



Florida Department of Transportation

CHARLIE CRIST
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

STEPHANIE KOPELOUSOS
INTERIM SECRETARY

February 14, 2007

TO: District Directors of Operations, District Directors of Production,
District Design Engineers, District Structures and Facilities Engineers,
District Maintenance Engineers, District Construction Engineers, District Structures Design
Engineers

FROM: Robert Robertson, State Structures Design Engineer
David O'Hagan, P.E., State Roadway Design Engineer

COPIES: **Ananth Prasad, Lora Hollingsworth, Timothy Lattner, Tom Malerk, Duane Brautigam,
Larry Jones, Larry Sessions, Robert Robertson, Marcus Ansley, Andre Pavlov,
Lex Collins, Jon Mayer, Tom Andres, Rafiq Darji, Rudy Powell, Jonathan Van Hook,
Jeffrey Ger (FHWA)**

SUBJECT: Temporary Design Bulletin C07-1
Roadway Design Bulletin 07-3
Bridge Widening and Rehabilitation

This design bulletin clarifies the requirements for bridge widening and rehabilitation. These clarifications will be integrated into the "Plans Preparation Manual" Volume 1 and the "Structures Manual", Volume 1 - Structures Design Guidelines.

REQUIREMENTS

1. Plans Preparation Manual – Volume 1 (2007 Version)

Chapter 26 – 26.16 Bridge Load Rating

Delete the entire article and replace it with the following:

26.16 Bridge Load Rating

Load rating analysis of new or existing bridges shall be performed in accordance with the AASHTO "Manual for Condition Evaluation and Load Resistance Factor Rating (LRFR) of Highway Bridges" as amended by the FDOT "Structures Manual", Volume 8. Load rating procedural matters can be found in the "Bridge Load Rating, Permitting and Posting Manual (Topic 850-010-035-b).

For new bridges the Engineer of Record shall load rate the bridge(s) and submit the calculations with the 90% plan submittal.

Prior to developing the scope-of-work for existing bridges that are to be widened and/or rehabilitated, the existing load rating will be confirmed by the FDOT or their consultant to determine the suitability of the bridge for widening and/or rehabilitation. If the existing load rating does not represent the condition of the bridge, a new load rating is required. The determination of the suitability of a bridge for widening and/or rehabilitation is based on structural capacity (load rating) and is found in the “FDOT Structure Manual”, Volume 1 - Structures Design Guidelines, Chapter 7. Load rating calculations for the entire structure (existing and new) shall be submitted with the 90% plan submittal for the project.

2. Structures Manual (January 2007) – Volume 1 – Structures Design Guidelines:

Chapter 7- Widening and Rehabilitation

Delete Article 7.1.1 Load Rating and replace with the following:

7.1.1 Load Rating

- A. Before preparing widening or rehabilitation plans, review the inspection report and the existing load rating. If the existing load rating does not represent the condition of the bridge, perform a new load rating of the existing bridge in accordance with ***SDG 1.7***. Design all bridge widening or rehabilitation projects in accordance with ***SDG 7.3***. If the bridge to be widened/rehabilitated does not have a design or permit load rating at inventory level of equal to or greater than 1.0, regardless of the specification used, replacement or strengthening is required unless a variation/exception is approved.
- B. If the widening or rehabilitation of a bridge does not produce a ***LRFR*** design inventory rating factor or a FL 120 permit rating factor greater than or equal to 1.0, calculate and report the appropriate rating factors using ***LRFR Appendix D.6*** and send a copy of the Load Rating Summary and the Load Rating Details in the ***Structures Manual Vol. 8*** to the State Structures Design Office. Calculate ratings for concrete box girders (segmental) using ***LRFR Appendix E.6***.
- C. If the load rating at inventory level using ***LRFR Appendix D.6*** yields a design inventory rating factor of less than 1.0 or 1.25 for cast-in-place and precast flat slab bridges, the use of the additional methods of analysis listed below may be approved for use by the Department. The use of these methods of analysis requires a variance approved by the State Structures Design Engineer.

For a process chart of the widening/rehabilitation decision making process, see **Figure 7-5**.

The documentation used to support the variance shall include the load rating summary details utilizing standard analysis methods and utilizing the use of the additional method of analysis.

The following additional methods of analysis are the only methods to be utilized to refine the load rating. Only one method of analysis from the list below can be used (combined methods not allowed). Because of heavy traffic and high volumes of overweight permit vehicles, the use of a variance should only be considered for bridges off the National Highway System.

1. APPROXIMATE METHOD OF ANALYSES

When using an approximate method of structural analysis defined in the LRFD specifications along with LRFD defined live load distribution factors, a rating factor of 0.95 may be rounded up to 1.0.

2. REFINED METHOD OF ANALYSIS

Refined methods of structural analyses (e.g. using finite elements) may be performed in order to establish an enhanced live load distribution and improved load rating. For continuous post-tensioned concrete bridges, a more sophisticated, time-dependent construction analysis is required to determine overall longitudinal effects from permanent loads (e.g. BD 2 analysis).

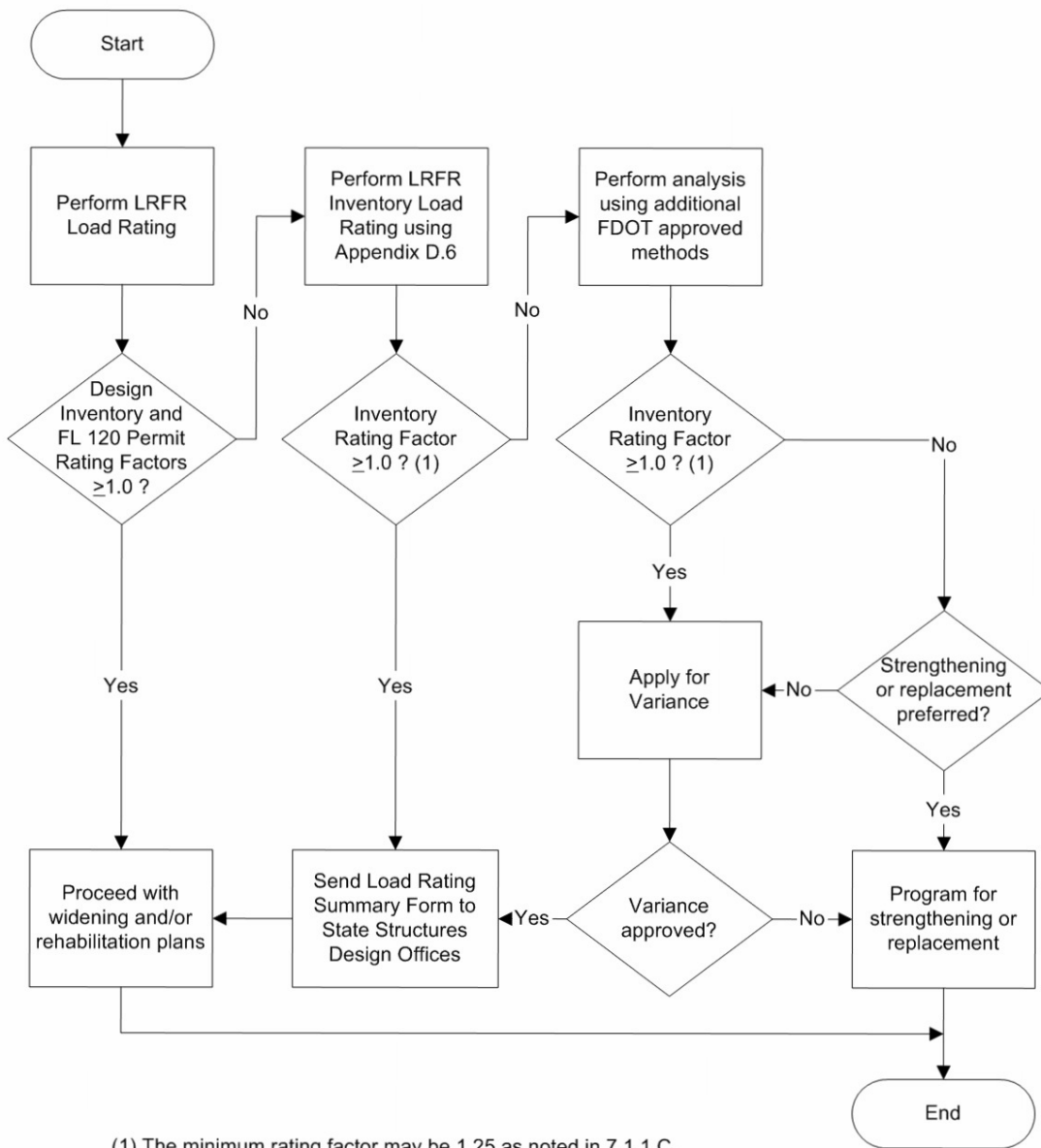
3. SHEAR CAPACITY – SEGMENTAL CONCRETE BOX GIRDER – CRACK ANGLE LRFD (LRFD 5.8.6)

To calculate a crack angle more accurately than the assumed 45 degree angle used in the specifications, use the procedure found in Appendix B of “**Volume 10 Load Rating Post-Tensioned Concrete Segmental Bridges**” (dated Oct. 8, 2004) found on the Structures Design Office internet web site.

4. SERVICE LIMIT STATE

If the load carrying capacity as determined by Service Limit State yields a rating factor less than 1.0 and the current bridge inspection is showing no signs of either shear or flexural cracking, the capacity may be established using Strength Limit State.

Figure 7-5
 Widening / Rehabilitation Decision Flow Chart



COMMENTARY

Bridge widening and rehabilitation projects require major capital expenditures therefore it is appropriate to update existing bridges within the project to the current design specification.

When LRFR Appendix D.6 is utilized a rating factor of 1.25 may be required for short span bridges (excluding culverts) as noted in 7.1.1 Load Rating. The legal limit in Florida for a single unit truck (SU4) is heavier than the notional HS-20 load; therefore, FDOT designs for the effect of this heavier loading by requiring an increase in the notional load to HS-25 (1.25 rating factor). A rating factor for these short span bridges of less than 1.25 may be considered; however, a variation is required.

BACKGROUND

This Bulletin supersedes the current provisions contained in the Structures Manual, Plans Preparation Manual, and any instructions presented at the "Load Rating Summit" in December 2005.

IMPLEMENTATION

The direction provided clarifies current policy. If an ongoing project is negatively affected by this policy, contact the Structures Design Office for direction.

CONTACT

Larry M. Sessions, P.E.
Assistant State Structures Design Engineer
850-414-4273.