



Illinois Department of Transportation

Memorandum

To: ALL BRIDGE DESIGNERS 09.1

From: Ralph E. Anderson *Ralph E. Anderson*

Subject: Guidelines for Structural Assessment Reports for Contractor's
Means and Methods

Date: March 9, 2009

This memorandum provides guidance to engineers regarding the Guide Bridge Special Provision for Structural Assessment Reports for Contractor's Means and Methods (GBSP 67). This special provision will initially be applicable for pilot projects selected by the Department beginning with the June 12, 2009 letting. For future lettings, appropriate projects may be selected by the Department and the Phase II engineers will be notified that GBSP 67 is applicable.

After the I-35W Bridge in Minnesota collapsed, the Federal Highway Administration issued Technical Advisory T5140.28, which charged state transportation agencies with ensuring that construction loading and stockpiled materials placed on structures do not overload its members.

In response to this advisory, the Department has developed GBSP 67, which requires the contractor to submit Structural Assessment Report(s) (SARs) to the engineer for approval. The SARs shall demonstrate that the structural demands of the applied loads due to the contractor's means and methods will not exceed the available capacity of the structure at the time the loads are applied. GBSP 67 is intended to replace the special provision for Demolition Plans for Removal of Existing Structures (GBSP 63) and to supplement the special provisions for erection of curved or complex steel structures.

For state owned bridges, the SARs shall be submitted by the contractor to the Resident Engineer and forwarded to the Bureau of Bridges and Structures (BBS), Attn: Design Section Chief, for review and approval. These submittals will be processed in the same manner as other construction-related submittals to BBS. BBS will respond to the District. For local agency owned bridges, the SARs shall be submitted to the owner's Resident Engineer. SARs for local agency projects will not be reviewed by BBS.

To assist in determining the available capacity for the SARs, each project with an existing structure will have an Existing Structure Information Package (ESIP) available to the contractor at the time the contractor obtains the plans and proposal prior to bidding. This package will typically include existing or "As-Built" plans and the latest National Bridge Inspection Standards (NBIS) inspection report. For state owned bridges, the District will be responsible for providing this package. After award, requests by the contractor for additional information shall be accompanied by justification. The District may ask the Phase II consultant engineer to prepare the ESIP. For local agency owned bridges, the owner will be responsible for providing this information to the contractor if the information is requested.

RESPONSIBILITIES

To assist in addressing the requirements of the SAR special provision, the responsibilities of the Phase II engineer, the contractor and the contractor's structural engineer are noted below.

Responsibilities of the Phase II Engineer:

- For all projects on state owned bridges:
 - Verify with BBS whether a note is required on the contract plans stating that a consultant pre-qualification category other than "Highway Bridges-Typical" will be required for preparation of the SARs. If a note is required, BBS will identify which pre-qualification category should be specified in the plan note shown below.
- For projects with an existing structure:
 - Review the existing and/or "As-Built" plans, the latest NBIS inspection report, shop plans and other reports such as the Bridge Condition Report (BCR), Structure Geotechnical Report (SGR) or Hydraulic Report that were not completed by that Phase II engineer.
 - Determine whether any notes should be provided on the contract plans advising the contractor there is structure deterioration. In addition to the General Note shown below, other advisory notes may be shown. These notes can be very helpful to the contractor and other field personnel. (For example, "Beam 1 is severely deteriorated and the Contractor is advised to put no loads on it.")

- Consider whether the condition of the existing structure will require the contractor to work under some restrictions. (For example, if the existing structure is so deteriorated that the contractor will not be able to bring a crane on the structure and will need to work from the stream, then making arrangements to acquire a permit to work in the water may be appropriate.)
- Obtain the current ratings or rating factors (Inventory and Operating) and any live load restrictions that are on file for the existing structure and show them on the plans. These ratings or rating factors are measures of the live load carrying capacity.
- Information to be shown on the contract plans (for state owned bridges), on a case-by-case basis (per discussion with BBS), for some complicated projects:
 - Add the following note to the General Notes of the structure plans:

“The Contractor shall retain the services of an engineering firm, prequalified in the IDOT consultant selection category of Highway Bridges (Advanced Typical / Complex), for preparation of the Structural Assessment Report(s). Contractor’s pre-approval shall not be applicable for this project. See Special Provision.”
- Additional information to be shown on the contract plans when there is an existing structure. (Structures that are allowed to carry legal loads only are not considered to have a live load restriction for the purposes of GBSP 67. Structures with signs stating “40 Tons Gross, 10 Tons Axle” indicate that only legal loads are allowed.):
 - For existing structures designed by the AASHTO Standard Specifications for Highway Bridges, add the following note to the General Notes of the structure plans:

“Current Ratings on File for Existing Structure
Inventory: HS__
Operating: HS__
Live Load Restrictions: __ [“Yes (____)” (Provide a value in tons)
“No”]

Inventory and Operating Ratings and Live Load Restrictions are provided for information only. Inventory and Operating Ratings are based on HS loading and configuration. Live Load Restrictions are based on Illinois legal loads and configurations. The Ratings and Live Load Restrictions are not necessarily representative of capacities to support the Contractor’s equipment.”

- For existing structures designed by the AASHTO LRFD Bridge Design Specifications, add the following note to the General Notes of the structure plans:

“Current Rating Factors on File for Existing Structure

Inventory: RF__

Operating: RF__

Live Load Restrictions: __ [“Yes (____)” (Provide a value in tons)
“No”]

Inventory and Operating Rating Factors and Live Load Restrictions are provided for information only. Inventory and Operating Rating Factors are based on HL-93 loading and configuration. Live Load Restrictions are based on Illinois legal loads and configurations. The Rating Factors and Live Load Restrictions are not necessarily representative of capacities to support the Contractor’s equipment.”

- The following note shall be added to the General Notes of the structure plans when the Phase II engineer has determined there is deterioration of the existing structure resulting in a reduced load carrying capacity:

“The Contractor is advised that the existing structure contains members that are in a deteriorated condition with reduced load carrying capacity. It is the Contractor’s responsibility to account for the condition of the existing structure when developing construction procedures for the complete or partial removal, or replacement of the structure. An Existing Structure Information Package is available upon request as noted in the special provisions.”

Responsibilities of the Contractor:

- Determine the intended means and methods of construction.
- Provide for SARs preparation by an Illinois licensed Structural Engineer. As noted in GBSP 67, the contractor shall be pre-approved to prepare SARs or shall retain a pre-qualified engineering firm to prepare SARs. For some complicated projects, pre-approved contractors may not be allowed to prepare the SARs and the contractor shall retain a pre-qualified engineering firm. On projects where these restrictions apply, there will be a note on the plans indicating this and also stating the required pre-qualification category for the engineering firm.
- Submit the SARs to the Resident Engineer along with evidence of pre-approval/pre-qualification as noted in GBSP 67.

- Upon approval of the SARs, implement measures necessary to ensure that the approved SARs are followed. (For example, if a crane will only be allowed to travel along certain beam lines, markings could be made on the deck to designate those lines.)

Responsibilities of the Contractor's Structural Engineer:

- For projects with an existing structure, review the ESIP information and any additional information provided to the contractor. Field verification of the current condition of the structure may be required.
- Verify that the structural demands of the applied loads due to the contractor's means and methods will not exceed the available capacity of the structure at the time the loads are applied. For existing structural components, the existing condition shall be considered. The appropriate load distributions according to AASHTO shall be used.
- Provide sealed SARs that clearly show the work covered (including allowed and/or restricted load locations), calculations of the available capacity, calculations of the load effects, any assumptions made, and comparison of the largest load effect and the available capacity. Separate portions of the work may be covered by separate SARs which may be submitted at different times.

GUIDELINES FOR THE PREPARATION OF SARs

To reduce the number of items to be analyzed and reviewed and the number of submittals, the structural engineer may wish to develop maximum load effect envelopes. These may provide the greatest amount of flexibility to the contractor. To produce a maximum load effect envelope, calculate the greatest possible effects on the structure based on several alternative construction plans or alternative loading patterns using the contractor's means and methods. Then determine the available capacity at the controlling locations. The SAR is only required to demonstrate that the maximum effect due to loading will be less than the available capacity at that location. Lists of the activities covered by the envelope and/or restrictions to the contractor's means and methods should be shown in the SAR. This will allow the contractor a wider range of options in the field. It will also inform the contractor's personnel that this wider range of options is acceptable according to the approved SAR. (For example, consider a bridge where a portion of the existing deck has been removed. Although there may be only one concrete truck on the structure at times and two concrete trucks on the structure at other times, the SARs would only need to verify that there is adequate capacity during the worst of these conditions. The intermediate, lesser load cases would not need to be shown.)

Since contractors may need to make revisions to their intended procedures due to weather, availability of equipment and personnel, etc., SARs that have been well thought-out and include the load effects of possible alternate means and methods will greatly assist the contractor in meeting critical path schedules and minimize the need for revised SARs submittals. (For example, a contractor may wish to remove an existing superstructure by placing removal equipment on the banks of a stream below. However, if the stream floods, the contractor may want to place the removal equipment on the existing structure. If the submitted SARs have already evaluated this condition and demonstrated that the maximum effects caused by this applied load will be less than the available capacity at all locations, then the contractor may switch from the original plan to the new plan without submitting a new SAR.)

If the contractor wants to change a load or load pattern, a SAR resubmittal will only be required when the change results in a greater load effect at a controlling location as determined by the contractor's structural engineer. The contractor's structural engineer shall provide written verification for the contractor to submit to the Engineer indicating that the specified revised loads do not result in an increased load effect.

After structures, or portions thereof, are closed to traffic and prior to removal of any portion of the existing structure, the contractor may move vehicles across the existing structure without a SAR provided the vehicles satisfy the requirements of Section 15-111 of the Illinois Vehicle Code or the FHWA document "Bridge Formula Weights" under the conditions noted in GBSP 67.

To meet the requirement in GBSP 67 that the contractor shall be responsible for following the approved SARs, lists of acceptable loadings at various stages should be well defined in the SARs to assist the contractor's personnel in ensuring that the approved SARs are followed. Clear and easy-to-follow summaries in the SARs of allowed/restricted movements, loads, conditions, etc., will permit the contractor's personnel to more readily recognize when an anticipated activity will not be in accordance with the approved SARs and to stop the activity until an approved SAR covering the activity is obtained. These summaries should be stated in language that will be understood by all personnel who are attempting to follow the SAR or who are attempting to ensure the SAR is followed.

Since there may be deterioration on an existing structure, the location of the controlling available capacity may not be obvious for each loading pattern.

An existing structure is likely to be posted for live load restrictions when the operating rating is less than HS20 or the operating rating factor is less than 1.0. For structures which are posted for live load restrictions, a SAR will always be needed for any applied construction loads and neither SAR exemption noted in GBSP 67 will be allowed (i.e., the SAR exemption for loads under 10 tons nor the SAR exemption for vehicles meeting the Section 15-111 of the Illinois Vehicle Code (see reference in GBSP 67)). The "Live Load Restrictions" line in the General Notes will show a "Yes" (with a value in parentheses, e.g., 15 Tons) for structures that are considered to have a live load restriction for the purposes of GBSP 67.

As noted in GBSP 67, the effects of the applied loads cannot exceed given capacity levels which are dependent on the type of work being done. For new construction and for portions of the existing structure that are to be reused, the specified available capacity is at the Inventory level, which is the design load level for normal service. For portions of the structure that are being removed, the specified available capacity is at the Operating level, which is the maximum permissible load level for occasional use. See the AASHTO Manual for Bridge Evaluation (MBE) for further information on determining the available capacity at each of these levels. Structures designed by the AASHTO Standard Specifications for Highway Bridges may utilize any of the methods shown in the MBE (Working Stress, Load Factor or Load and Resistance Factor). Structures designed by the AASHTO LRFD Bridge Design Specifications shall utilize the Load and Resistance Factor method shown in the MBE.

Firms involved in the development of the contract plans or firms which are performing project management and/or SAR review on that structure will not be eligible to develop a SAR for that project.

Please contact the Design Section Chief of the Bureau of Bridges and Structures with any questions.