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Updated: 9/24/2020 & 7/13/2021

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1. Substructure Load Rating Summary Forms

Where a substructure load rating is necessary, an independent substructure LRSF shall be signed, sealed, and submitted separate from the superstructure LRSF. Use the freeform fields when uploading the LRSFs to the Bridge File to differentiate the substructure and superstructure documentation. If a bridge requiring a substructure rating requires posting, the posting weight should be determined as the more conservative weight resulting from the superstructure and substructure rating.

2. Accessing Plans for Bridges in Preconstruction or Under Construction

For bridges that have not yet been constructed, or are currently being constructed and the rating is the responsibility of a consultant as part of the SCDOT Load Rating contract, access to the bridge plans may be obtained through the following sources:

- Contact SCDOT to request Plans Online access
- Contact the Preconstruction Project Manager
- Contact the Resident Construction Engineer or other district construction personnel

3. Considering Both LRFR & LFR Rating Factors for One Structure

When determining posting weights, the bridge weight limits may be taken as the more favorable weight resulting from the LRFR rating or LFR/ASR rating, if applicable. Note that a bridge may be rated using an alternative rating method other than LRFR if the criteria in Load Rating Guidance Document (LRGD) Section 6.9.3 is satisfied. This change is not considered retroactive for structures that have been submitted to BMO for posting consideration. If both methods are used, independent signed and sealed LRSFs shall be submitted. Items 64 and 66 on the Data Correction Form and BIO shall be corrected using the LRFR rating factors.

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4. BIO Updates for Structures Requesting Posting (*HD069)

Question:

Is it ok to delay performing BIO updates for the package until after the decision is made whether or not to post the bridge? Perhaps even after the bridge is posted? A posted bridge would require change to status of NBI 41 'Traffic Status'.

Answer:

Generally, all BIO updates are performed when a bridge is submitted for QA review, and if it is selected for QA and comments from the QA review cause a BIO item to change, the BIO update is resubmitted with the appropriate change(s). This is done to ensure BIO updates are made prior to QA review and not forgotten.

The same should be done for bridges requesting posting, except NBI Item 41 should not be changed until the final posting form is signed by the BME. If the BME signs the posting form and the bridge requires posting, resubmit the BIO update and revise Item 41 to *B – OPEN, POSTING RESTRICTIONS RECOMMENDED*. Once the posting signs are erected, the district personnel will update Item 41 to *P – POSTED FOR LOAD*. If the BME determines that the bridge should not be posted and the form is signed as such, do not revise Item 41 and do not resubmit the BIO update.

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5. Submittal Procedure for Bridges in Design

An Asset ID shall be requested for new bridge facilities and bridge replacements in accordance with Bridge Design Memo DM0420. The Asset ID Request Form can be found on the SCDOT BMO public website.

Deliverables 1 through 9 shall be submitted to SCDOT Bridge Maintenance Office's (BMO) ProjectWise directory (LoadRatingSubmittals) for QA review at the 95% bridge plan submittal stage, unless noted otherwise. When submitting load rating deliverables to the ProjectWise directory, please combine and upload them in a single .ZIP file. After a QA review has been performed on the load rating deliverables and all QA comments have been resolved, submit the final deliverables 1 through 6 and submit deliverable 10. The load rating shall be approved by the Bridge Maintenance Office prior to the submittal of final bridge plans. The deliverables shall be named in accordance with the guidance provided below using the description of each deliverable.

Where *[Asset ID]* appears in the file name, enter the structure's Asset ID without any leading zeroes. Where *[FREEFORM]* appears in the file name, the load rater may elect to enter a very brief description (with no spaces) describing the type of file if needed. The three-digit number (*00X*) that appears at the end of the file name is a serial number that increases sequentially. Refer to the Abbreviated Load Rating Bridge File Policy (BFP) available on the SCDOT BMO website for acceptable freeform entries and more information regarding serial numbers. The date that appears in the file name (*YYYY-MM-DD*) of deliverables 1 through 6 shall match the date the final Load Rating Summary Form is signed and sealed. See the description of deliverables 7 through 11 for the appropriate date to be used in the file name.

1. *Load Rating Input File*: Provide a BrR input file (.XML file) or other approved computer program input files and Excel, Mathcad, or other design aid tools, as applicable (no hard copy). A BMO Approvals Request Form shall be submitted prior to the initiation of any load rating activities if the designer is requesting to use an alternative software program other than BrR for load rating. In general, approval to utilize alternative software will only be granted if BrR cannot support the selected superstructure type. The .XML file shall include LRFR rating results. Actual Excel or Mathcad files should be submitted to SCDOT. Refer to the LRGD and applicable Technical Notes (available on the SCDOT BMO public website) for required rating considerations of bridges in design. If proprietary software or files are used, coordinate with BMO prior to submitting PDF output. PDF output shall be submitted in a format that can be checked by hand.

   File Naming Convention:
   BrR File: *[Asset ID]-LR_BrR-YYYY-MM-DD-001.xml*
   Non-BrR File (if used): *[Asset ID]-LR_Non-BrR-[FREEFORM]-YYYY-MM-DD-001.xxx*

2. *Load Rating Summary Form (LRSF)*: Provide a completed LRSF in .PDF and .XLSX format. The individual performing the QC review shall provide his/her name, company, title, and date on the LRSF. Once all deliverables are submitted, a QA review will be performed through the BMO office, and any findings from the QA review shall be addressed by the designer prior to acceptance of the load rating. The final .PDF shall be digitally signed and sealed once all QA Review comments are resolved. The LRSF can be found on the SCDOT BMO public website.

   File Naming Convention:
   .PDF File: [*Asset ID]-LR_SF_LRFR-YYYY-MM-DD-001.pdf*
   .XLSX File: [*Asset ID]-LR_SF_XLSX-YYYY-MM-DD-001.xlsx*

3. *Supplemental Calculations*: Provide supporting load rating calculations. If software other than BrR is used, provide documentation of the computer program's results by means of longhand calculations or an independent software analysis program in accordance with Section 3.3 of the Load Rating Guidance Document (LRGD). Actual Excel or Mathcad files should be submitted to SCDOT. If proprietary software or files are used, coordinate with BMO prior to submitting PDF output. PDF output shall be submitted in a format that can be checked by hand.

   File Naming Convention:
   Excel/Mathcad/Other File: [*Asset ID]-LR_SuppCalcs-YYYY-MM-DD-001.xxx*
   .PDF of Calculations File: [*Asset ID]-LR_SuppCalcs-YYYY-MM-DD-002.pdf*

4. *QC Review Checklist*: Provide a completed QC Review Checklist in .PDF format. Refer to Chapter 3 of the LRGD for additional QC/QA information. The QC Review Checklist can be found on the SCDOT BMO public website.

   File Naming Convention:
   QC Review Checklist File: [*Asset ID]-LR_QCList-YYYY-MM-DD-001.pdf*

5. *Data Correction Form*: Provide a completed Data Correction Form in .PDF format. Note that this is a new Asset ID and the Data Correction Form will need *Recommended Corrected Data* for most fields. Refer to Section 5.4 of the LRGD and Item 3 of Technical Note 05 for additional information.

   File Naming Convention:
   Data Correction Form File: [*Asset ID]-LR_BridgeData-YYYY-MM-DD-001.pdf*

6. *Labeling Diagram*: Provide a labeling diagram in .DGN and .PDF format. See Section 5.5 of the LRGD and Item 1 of Technical Note 04 for more information. Labeling diagram templates for various superstructure types can be found on the SCDOT BMO public website.

   File Naming Convention:
   .DGN File: [*Asset ID]-LabelDiagram-YYYY-MM-DD-001.dgn*
   .PDF File: [*Asset ID]-LabelDiagram-YYYY-MM-DD-002.pdf*

7. *Asset ID Request Form*: Provide a completed Asset ID Request Form in .PDF format. An Asset ID shall be requested in accordance with Bridge Design Memo DM0420. See Section 4.4 of the LRGD for more information. The date that appears in the file name should match the date the Asset ID Request Form is completed and returned by SCDOT. The Asset ID Request Form can be found on the SCDOT BMO public website.

   File Naming Convention:
   Asset ID Request Form File: [*Asset ID]-AssetIDReq-YYYY-MM-DD-001.pdf*

8. *Bridge Maintenance Office Approvals Request Form (if necessary)*: The BMO Approvals Request Form shall be submitted for approval prior to the initiation of any load rating activity. If approval is granted by SCDOT for deviations to standard procedures as noted in the LRGD or published technical notes, provide a copy of the completed BMO Approval Form in .PDF format with the final load rating package. The date that appears in the file name should match the date the BMO Approvals Request Form is approved. The BMO Approvals Form can be found on the SCDOT BMO public website.

   File Naming Convention:
   BMO Approvals Form File: [*Asset ID]-LR_BMOApprove-YYYY-MM-DD-001.pdf*

9. *95% Bridge Plans*: Provide a combined electronic copy of the 95% bridge plans in .PDF format.

   File Naming Convention:
   .PDF File: [*Asset ID]-Plans_95Review-YYYY-MM-DD-001.pdf*

10. *Final Design Plans*: Once all QA comments have been resolved, provide a combined electronic copy of the signed and sealed final design plans in .PDF format. The date that appears in the file name should match the date the final design plans are signed and sealed for construction.

    File Naming Convention:
    .PDF File: [*Asset ID]-Plans_AsLet-YYYY-MM-DD-001.pdf*

11. *Construction Changes*: The SCDOT Director of Construction (DOC) office Bridge Construction Engineer, in coordination with the Resident Construction Engineer, will notify the Engineer of Record (EOR) in writing of any construction issues that could negatively affect the load rating, upon discovery. Relevant project documents, such as field measurements, material test results, as-built drawings, contractor work schedule, etc., will be provided to the EOR along with the request to review the load rating. Any supplemental load ratings performed in response to construction changes will need to be completed promptly in order to minimize project delays.

    Relevant correspondence documenting any construction changes shall be uploaded per the BFP following proper file naming convention, with the date in the file name matching the date of the correspondence. If a change due to construction affects the load rating, provide an updated LRSF and any additional files that may have been affected. Common construction changes that would affect the load rating can be found in the list below.

    File Naming Convention:
    .PDF File: [*Asset ID]-Plans_AsBuilt-YYYY-MM-DD-001.pdf*
    Correspondence File(s): [*Asset ID]-LR_Corr-YYYY-MM-DD-00X.xxx*

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Common Construction Changes That May Adversely Affect the Load Rating:

- Material strength less than required on contract plans
- Modification to or addition of wearing surface
- Revised deck, slab, or haunch dimensions – when construction tolerances are exceeded
- Different barrier, parapet, railing or sidewalk installed
- Excessive concrete reinforcement location and size deviations
- Use of stay-in-place (SIP) forms not included in contract plans
- Unrepaired construction damage (e.g. gouges in steel beams, spalled concrete, etc.)
- Any field welding of beams not specified on contract plans
- Shop drawings not matching contract plans, especially prestressed concrete beams or slabs
- Misalignments (out of plumb, etc.) exceeding construction tolerances
- Revised bearing point location
- Addition of loads not identified on the contract plans (e.g. utilities, signs, fencing, lighting, etc.)
- Structure geometry (e.g. span length, beam spacing, etc.) exceeding construction tolerances
- Atypical substructure geometry (e.g. hammerhead cap cantilever, straddle bent length, etc.) exceeding construction tolerances
- Alterations affecting the pile performance of pile bents or footings
- Differing subsurface conditions encountered during deep foundation construction

Please note that this list is not exhaustive and sound engineering judgment shall be used when considering whether a construction change shall be brought to the attention of the EOR.

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6. Posting Avoidance Measures for Recently Designed Bridges and Bridges in Design

Projects that have not yet advanced beyond the preliminary bridge design phase shall be designed such that all inventory, operating, and legal loads rated in accordance with the guidance provided in the LRGD and all published Technical Notes results in a rating factor equal or greater than 1.0 for strength and service limit states.

For bridge designs that have progressed beyond the preliminary bridge design phase (as of the publication date of this Technical Note), the following provisions may be applied to designs in which legal loads produce Service III ratings < 1.0 if all of the following criteria is satisfied:

- The structure is a prestressed concrete bridge that is not segmentally constructed.
- The structure is under construction or was completed after December 31, 2016 or is currently in design and has progressed beyond the preliminary bridge design phase.
- If the beams have been constructed and are currently in service and show no signs of distress.
- All legal load rating factors at the Strength I limit state meet or exceed 1.0.

If the above criteria are satisfied, the measures listed below may be applied to improve the rating factor at the Service III limit state.

- The inclusion of elastic gains may be utilized in the load rating analysis if they were included during design.
- The legal-load load factor may be reduced to 0.8 for the Service III limit state.

Submit a BMO Approvals Request Form including the date the preliminary bridge plans were submitted requesting permission to utilize these measures. Both of these measures may be utilized concurrently if necessary. If either or both are applied to the load rating analysis, it shall be stated in the *Remarks* section of the Load Rating Summary Form (LRSF). If the resulting rating factor is still less than 1.0 at the Service III limit state after both measures have been utilized, the load rating engineer shall either re-design the structure such that all inventory, operating, and legal loads result in a rating equal to or greater than 1.0 for strength and service limit states or submit a BMO Approvals Request Form requesting other measures to improve the rating factors.

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7. Guidance for Load Rating Bridges Currently Under Construction (*HD073)

Question:

As there will be a number of differences in load rating a bridge currently under construction (no inspection reports, no site assessment, no existing NBI data, etc.), I wanted to check if there will be additional guidance issued on the documentation required to ensure uniformity of such ratings from different consultants.

Answer:

Yes, for bridges currently under construction or in design, the guidance listed below should be used to populate information for the specified load rating deliverables.

- ADT and Truck Percentage
  - Replacement Bridges: Use the existing year ADT and percent trucks as shown on the title sheet of the plans or latest NBI data report available, whichever is later. Note the source in the remarks on the LRSF.
  - New Location Bridges: Use the existing year ADT and percent trucks as shown on the title sheet of the plans. Note the source in the remarks on the LRSF.
  - Widening or Rehabilitation: Use the existing year ADT and percent trucks as available in the latest NBI data report. Note the source in the remarks on the LRSF.
- BrR Model
  - Create superstructure definitions as described in Item #3 of Technical Note 7.
  - Select "Good or Satisfactory" for LRFR Condition Factor.
  - Save the model with ~~"Future"~~ "As-let" (or "As-built", if applicable) selected.
- LRSF
  - Include the ~~future~~ As-let (or As-built, if applicable) condition rating results in accordance with Item #3 of Technical Note 7.
  - Enter "N/A" for the following items in the "LRFR Summary" tab:
    - (27) Year Built
    - (90) Date of Inspection
    - (418) Conditions During Rating
    - (58) Deck
    - (59) Superstructure
    - (60) Substructure
    - (62) Culvert
    - (113) Scour Critical
  - All other items should be completed
- Data Correction Form

- Complete all items, including NBI Items 64 and 66, to match the ~~future~~ As-let (or As-built, if applicable) condition.

*Previous Load Rating Project Help Desk Reference, either copied or updated for this Technical Note.

Please direct any questions concerning the above to:

Michael Baker International
e-mail: SCDOT_LR_Help_Desk@listserv.bakerprojects.com