

TO:

# ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

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**SUBJECT:** Technical Policy & Procedures Manual  
Users Manual For Bridge Inventory and Inspection,  
Part III - Rating - Bridge Load Posting Guide-  
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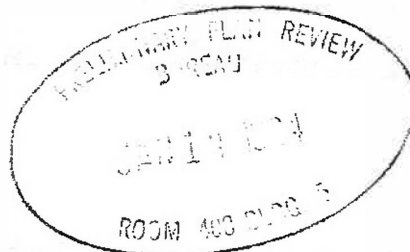
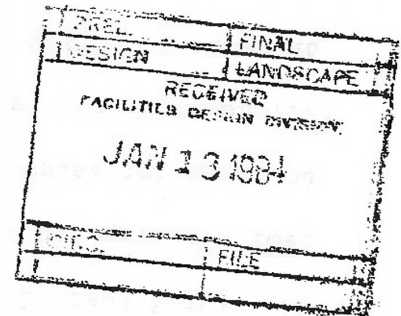
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The purpose of this Engineering Instruction is to transmit the Bridge Load Posting Guidelines For State Owned Bridges. These guidelines are to be used as an aid for determining load postings for State owned bridges.



## BRIDGE LOAD POSTING GUIDELINES FOR STATE OWNED BRIDGES

### 1. GENERAL

These guidelines are to be used for determining load postings for State owned bridges. Because of the varying nature of structural systems, materials, frequency of loadings and other factors which may affect a load posting, no rigid set of rules can be adopted that would be appropriate in every case. For this reason, these guidelines are intentionally flexible. Engineers determining posting values should be familiar with the materials referenced at the end of these guidelines, as they contain important background information on inspection, analysis, and posting of bridges. The AASHTO Manual for Maintenance Inspection of Bridges is of special significance because it is considered the basic policy for bridge posting in this country. It defines load ratings used for posting bridges, including inventory & operating ratings and states that the bridge owner may use either for posting at his discretion. Parties responsible for establishing postings for State owned bridges should also be familiar with the portion of the Manual of Administrative Procedures (MAP) concerning posting. The MAP issuance deals with the administrative aspects of posting bridges, while this document deals with determining at what value to post a bridge.

These guidelines are for establishing the rating level, inventory, operating or somewhere in between, at which a bridge is to be load posted. The Engineer may, for a specific bridge, have sufficient reason to post at a rating level different from what would normally be determined by these

guidelines. However, bridges should never be posted for loads exceeding the operating rating or for less than 3 tons. If a bridge is not capable of carrying 3 tons, it should be closed to vehicular traffic.

These guidelines should not be used without first thoroughly reviewing the AASHTO Manual and all NYSDOT issuances relating to bridge rating and posting.

## II. INSPECTION

Bridges being investigated for possible load posting should be inspected in the field to verify the accuracy of existing plans, should they exist, or to determine section properties and other basic data if plans do not exist. In either case, the Inspector should make a careful field check of dead loads, including deck and overlay thicknesses and check for the presence of utilities. The Field Inspector should also make a careful check for deterioration, substructure problems, and other forms of distress that could affect the capacity of the bridge. This is especially important when evaluating metal superstructures, where measurement for section loss must be made and a close visual inspection must be performed in tension areas likely to develop cracks.

## III. STRENGTH EVALUATION

The field investigation should be followed by a Level 1 analysis of the bridge superstructure. Refer to EI 81-20, Load Rating of Bridges, Technical Policy & Procedures Manual for a definition of a Level 1 analysis. This analysis should include all elements of the bridge

superstructure defined as "primary members" in the New York State Bridge Inspection Manual 82. It is not necessary to analyze concrete bridge decks and a bridge should not be posted based on an analysis of a concrete deck. Metal and timber decks should be analyzed and postings may be necessary depending on their calculated capacity. The vehicle used for analysis purposes shall be an HS20 truck. If it is determined that no posting is required when an HS20 truck is used, there is no need for further analysis. However, if the analysis for an HS20 truck indicates a need for posting, the bridge shall also be analyzed for an H type vehicle.

Occasionally, the evaluating engineer may determine that a full-scale load test would be beneficial in making a posting determination. When this is done, the testing should include the use of vehicles of known weight distribution and field measurement of induced strains used to determine inventory and operating levels. The results of the tests may be used to establish a posting, even if the results are different from those determined by the analytical approach.

Unless unusual conditions exist, concrete and masonry substructures do not have to be analyzed when investigating the need for posting. Metal substructure elements, such as metal piers, should be analyzed. In some cases, substructure conditions such as, scour, loss of support for bearings, tilting or other deficiencies may govern the posting of a bridge. When this occurs, posting will be subjective in nature and a precise analysis cannot be performed.

Both working stress and load factor analysis are acceptable methods for determining rating values. The engineer performing the evaluation will determine the method to be used. Different methods of analysis can be used for different structural elements on the same bridge.

#### IV. SIGNING

Signing shall be done in conformance with the current Manual of Uniform Traffic Control.

#### V. DETERMINING POSTING VALUES

##### A. Metal Elements

##### 1. Posting At Inventory Rating

- a. Nonredundant metal bridge elements should generally be posted at or near the inventory rating. Exceptions are elements of riveted construction and all floorbeams, which may be posted at the midpoint between the inventory and operating ratings, providing they are in good condition. Examples of nonredundant elements that will normally result in postings near the inventory rating include welded or rolled two girder bridges, truss members on pinned eye bar trusses and truss members on welded trusses. Rolled beams or welded members used as pier caps and which carry all superstructure loads to individual columns also fall

into this category. This detail is frequently used in viaduct type construction.

- b. Bridges with extensive metal loss in highly stressed areas should generally be posted at or near the inventory rating regardless of type of construction. This is especially true if the metal loss is in a highly stressed tension or shear area, creating stress risers at critical locations.
- c. Consideration should be given to posting at or near the inventory rating when a bridge is expected to receive a high frequency of loading at the posted level.
- d. Because of varying conditions encountered, such as structural types, materials, details, load history, and nature or location of observed deficiencies, the Engineer may, at his discretion, elect to use the inventory rating for posting purposes even though the situation does not fall into one of the above categories.

2. Posting Near The Midpoint Between Inventory Rating And Operating Rating

- a. This rating range may be used for posting purposes on a routine basis for metal bridge elements in good to fair condition providing the elements under consideration are

redundant. A large number of bridge elements fall into this category, including multi-girders and stringers.

- b. This rating range may be used for posting purposes on a routine basis for all floorbeams and all riveted members providing they are in good physical condition.
- c. Slightly exceeding the midpoint between inventory and operating ratings is acceptable in order to reach an even value for posting, such as, 15 tons.

### 3. Posting Up To Operating Rating

- a. The operating rating should only be used for posting purposes where the Engineer has a high degree of confidence in the section properties used, the dead loads involved, and the analysis itself.
- b. Also, any metal element under consideration for being posted at this level should be redundant.
- c. If the Engineer elects to use the operating rating for posting purposes, he should evaluate the need for more frequent inspections than normally performed. If he feels that more frequent inspections are necessary, he should notify the Regional Highway Maintenance Engineer and the Main Office Structures Division, in writing.

### B. Concrete Elements

1. No Plans Available

When an analysis cannot be performed because there are no plans and the concrete superstructure has been carrying legal loads without inducing visual signs of distress, it is not necessary to post the bridge based on superstructure capacity.

2. Plans Available

- a. Posting At Inventory Rating - It is unlikely that a concrete bridge would be posted at the Inventory Rating due to the known inherent strength of this type of construction. However, the rating Engineer may elect to post at this level , at his discretion, for very unusual cases.
- b. Posting Near Midpoint Between Inventory And Operating Ratings - This range may be used for posting purposes for concrete superstructures that are seriously deteriorated providing a sudden failure mode does not appear to exist. The most-common sudden failure mode for concrete T-beam and slab spans is extensive distress in the member itself near bearing locations or impending failure of substructure support.
- c. Posting Up To Operating Rating - The operating rating may be used for posting purposes for concrete superstructures

that are moderately deteriorated providing a sudden failure mode does not appear to exist. The most-common sudden failure mode for concrete T-beam and slab spans is extensive distress in the member itself near bearing locations or lack of substructure support.

## SECTION VI DOCUMENTATION

- A. All Bridges - The party initiating the posting or change in posting shall notify the Regional Structures Engineer, in writing, about the posting change. The Regional Structures Engineer will update the inventory file to reflect the change. If a bridge receives a full-scale load test, a report shall be prepared describing testing procedures, measured structural response, and conclusions drawn. A copy of this report should be forwarded to the Inventory and Inspection Unit of the Structures Division.
- B. State Owned Bridges - Copies of all correspondence relating to the determination for the need for posting including calculations, inspection reports, full-scale testing reports, etc., shall be placed in the State Bridge Identification (BIN) File. Refer to the current portion of the Manual of Administrative Procedures for other administrative details on posting.
- C. Other Bridges - Should a bridge owner other than the State elect to use these guidelines the following applies. Copies of all correspondence relating to the determination for the need for posting including calculations, inspection reports, full-scale testing reports, etc., shall be placed in the Local BIN File. Copies of this material should be forwarded by the bridge owner to the Regional Structures Engineer for inclusion in the State Bridge Identification (BIN) File.

References:

1. Manual for Maintenance Inspection of Bridges 1978 by American Association of State Highway and Transportation Officials.
2. Bridge Inspection Manual 82, by NYSDOT
3. Load Rating of Bridges Technical Policy and Procedures Manual by NYSDOT
4. New York State Standard Specifications for Highway Bridges by NYSDOT
5. New York State Manual of Administrative Practices, subject Closing or Posting of State Owned Bridges.