



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

April 15, 2016

CIRCULAR LETTER 2016-10

NBIS METRIC 13 – LOAD RATING PROCEDURES

COUNTY ENGINEERS / SUPERINTENDENTS OF HIGHWAYS
MUNICIPAL ENGINEERS / DIRECTORS OF PUBLIC WORKS / MAYORS
METROPOLITAN PLANNING ORGANIZATIONS - DIRECTORS
CONSULTING ENGINEERS

The purpose of this Circular Letter is to make bridge owners aware of changes to the procedures for assigning load ratings to structures in Illinois, and to facilitate processes for the adaptation of new load rating procedures.

A. BACKGROUND. In 1972, the Federal Highway Administration (FHWA) gave Illinois approval to assign load ratings to structures with Design Loadings of HS20, HS15, and for short spans with H20 and H15 Design Loads. IDOT has continued to operate under that approval, using assigned load ratings, as opposed to calculated load ratings, at the Inventory and Operating levels for some structures where plans are not available, for new structures when they are entered into the Illinois Structure Information System (ISIS), and for many other structures based on Engineering Judgment (EJ).

New short wheel base, multi-axle single unit vehicles, known as Specialized Hauling Vehicles (SHVs), are now allowed to operate on Interstate highways and on the adjacent local highway system. Additional legislation also allows heavier statutory loads. There is now concern that many of the nation's bridges do not have capacity to carry all legal truck loads. In response, the Department initiated a parametric study to compare Illinois Legal Loads versus the (HS20 and HL-93) Design Truck Loads used in Illinois. This resulted in an increase to the representative loads used to load rate structures in Illinois.

On November 15, 2013 the FHWA issued a memo calling for the total re-rating of all bridges for SHVs if certain requirements were not met. The memo calls for re-rating all structures where the State's legal and statutory vehicles, as well as SHVs, are not enveloped by the design truck loads. In response, the Department is revisiting the issue with a supplemental parametric study for the SHVs and other loads to ascertain if the Design Truck Loads envelope all vehicles, and to determine if the representative rating trucks envelope all legal loads.

B. SEPTEMBER 29, 2011 FHWA MEMO. In response to changes in the *AASHTO Manual for Bridge Evaluation* (MBE), a September 29, 2011 FHWA memo allowed assigned load ratings so long as the following conditions are met:

1. The bridge was designed and checked using either the AASHTO Load and Resistance Factor Design (LRFD) or Load Factor Design (LFD) methods to at least HL-93 or HS-20 live loads, respectively; and
2. The bridge was built in accordance with the design plans; and
3. No changes to the loading conditions or the structure condition have occurred that could reduce the inventory rating below the design load level; and
4. An evaluation has been completed and documented, determining that the force effects from State legal loads or permit loads do not exceed those from the design load; and
5. The checked design calculations, and relevant computer input and output information, must be accessible and referenced or included in the individual bridge records.

A summary of the assigned load rating, which demonstrates these five conditions are met, is to be included in the bridge records and approved by the individual charged with the overall responsibility for load rating bridges, or by an individual meeting 23 CFR 650.309 (c) qualifications and delegated, in writing, this approval authority. If any of these conditions cannot be met for a bridge at any point during its service life, load ratings cannot be assigned and must be determined by other methods defined in the *AASHTO Manual for Bridge Evaluation*.

If complete design files have not been retained for existing bridges, design plans clearly identifying the loading as at least HL-93 or HS-20 and bearing the stamp of a licensed professional (*Note: "structural" in Illinois*) engineer may be used by the individual responsible for load rating under 23 CFR 650.309 (c) as the basis for an assigned load rating. The approval must be documented as the basis for the assigned load rating and become part of the official bridge records. If the owner has such design plans, conditions (1) and (5) above are considered to be met. Therefore, at this time all owners should ensure that bridge plans are in the bridge file. A list of the structures with assigned ratings for which plans are needed by the Department for analysis will be provided at a later date. **This bridge file review must be completed by December 31, 2016.**

Conditions (2), (3), and (4) still must be met.

There is an understanding that given the construction date of many structures in the inventory, condition (2) may be difficult to document. We expect with current construction procedures, inspection documentation, and other requirements related to changed conditions, that structures were built according to available plans. Owners should evaluate their structure inventory, document, and take measures to identify and address areas of concern.

We expect condition (3) is met by the Department's procedures for load rating inspection and evaluation of structures with drops in structure condition ratings of "4" or less.

In order to satisfy condition (4), IDOT's supplemental parametric study is intended to determine if the HL-93 and HS-20 Design Loads encompass the State legal loads or permit loads. If the results of the parametric study find design loads do not encompass State legal loads or permit loads, a load analysis will be required.

C. ASSIGNED LOAD RATINGS / ENGINEERING JUDGMENT. Except in rare cases, such as culverts with fill height over 2.0 feet, the Department may no longer use EJ to overrule the findings of structural analysis. The Department has used EJ in the past to preclude the need for a load posting for some structures that have been adequately handling traffic with no signs of distress. However, given the concerns noted above, the FHWA will no longer allow this practice; the Department must, when possible, base load posting decisions on actual calculations.

"LOW OPERATING RATING (OR) - NO POSTING." The FHWA has identified a large number of structures in Illinois having an OR Factor of less than 1.0 for the Design Load which are not load posted (Owners must understand that an OR of less than 1.0 is not a direct indication that the structure cannot carry legal loads of various configurations). The Department is in the process of re-evaluating these structures to re-analyze for representative rating loads. The schedule is as follows:

1. OR < 0.5 – 14 Local Structures. Due March 1, 2016-Complete.
2. $0.5 \leq \text{OR} < 0.9$ – 154 Local Structures. Due June 30, 2016.
3. $0.9 \leq \text{OR} < 1.0$ – 619 Local Structures. Due November 30, 2016.

The Local Bridge Unit (LBU) is initially reviewing our files to screen those structures for which we have sufficient history to re-analyze; plans, photos, rating computations. When the LBU does not have sufficient information, the owner is contacted, requesting plans and photos if available. Understanding of the requirement and prompt attention to the request is necessary in order to meet required deadlines.

If sufficient information is not available, load rating inspections will be performed by LBU staff or our consultants, and the structures re-analyzed.

NON-DESTRUCTIVE TESTING / RE-ANALYSIS. To counter the effects of the loss of the Engineering Judgment tool and increased rating loads, owners may have structures load tested. Methodology and policy is established in *The Manual for Bridge Evaluation* (MBE), Chapter 8. However, this can be an expensive venture with necessary planning, load testing, instrumentation and analysis, and continued monitoring that may be required.

The Department is investigating this and other alternatives.

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D. RESULTS/IMPACTS. Although the full impacts of this issue cannot be known until at least the completion of the supplementary parametric study, the following is provided:

MORE AND LOWER LOAD POSTINGS. As indicated above, as a result of the initial parametric study, it was necessary to increase the representative rating loads; this resulted in an increase in weight of about **13.2%** to our 36 ton 3-S2 “bomber” rating truck, to 40.75 tons. Coupled with the loss of Engineering Judgment as a rating tool, we expect an increase in the number of load posted structures, and lower load postings – not just structures identified in the Item C list above, but for all structure load rating analyses. Therefore, as we analyze and re-analyze structures, we can expect more / lower load postings.

PARAMETRIC STUDY / FUTURE REQUIREMENTS. After the completion of the supplemental parametric study discussed previously, expected near the end of CY 2016, the Department will study the results, then modify policy and prepare guidance for future load ratings.

We expect that beginning July 1, 2017, all new construction, rehabilitations, and other work affecting the load capacity of a structure, will require a load rating analysis, and submittal of the plans and load rating results to the Department. More guidance will be provided in the future. However, for planning purposes, owners and their consultants should prepare by including load ratings in their scope of work.

If the results of the parametric study find that the Illinois Design Loads do not encompass the State legal loads or permit loads, all structures in the State may need to be re-analyzed.

If you have any questions, please contact the IDOT Bridge Management Unit at DOT.BBS.BridgeMgmt@Illinois.gov.

Sincerely,



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