

**Technical Note
e-Notification**

No. 14

May 25, 2022

Updated: 08/31/2022

**Technical Note 14
With Updated Item 2**

1. Load Rating Filename Dates

The filename date appearing in the following load rating deliverables shall be the date the load rating is signed and sealed:

- Load rating input file (BrR or other approved software)
- Load Rating Summary Forms
- Supplemental calculations
- QC Review Checklist
- Data Correction Form
- Site Assessment Form
- Posting Form (if applicable)
- BMO Approvals Form (if applicable)
- QA Review Checklist
- Labeling Diagram
- Schematic Drawing (if applicable)

2. Documenting and Submitting Updated Load Ratings

For structures with a load rating updated due to a widening, rehabilitation, added overlay, noted deterioration, etc., upload only supplemental load rating documentation to the Bridge File that has changed since the previous load rating. This shall be accomplished by preserving the original alternative and creating a new bridge alternative within that reflects the change(s). The date in the file name of the updated files shall be the date the updated load rating was signed and sealed. Note in the assumptions of the Load Rating Summary Form which file(s) from a previous load rating are still applicable (**including the file name and date**) to the updated rating. When updating the BrR model, save a copy of the existing BrR model from the Bridge File to preserve it. ~~and then modify the file as necessary~~ Then, add a new Superstructure Definition and Bridge Alternative that defines the updated load rating. The engineer will only be responsible for any new Superstructure Definitions and Bridge Alternatives that are added, and this should be documented on the Load Rating Summary Form. Upload the new, modified BrR file and do not delete or overwrite the previous BrR file in the Bridge File.

The load rater or inspector shall upload all repair photos, plans (if applicable), and correspondence to the Bridge File. If the repair results in the bridge no longer requiring posting, follow the procedure set forth in Item #5 of TN10. In addition, complete the Posting Rescission Form and upload to the

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**Technical Note 14
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Bridge File using the document type *LR_Posting* with the freeform field populated as “Rescission.” If necessary, NBI Items 63-66, 411, and 418 shall be updated to the governing ratings.

If a bridge was previously posted or recommended for posting (regardless of whether it was approved for posting by BMO) and an updated load rating shows that the bridge no longer is recommended for posting, do not complete a new posting form. Do not, for any reason, delete the Posting Form from the previous rating from the Bridge File, so that it will be preserved for future reference as a historical record. If the updated rating results in a recommendation for posting or a change to the posting that is already established, submit the posting request following the protocol set forth in Item #3 of Technical Note 06 and other subsequent Technical Notes.

If a bridge substructure is repaired and a new load rating is requested, the load rater may:

1. Rate the substructure in its repaired condition and complete documentation to reflect the results, or
2. If engineering judgment is made that the substructure will no longer govern, create a new substructure LRSF and record rating factors equal to 1.000 for each rating vehicle at each rating level.

If the substructure no longer governs, the load rater shall state in the *Notes* section of the substructure LRSF that repairs were made sufficiently, the substructure no longer governs the load rating, and to refer to the superstructure LRSF dated MM/DD/YYYY for the governing load rating. Upload both the Excel and PDF versions of the LRSF and any other supplemental documentation to the Bridge File with the date the repairs were completed.

If the load rater chooses Option 2, a BMO Approvals Form must be submitted and approved by the Bridge Maintenance Office or a designee. Please select “Other” and specify “Substructure Repair Review” in Section 3 of the Approval Form. Documentation must also be submitted from the District that the repairs have been completed entirely and adequately, or a site assessment must be performed to confirm the repairs are adequate. The load rater shall populate the *Load Rating Engineer* block in Section 4 of the LRSF but may leave the *Quality Control Engineer* block blank. The LRSF is not required to be sealed by an engineer; however, the load rater shall place the following stamp* in the seal block of the LRSF and digitally sign in the box below the stamp:

**Technical Note
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**Technical Note 14
With Updated Item 2**

**Substructure
Repair**

Bridge substructure
has been repaired.
All rating factors
set equal to 1.000.

** This stamp has been saved in the 'Supplemental Documentation' ZIP file on BMO's website.*

Note: The Bridge Maintenance Office reserves the right to require a complete signed and sealed load rating in accordance with Option 1 above.

3. Steel Girder Posting Avoidance

Several posting avoidance measures specific to steel multi-girder bridges on the State-owned system include the following:

1. BrR Refined LLDF per AASHTO Guide Spec. 1994 (LFR)

For the use of this analysis the bridge must meet the following criteria:

- BrR must be able to perform a line girder analysis (this would exclude curved girders)
- Must not have a timber deck
- Bridge geometrics must fall in these categories:
 - a. $3.5 \text{ feet} \leq \text{Girder Spacing (S)} \leq 16 \text{ feet}$
 - b. $20 \text{ feet} \leq \text{Bridge Span (L)} \leq 240 \text{ feet}$
 - c. $4.5 \text{ inches} \leq \text{deck thickness (ts)} \leq 16 \text{ inches}$
 - d. $4 \leq \text{Number of Girders (Nb)}$
- Skewed Bridge geometrics must fall in these categories:
 - e. $30^\circ \leq \text{Girder Skew } (\theta) \leq 60^\circ$
 - f. $3.5 \text{ feet} \leq \text{Girder Spacing (S)} \leq 16 \text{ feet}$
 - g. $20 \text{ feet} \leq \text{Bridge Span (L)} \leq 240 \text{ feet}$
 - h. $4.5 \text{ inches} \leq \text{deck thickness (ts)} \leq 16 \text{ inches}$
 - i. $4 \leq \text{Number of Girders (Nb)}$

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**Technical Note 14
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2. Include composite action for non-composite girders: To calculate the ability of a non-Composite section to act compositely, the stress at the interface of embedment should not exceed that of interface shear transfer as calculated by AASHTO 5.7.4, or what is suggested as a limit in NCHRP Report 234. If this capacity is exceeded, the section is anticipated to act as a non-composite section. All loading under this threshold should allow the girder to act in a composite manner.
3. Utilize 3D FEM analysis in BrR.

Posting avoidance measures should only be applicable to bridges that have been in service for an appreciable period of time and show no signs of distress or section loss.

**Technical Note
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**Technical Note 14
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4. Upgrade to BrR v7.2

Item #1 of Technical Note 12 has been updated to reflect an upgrade to the BrR version that shall be used when performing a new or updated load rating. Please refer to this update for more information.

5. Documents Uploaded to the SCDOT BMO Website

BrR Analysis Template – A revised BrR analysis template file for BrR versions 7.0 and greater (including the recently released v7.2), “*SCDOT LR Templates.brsx*,” has been published to SCDOT’s Load Rating Site in the “*Supplemental Documentation*” ZIP file. This template aims to resolve the issue that was causing the simple span analysis templates from importing successfully.

County QA Review Load Rating Procedures – A procedural document that outlines the process of submitting a county-owned load rating package for QA review has been published to SCDOT’s Load Rating Site in the “*Supplemental Documentation*” ZIP file.

6. Simplifying “Distance” Inputs in BrR

The load rater may make slight adjustments to any “distance” input in BrR to prevent rounding errors or results deemed not practical. BrR may alert the user of an input error or produce unreasonable rating factors, particularly where complex or skewed geometry causes a distance to be fractions of a foot or inch. For instance, the rater may slightly shift transverse stiffeners on steel beams to clear the prescribed rounding threshold. Reasonable engineering judgment shall be applied, and the rater shall add a note in the *Remarks* section of the LRSF indicating this step was taken.

**Technical Note
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7. Procedure for Load Rating Precast Concrete and Prefabricated Steel Structures

When performing a load rating for a precast concrete structure, such as a precast box or floorless culvert, or a prefabricated steel structure, such as a temporary truss or press brake tub girder bridges, the guidance listed below should be followed.

New Structures: Often these types of structures are proprietary, designed and fabricated by companies such as Mabey, Acrow, Valmont, Conspan, etc. In order to protect their designs, as-builts sufficient to create a model in order to produce a load rating are not generally made available. Therefore it is vital to include in contracts with these companies (through the Contractor) directions for them to provide acceptable, certified load ratings following the SCDOT LRGD for SCDOT records prior to delivery. The BrR file and associated files produced for SCDOT records shall also be functional to properly interface with SCDOT Oversize-Overweight permitting software. Non-proprietary structures should follow SCDOT Standards, and this should be confirmed.

In-Service Structures: If the structure is already in service at the time a rating is performed, an effort should be made to obtain as-let or as-built plans from the company with sufficient information to perform a load rating. If these are not made available, then a field assessment to create schematics should be performed, and if necessary, further analysis, material and/or load testing should be recommended, and submitted to SCDOT for approval, to gather sufficient information to perform the rating. Engineering judgment should also be employed to make conservative assumptions when needed, following the SCDOT LRGD and the AASHTO Manual for Bridge Evaluation.

Please direct any questions concerning the above to:

Michael Baker International

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