~ |
| | | Save analy | sis results | | |
| nalysis type: | Line Girder V | | | | |
| ne / Impact loading type: | Detailed by Scaling V | Apply preference | ce setting: | None | ~ |
| Vehicles Output E | ngine Description | | | | |
| Traffic direction: Both di | rections ~ | Re | efresh | Temporary vehicles | Advanced |
| Vehicle selection | | Vehic | le summaŋ | у | |
| ⇒Standard →Alternate Mil →EV2 =EV3 →H 15-44 →H 20-44 →H 5 15-44 →H 5 20 (SI) →SU4 →SU4 →SU4 →SU4 →SU4 →SU5 →SU6 →SU7 ¬Type 3 3 ¬Type 33 ¬Type 332 →Type 332 →Type 332 →Type 332 →Type 332 →Type 332 →Type 352 →Gency →TiSk Truck "B →TiSk | ۲" ۱۳ Ick MOD | Add to >> Remove from << | | 20-44 ng 20-44 perating 2 3-3 (lowaDOT) 2 353A 2 353B 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 | |

9. In the top ribbon, the "Analyze" icon is now activated, click on the icon to start the analysis.

| BrR | | | | ANALYSIS | | REPORTS | |
|---|------------------------------|--------------|-----------|------------|-----|-----------|--|
| BRIDGE WORKSPACE | WORKSPACE | TOOLS | VIEW | DESIGN/RA | TE | REPORTING | |
| Analysis Analyze Analysis Settings | Tabular Spec Results Chec | ification En | gine Resu | | | | |
| Analysis | Results Chec | Result | | on Results | | | |
| Workspace | | | | \$X | Sch | ematic | |
| Bridge Components | | | | | | | |
| ▲ TrainingBridge1 ▷ Ø Components Ø Diaphragm Def | initions | | | | | | |
| Eateral Bracing Eateral Bracing Eateral Bracing Eateral Bracing Eateral Bracing | JRE DEFINITION | IS | | | | | |



- Once the analysis has been completed, in the Bridge Workspace tree, navigate to the Member Alternatives and select the member to highlight it. In this example, "G1" -> "Plate Girder" member alternative is selected.
 - 11. In the top ribbon, click on "Tabular Results" to bring up the "Analysis Results" of the selected member.

| - | ALYSIS REPORTS Bridge Workspace - TrainingBridge1 | |
|---|--|---------------|
| Analysis Analyze Analysis Settings Analysis Anal | - | |
| Workspace Bridge Components Components Diaphragm Definitions Diaphragm Definitions Diaphragm Definitions SuperSTRUCTURE DEFINITIONS Impact/Dynamic Load Allowance Impact/Dynamic Load Allowance Impact/Dynamic Load Allowance Impact/Dynamic Load Allowance Impact/Dynamic Load Allowance Impact/Dynamic Load Allowance Impact/Dynamic Load Allowance Impact/Dynamic Load Study Stucture Typical Section Bracing Spec Check Selection Stuperstructure Loads Shiffener Definitions Stiffener Definitions Impactor Members Impact/Dynamic Loads Stiffener Definitions Stiffener Definitions Impactor Members Impact/Dynamic Loads Stiffener Definitions Superstructure Loads Impactor Members Impact/Dynamic Loads Impactor Members Supports Impactor Members Impact/Dynamic Loads Impactor Members Impactor Members | X Schematic | ¢X Re |
| I Plate Girder (E) (C) (10) I G2 I G3 I G4 I G4 Galaria Girder (E) (C) (10) Galaria Galaria Galaria Galaria Galaria Galaria Galaria Galaria Galaria Galaria Galaria Galaria Galaria | Analysis Analysis - TrainingBridge1 Analysis - TrainingBridge1 Analysis Event Coation - 128.8000 (ft) - Location - 128.8000 (ft) - Location - 144.9000 (ft) - Location - 144.9000 (ft) - Location - 161.0000 (ft) Completed Specification Check. Info - LFR analysis successfully completed! Info - Populating deal load results for non-composite (stage 1 Info - Populating deal load results for composite (long term) (ft) | I stage 2) |



APPENDIX A

Iowa DOT BrR System Data File Settings

A1 BrR System Data: Parameters – Districts

| Pa | ran | neters | × |
|----|-----|------------|-----------------------|
| S | ele | ction crit | eria: District V |
| | | ID | District ^a |
| | > | 01 | 01 |
| | | 02 | 02 |
| | | 03 | 03 |
| | | 04 | 04 |
| | | 05 | 05 |
| | | 06 | 06 |
| | | 07 | 07 ^b |
| | | | |

A2 BrR System Data: Parameters – Counties

| rame | ters | × | Parameters | × | Parameters | × | | Parameters | × |
|--------|----------|--------------|---------------|----------------|------------|----------------------------|-------------------|------------|---------------|
| Select | ion crit | eria: County | Selection cri | iteria: County | Selection | Selection criteria: County | | | eria: County |
| | ID | Countya | ID | County a | ID | Co | _{unty} a | ID | County a |
| > | 01 | Adair | 26 | Davis | 51 | Jefferson | | 75 | Plymouth |
| | 02 | Adams | 27 | Decatur | 52 | Johnson | | 76 | Pocahontas |
| | 03 | Allamakee | 28 | Delaware | 53 | Jones | | 77 | Polk |
| | 04 | Appanoose | 29 | Des Moines | 54 | Keokuk | | 78 | Pottawattamie |
| | 05 | Audubon | 30 | Dickinson | 55 | Kossuth | | 79 | Poweshiek |
| | 06 | Benton | 31 | Dubuque | 56 | Lee | | 80 | Ringgold |
| | 07 | Black Hawk | 32 | Emmet | 57 | Linn | | 81 | Sac |
| | 08 | Boone | 33 | Fayette | 58 | Louisa | | 82 | Scott |
| | 09 | Bremer | 34 | Floyd | 59 | Lucas | | 83 | Shelby |
| | 10 | Buchanan | 35 | Franklin | 60 | Lyon | | 84 | Sioux |
| | 11 | Buena Vista | 36 | Fremont | 61 | Madison | | 85 | Story |
| | 12 | Butler | 37 | Greene | 62 | Mahaska | | 86 | Tama |
| | 13 | Calhoun | 38 | Grundy | 63 | Marion | | 87 | Taylor |
| | 14 | Carroll | 39 | Guthrie | 64 | Marshall | | 88 | Union |
| | 15 | Cass | 40 | Hamilton | 65 | Mills | | 89 | Van Buren |
| | 16 | Cedar | 41 | Hancock | 66 | Mitchell | | 90 | Wapello |
| | 17 | Cerro Gordo | 42 | Hardin | 67 | Monona | | 91 | Warren |
| | 18 | Cherokee | 43 | Harrison | 68 | Monroe | | 92 | Washington |
| | 19 | Chickasaw | 44 | Henry | 69 | Montgomery | | 93 | Wayne |
| | 20 | Clarke | 45 | Howard | 70 | Muscatine | | 94 | Webster |
| | 21 | Clay | 46 | Humboldt | 71 | O'Brien | | 95 | Winnebago |
| | 22 | Clayton | 47 | lda | 72 | Osceola | | 96 | Winneshiek |
| | 23 | Clinton | 48 | lowa | 73 | Page | | 97 | Woodbury |
| | 24 | Crawford | 49 | Jackson | 74 | Palo Alto | | 98 | Worth |
| | 25 | Dallas | 50 | Jasper | 75 | Plymouth | | 99 | Wright |

Notes:

^a Item modified or added for Iowa DOT BrR System File. Otherwise, they are BrR default values or items.

^b District 7 is for Local Public Agencies (LPA)



A3 BrR System Data: System Defaults

General

| General Bridge | vorkspace Superstructure analy | sis Specifications | Substructure analysis | Tolerance | Custom agency field |
|---------------------|--------------------------------|--------------------|-----------------------|-----------|---------------------|
| Agency name: | lowaDOT a | | | | |
| Default preference | etting: None | ~ | | | |
| Multimedia server f | older: C:\ | | | | |

Bridge workspace

| eneral Bridge workspace Superstructure analysis S | pecifications Substructure analysis Tolerance Custom agency fields | |
|---|--|---|
| New bridge | Library LRFD substructure design settings | |
| System of units: US Customary 🗸 🗸 | Preliminary mode design settings: | |
| | Preliminary Design Setting (US) | ~ |
| PS values | Final mode design settings: | |
| Default average humidity: 70.00 ^a % | Final Design Setting (US) | ~ |
| LRFD wind loads | | |

Substructure analysis

| General Bridge workspace | Superstructure analysis | Specifications | Substructure analysis | Tolerance | Custom agency fiel |
|-----------------------------|-------------------------|----------------|-----------------------|-----------|--------------------|
| A | | | | | |
| Apply dynamic load allowand | e to | | | | |
| Cap ^a | | | | | |
| Columns/walls a | | | | | |
| Spread footing/footing | cap | | | | |
| Piles | | | | | |
| Drilled shafts | | | | | |

Notes:

^a Item modified or added for Iowa DOT BrR System File. Otherwise, they are BrR default values or items.



A3 BrR System Data: System Defaults (Cont'd)

Tolerance

| ~ | | D.1 | | | o | | | |
|-----|----------|---------------|------|-------------------------|----------------|-----------------------|-----------|---------------------|
| Gen | eral | Bridge worksp | ace | Superstructure analysis | Specifications | Substructure analysis | Tolerance | Custom agency field |
| Def | ault sys | tem of units: | US C | Customary | | | | |
| | Unit | Tolerance | | | | | | |
| > | ft | 0.001000 | | | | | | |
| | in | 0.0000100 | | | | | | |
| | m | 0.0001000 | | | | | | |
| | mm | 0.01000 | | | | | | |
| | mi | 0.01000 | | | | | | |
| | km | 0.01000 | | | | | | |

Custom agency fields

| cinc | eral B | ridge workspace Sup | perstructure analysis | Specifications | Substructure analysis | Tolerance | Custom agency fields |
|------|---------|-----------------------|-----------------------|----------------|-----------------------|-----------|----------------------|
| | Field # | Bridge explorer label | | | | | |
| > | 1 | City ^a | | | | | |
| | 2 | TWO | | | | | |
| | 3 | THREE | | | | | |
| | 4 | FOUR | | | | | |
| | 5 | FIVE | | | | | |
| | 6 | SIX | | | | | |
| | 7 | SEVEN | | | | | |
| | 8 | EIGHT | | | | | |
| | 9 | NINE | | | | | |
| | 10 | TEN | | | | | |

Notes:

^a Item modified or added for Iowa DOT BrR System File. Otherwise, they are BrR default values or items.



A4 Example of BrR Bridge Model Description Window

State Bridges

| New Bridge | | | | | | - 0 |
|----------------------------|----------------------|------------------|------------------------|---------|-------------------------------------|---|
| Bridge ID: New | Bridge | NBI structure IC | D (8): | | Template Bridge completely defin | Bridge Workspace View Superstructures Culverts Substructures |
| Description | Description (cont'd) | Alternatives | Global reference point | Traffic | Custom agency fields | |
| District (2): | 01 | | ~ | Those | e 4 fields will be | Note: Blank for |
| County: | Adair | | ~ | | cted from the | template bridges – |
| Owner (22): | State Highway Agen | ку | \sim | | p-down menu | info to be entered by |
| Maintainer: | | | | | | into to be entered by |
| Maintainer: | State Highway Agen | ю | ~ | | | load rater for |
| Maintainer: Admin area: | State Highway Agen | ю | ~ L | | | |
| | State Highway Agen | ncy | | | | load rater for |

County Bridges

| New Bridge | | | | | - 0 | × |
|-------------------|----------------------|------------------|------------------------|----------------------------------|--|---|
| Bridge ID: New B | ridge | NBI structure ID | (8): | Template Bridge completely de | Bridge Workspace View Superstructures Culverts Substructures | |
| Description [| Description (cont'd) | Alternatives (| Global reference point | Traffic Custom agency fields | | |
| District (2): | 07 | ĸ | ~ | These 4 fields will be | Note: Blank for | ٦ |
| County: | Adair | | ~ | selected from the | template bridges – | |
| Owner (22): | County Hwy Agency | | ~ | drop-down menu | info to be entered by | |
| Maintainer: | County Hwy Agency | 1 | | | load rater for | |
| Admin area: | | | | District 7 is or LPAs | individual bridges | |
| NHS Indicator: | | | ~ | | | 1 |
| Functional class: | | | \sim | | | |



<u>City Bidges</u>

| New Bridge | | | | | | | | — C | |
|---|-----------------------------------|---------------|--|---------|------------------------|---|---------|---|---|
| ridge ID: New | Bridge | NBI structure | ID (8): | | | Template Bridge completely | defined | Bridge Workspace View Superstructures Culverts Substructures | |
| Description | Description (constal) | Alternatives | Global reference | e noint | Traffic | Custom agency fields | | | |
| Description | Description (cont'd) | Anternatives | olobarrelerence | c point | . nume | ,, | | | |
| | 07 | Alternatives | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | | 4 fields will be | | Note: Blank for | |
| District (2): | | Alcindures | | | These | | te | Note: Blank for emplate bridges – | |
| District (2): County: | 07 | • | ~ | | These selec | 4 fields will be | | | / |
| District (2): County: Owner (22): | 07 Adair | Agenc | ~ | | These selec | 4 fields will be cted from the | | emplate bridges – | / |
| District (2): County: Owner (22): Maintainer: | 07 Adair City/Municipal Hwy | Agenc | ~ | | These selec drop | 4 fields will be cted from the | inf | emplate bridges – o to be entered by | / |
| District (2): County: Owner (22): Maintainer: Admin area: NHS Indicator: | 07 Adair City/Municipal Hwy | Agenc | ~ | | These selec drop | 4 fields will be cted from the -down menu | inf | emplate bridges – o to be entered by load rater for | / |

| A New | Bridge | | | | | | - 0 | × |
|--------|-----------|----------------------|---------------|------------------------|---------|---------------------------------------|---|---|
| Bridge | e ID: New | r Bridge | NBI structure | ID (8): | | Template Bridge completely defined | Bridge Workspace View Superstructures Culverts Substructures | |
| Des | cription | Description (cont'd) | Alternatives | Global reference point | Traffic | Custom agency fields | | |
| | Field | Value | | | | | | |
| > | City | Kirksville | K | | | | A | |
| | TWO | | | | | | | |
| | THREE | | | | | | | |
| | FOUR | | | | | | | |
| | FIVE | | | | | | | |
| | SIX | | | | Keyed | in by load rater | | |
| | SEVEN | | | | | | | |
| | EIGHT | | | | | | | |
| | NINE | | | | | | | |
| | TEN | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |



APPENDIX B

Iowa DOT BrR Library Data File Settings

Implementation of AASHTOWare BrR Program for Rating Iowa Bridges, Iowa DOT & Iowa Highway Research Board

B1 BrR Library Data: Appurtenances

Generic

| brary | Units | Name | Description |
|----------------|--------------|-------------------------------------|---|
| gency Defined | US Customary | Curb_8" H x 2'-1.5" W (6" Overhang) | lowa DOT Standard curb with 6" overhang (Area 231.7 sq.in.) |
| Agency Defined | US Customary | ConcRail_3'-2" Aesthetic | Iowa DOT Aesthetic concrete railing |
| Agency Defined | US Customary | ConcRail_2'-8" Open (20" Block) | Iowa DOT Standard Open Rail w/ 1'-8" top rail block height |
| Agency Defined | US Customary | ConcRail_2'-8" Open (19" Block) | Iowa DOT Standard Open Rail w/ 1'-7" top rail block height |
| Agency Defined | US Customary | ConcRail_2'-5" Open (15" Block) | Iowa DOT Standard Open Rail w/ 1'-3" top rail block height |
| Agency Defined | US Customary | ConcRail_2'-5" Open (19" Block) | Iowa DOT Standard Open Rail w/ 1'-7" top rail block height |
| Agency Defined | US Customary | ConcRail_3'-6" Median Barrier | Iowa DOT Standard Median Rail |
| Agency Defined | US Customary | ConcRail_2'-10" Separation Barrier | Iowa DOT Standard Separation Barrier |
| Agency Defined | US Customary | ConcRail_2'-10" Aesthetic | Iowa DOT Aesthetic concrete railing w/ 3/4" panels |
| Agency Defined | US Customary | ConcRail 3'-6" Open (1'-1" Window) | Iowa DOT Standard Open Rail w/ 1'-1" windows |

Median

| | Library | Units | Name | Description |
|---|----------------|--------------|---------------------------------------|--|
| L | Agency Defined | US Customary | ConcRail_2'-5" Temporary Barrier Rail | Iowa DOT Standard Temporary Barrier Rail |

Parapet

| Library | Units | Name | Description |
|----------------|--------------|--|---|
| Agency Defined | US Customary | Curb_10" H x 1'-3.5" W | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_10" H x 1'-3" W | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_10" H x 1'-1.5" W | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_10" H x 1'-0" W (1.25" Slope Width) | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_10" H x 1'-0" W (7/8" Slope Width) | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_12" H x 1'-0" W (1.25" Slope Width) | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_12" H x 1'-0" W (1.5" Slope Width) | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_18" H x 1'-0" W | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_18" H x 1'-1.5" W | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_8" H x 9.5" W | Iowa DOT Standard curb |
| Agency Defined | US Customary | Curb_10" H x 11.25" W (3" Back Ext.) | lowa DOT Standard curb with 6" x 3" back extension |
| Agency Defined | US Customary | Curb_11" H x 9.5" W (1" Back Ext.) | Iowa DOT Standard curb with 7" x 1" back extension |
| Agency Defined | US Customary | Curb_12" H x 9.5" W (1" Back Ext.) | Iowa DOT Standard curb with 7" x 1" back extension |
| Agency Defined | US Customary | Curb_9.5" H x 1'-11" W (11" Back Ext.) | lowa DOT Standard curb with 9" x 11" back extension |
| Agency Defined | US Customary | Curb_10" H x 2'-0" W (9" Back Ext.) | lowa DOT Standard curb with 9" x 9" back extension |
| Agency Defined | US Customary | ConcRail_2'-8" F-Shaped (8" W) | Iowa DOT Standard F-Shaped Barrier Rail w/ 8" top width |
| Agency Defined | US Customary | ConcRail_2'-10" F-Shaped (9.5" W) | Iowa DOT Standard F-Shaped Barrier Rail w/ 9.5" top width |
| Agency Defined | US Customary | ConcRail_2'-10" F-Shaped (7.75" W) | Iowa DOT Standard F-Shaped Barrier Rail w/ 7.75" top width |
| Agency Defined | US Customary | Curb_10" H x 2'-6.75" W (3" Back Ext.) | lowa DOT Standard curb with 8" x 3" back extension |
| Agency Defined | US Customary | Curb_10" H x 3'-0.75" W (3" Back Ext.) | lowa DOT Standard curb wtih 8" x 3" back extenstion |
| Agency Defined | US Customary | ConcRail_3'-8" F-Shaped (8.5" W) | Iowa DOT Standard F-Shaped Barrier Rail w/ 8.5" top width |
| Agency Defined | US Customary | ConcRail_2'-10" F-Shaped (3" Back Ext.) | lowa DOT Standard F-Shaped Barrier Rail with 6" x 3" Back Extension |
| Agency Defined | US Customary | ConcRail_3'-6" F-Shaped (7" W) | Iowa DOT Standard F-Shaped Barrier Rail w/ 7" top width |
| Agency Defined | US Customary | ConcRail_3'-8" F-Shaped (6" Back Ribs) | lowa DOT Standard Barrier Rail w/ 9.5" top width and three 6" ribs as additional load |
| Agency Defined | US Customary | Curb 10" H x 1'-0" W (3" Back Ext.) | lowa DOT Standard curb with 6" x 3" back extension |



Railing

| Library | Units | Name | Description |
|----------------|--------------|--------------------------------|---|
| Agency Defined | US Customary | SteelRail_Pedestrian Hand Rail | Iowa DOT Standard Pedestrian Hand Rail |
| Agency Defined | US Customary | MetalRail_Steel Railing | Iowa DOT generic steel railing C |
| Agency Defined | US Customary | ConcRail_1'-11" W-Beam Railing | Iowa DOT Side mounted concrete post with W-beam railing 6'-3" spacing |
| Agency Defined | US Customary | MetalRail_Aluminum Railing | Iowa DOT generic aluminum railing C |

Notes:

^c Steel and aluminum bridge railings are defined as generic railings with a conservative railing load of 0.05 kip/ft and 0.03 kip/ft, respectively. Actual railing load can be calculated and keyed in for a more refined analysis if needed.



B2 BrR Library Data: Materials

Concrete

| | Library | Units | Name | Description |
|---|----------------|--------------|--------------------------------------|--|
| E | Agency Defined | US Customary | PS Concrete (f'c=5ksi & f'ci=4.5ksi) | Iowa DOT Prestressed concrete ^d |
| | Agency Defined | US Customary | f'c= 3000 psi | Iowa DOT 3000 psi Cement Concrete ^d |

Reinforcing Steel

| Library | Units | Name | Description |
|----------------|--------------|------------------------------------|---|
| Agency Defined | US Customary | Up to 1905 | lowa DOT reinforcing steel built up to year 1905 |
| Agency Defined | US Customary | 1906 to 1944 | Iowa DOT reinforcing steel built between year 1906 to year 1944 |
| Agency Defined | US Customary | 1945 to 1980 | Iowa DOT reinforcing steel built between year 1945 to year 1980 |
| Agency Defined | US Customary | Unknown Grade, After 1980 - 40 ksi | Iowa DOT reinforcing steel unknown grade built after year 1980 - 40 ksi |
| Agency Defined | US Customary | After 1980 - 60 ksi | lowa DOT reinforcing steel built after year 1980 - 60 ksi |

Structural Steel

| Library | Units | Name | Description |
|----------------|--------------|----------------------------|--|
| Agency Defined | US Customary | ASTM A7 Steel (Up to 1934) | Iowa DOT ASTM A7 Steel built up to year 1934 |
| Agency Defined | US Customary | ASTM A7 Steel (After 1934) | IowaDOT ASTM A7 Steel built after year 1934 |

Notes:

^d For other concrete strengths, user can select this library item in the model, update the f'c and fc values, and click the "Compute" button to auto populate other material parameters. The item name can be updated as needed in the model.

B3 BrR Library Data: Prestress Shapes

Box Beams – Rectangular Void

| Library | Units | Name | Description | Year |
|----------------|--------------|-----------------------|--|------|
| Agency Defined | US Customary | lowaDOT_PPCBB_21Hx48W | lowaDOT Standards 824-16.pdf & 830-16.pdf Height: 21" Width: 48" | 2016 |
| Agency Defined | US Customary | lowaDOT_PPCBB_27Hx48W | IowaDOT Standards B24-16.pdf & B30-16.pdf Height: 27" Width: 48" | 2016 |
| Agency Defined | US Customary | lowaDOT_PPCBB_33Hx48W | IowaDOT Standards B24-16.pdf & B30-16.pdf Height: 33* Width: 48* | 2016 |

I Beams – Narrow Top Flange

| Library | Units | Name | Description | Year |
|----------------|--------------|------------------------------|--|------|
| Agency Defined | US Customary | IowaDOT_PPCIB_25Hx9TF | IowaDOT Standard H10 standards .pdf Height: 25" Width: Top flange: 9", Bottom flange: 16" | 1954 |
| Agency Defined | US Customary | IowaDOT_PPCIB_28Hx12TF | lowaDOT Standards H11 standards .pdf & PC_S.pdf Height: 28" Width: Top flange: 12", Bottom flange: 16" | 1956 |
| Agency Defined | US Customary | IowaDOT_PPCIB_35Hx12TF | lowaDOT Standards H11 standards .pdf & PC_S.pdf Height: 35" Width: Top flange: 12", Bottom flange: 16" | 1956 |
| Agency Defined | US Customary | IowaDOT_PPCIB_BeamA_32Hx13TF | lowaDOT Standards H12 standards .pdf, H13 standards .pdf, H14 standards .pdf, H15 sta Height: 32" Width: Top flange: 13", Bottom flange: 17" | 1960 |
| Agency Defined | US Customary | IowaDOT_PPCIB_BeamB_39Hx13TF | lowaDOT Standards H12 standards .pdf, H13 standards .pdf, H14 standards .pdf, H15 sta Height: 39" Width: Top flange: 13", Bottom flange: 17" | 1960 |
| Agency Defined | US Customary | IowaDOT_PPCIB_BeamC_45Hx13TF | lowaDOT Standards H12 standards .pdf, H13 standards .pdf, H14 standards .pdf, H15 sta Height: 45" Width: Top flange: 13", Bottom flange: 17" | 1960 |
| Agency Defined | US Customary | lowaDOT_PPCIB_BeamA_32Hx15TF | lowaDOT Standards H15 standards .pdf, H16 standards .pdf, H24-84 standards .pdf, H24 Height: 32" Width: Top flange: 15", Bottom flange: 19" | 1969 |
| Agency Defined | US Customary | lowaDOT_PPCIB_BeamB_39Hx15TF | lowaDOT Standards H15 standards .pdf, H16 standards .pdf, H24-84 standards .pdf, H24 Height: 39" Width: Top flange: 15", Bottom flange: 19" | 1969 |
| Agency Defined | US Customary | IowaDOT_PPCIB_BeamC_45Hx15TF | lowaDOT Standards H15 standards .pdf, H16 standards .pdf, H24-84 standards .pdf, H24 Height: 45" Width: Top flange: 15", Bottom flange: 19" | 1969 |
| Agency Defined | US Customary | lowaDOT_PPCIB_BeamC_45Hx16TF | lowaDOT Standards H24-06 standards .pdf, H24-87 standards .pdf, , H24S-87 standards Height: 45" Width: Top flange: 16", Bottom flange: 20" | 1987 |
| Agency Defined | US Customary | lowaDOT_PPCIB_BeamA_32Hx16TF | lowaDOT Standards H24-87 standards .pdf, H24S-87 standards .pdf, H24SI-05 standards Height: 32" Width: Top flange: 16", Bottom flange: 20" | 1987 |
| Agency Defined | US Customary | lowaDOT_PPCIB_BeamB_39Hx16TF | lowaDOT Standards H24-87 standards .pdf, H24S-87 standards .pdf, H24SI-05 standards Height: 39" Width: Top flange: 16", Bottom flange: 20" | 1987 |
| Agency Defined | US Customary | IowaDOT_PPCIB_BeamD_54Hx20TF | lowaDOT Standards H24SI-05 standards .pdf, H30SI-05 standards .pdf, and H30SI-12 sta Height: 54" Width: Top flange: 20", Bottom flange: 22" | 2005 |

Tee Beams

| | Library | Units | Name | Description | Year |
|--|----------------|--------------|-------------------------|--|------|
| | Agency Defined | US Customary | IowaDOT_PPCDTB_25Hx96TF | lowaDOT Standard H17 standards .pdf Height: 25" Top Width: 96" | 1973 |

Michael Baker

B4 BrR Library Data: Vehicles – Standard Gage

| Library | Units | Name | Description |
|----------------|--------------|-------------------------------|--|
| Agency Defined | US Customary | Type 4 | Iowa DOT Legal Load - Straight Truck 54.5 Kips |
| Agency Defined | US Customary | Type 3S3A | Iowa DOT Legal Load - Truck + Semi Trailer 80 Kips |
| Agency Defined | US Customary | Type 3S3B | Iowa DOT Legal Load - Truck + Semi Trailer 90 Kips |
| Agency Defined | US Customary | Type 4S3 | Iowa DOT Legal Load - Truck + Semi Trailer 96 Kips |
| Agency Defined | US Customary | Type 3-3 (lowa DOT) | Iowa DOT Legal Load - Truck + Full Trailer 80 Kips |
| Agency Defined | US Customary | Type 5-2 | Iowa DOT Legal Load - Truck + Full Trailer 96 Kips |
| Agency Defined | US Customary | 90k Truck | Iowa DOT Annual Permit Truck 90 Kips - 6-Axle Vehicle |
| Agency Defined | US Customary | 136k Truck "A" | Iowa DOT Annual Permit Truck 136 Kips - 7-Axle Truck with a Triple-Axle Configuration |
| Agency Defined | US Customary | 136k Truck "B" | Iowa DOT Annual Permit Truck 136 Kips - 7-Axle Truck with a Quad-Axle Configuration |
| Agency Defined | US Customary | 156k Truck | Iowa DOT Annual Permit Truck 156 Kips - 8-Axle Truck with a Quad-Axle Configuration |
| Agency Defined | US Customary | Quint Axle Crane Truck | Iowa DOT Annual Permit Truck 100 Kips - 5-Axle Truck with a Triple-Axle Configuration |
| Agency Defined | US Customary | Fluid Milk Truck | Iowa DOT Annual Permit Truck 96 Kips - 7-Axle Truck with a Six-Axle Configuration |
| Agency Defined | US Customary | Small Annual Crane Truck | Iowa DOT Annual Permit Truck 80 Kips - Triple-Axle Configuration |
| Agency Defined | US Customary | Type 3 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 56 Kips |
| Agency Defined | US Customary | Type 4 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 61.1 Kips |
| Agency Defined | US Customary | SU4 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 60.5 Kips |
| Agency Defined | US Customary | SU5 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 69.4 Kips |
| Agency Defined | US Customary | SU6 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 77.9 Kips |
| Agency Defined | US Customary | SU7 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 86.8 Kips |
| Agency Defined | US Customary | Type 3S2 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 80.6 Kips |
| Agency Defined | US Customary | Type 3S3A OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 89.6 Kips |
| Agency Defined | US Customary | Type 3S3B OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 100.8 Kips |
| Agency Defined | US Customary | Type 4S3 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 107.5 Kips |
| Agency Defined | US Customary | Type 3-3 OW (lowa DOT) | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 89.6 Kips |
| Agency Defined | US Customary | Type 5-2 OW | Iowa DOT Annual All-Systems Permit Truck - Legal Load + 12% OW 107.5 Kips |
| Agency Defined | US Customary | Type 4 Lane-Type | lowa DOT Legal Load Lane-Type - Straight Truck 40.875 Kips (0.75 Reduction) ^e |
| Agency Defined | US Customary | Type 3S3A Lane-Type | lowa DOT Legal Load Lane-Type- Truck + Semi Trailer 60 Kips (0.75 Reduction) ^e |
| Agency Defined | US Customary | Type 3-3 Lane-Type (lowa DOT) | lowa DOT Legal Load Lane Type - Truck + Full Trailer 60 Kips (0.75 Reduction) ^e |
| Agency Defined | US Customary | Type 3S3B Lane-Type | lowa DOT Legal Load Lane-Type - Truck + Semi Trailer 67.5 Kips (0.75 Reduction) ^e |
| Agency Defined | US Customary | Type 4S3 Lane-Type | lowa DOT Legal Load Lane-Type - Truck + Semi Trailer 72 Kips (0.75 Reduction) ^e |
| Agency Defined | US Customary | Type 5-2 Lane-Type | lowa DOT Legal Load Lane-Type - Truck + Full Trailer 72 Kips (0.75 Reduction) ^e |

Assumptions:

- Wheel contact width = P/0.8, where P = Wheel Load
- All added trucks have standard gage distance of 6 ft.

Notes:

^e Vehicles for negative moments and reactions at interior supports, per AASHTO MBE 3rd Ed. 6A.4.4.2.1a.