COMPLEX BRIDGE PEER REVIEW REQUIREMENTS

Independent Peer Reviews are used to independently confirm that the design of complex bridges or complex bridge components meet the requirements of the specified design criteria. Independent Peer Review is intended to be a thorough, independent verification of the original work. A Peer Review is not simply a check of the Engineer of Record's (EOR's) plans and calculations. It is an independent verification of the design using different programs where applicable and independent processes than what was used by the EOR.

Independent Peer Review does not relieve the EOR of the design Quality Control and Quality Assurance requirements contained in the RFP or any other submittal requirements in TP-700. Independent Peer Review does not relieve the EOR of their liability for errors and omissions in their work.

The Peer Review will be performed by an independent engineering firm, other than the firm responsible for the initial work, and will be designated and contracted by the Proposer to conduct the review. The designated Independent Peer Review firm will have no other involvement with the project for the Proposer. The Peer Review firm may perform other services for SCDOT on the project not related to design (such as CE&I and utility coordination). The Independent Peer Review firm shall employ a minimum of two Professional Engineers assigned to perform the work associated with the Independent Peer Review. Both professional engineers shall have either five years' minimum experience or three representative (similar in scope and complexity) previous projects worth of design experience, in the design of the type of complex structure/element being reviewed. Both assigned Professional Engineers shall also have a minimum of ten years' experience in the design of highway bridge projects. If multiple engineering firms serve as EOR on the same project for any of the qualifying complex bridge types and components in Section 1 below, then each firm shall be subject to all Independent Peer Review requirements contained herein.

1. QUALIFYING COMPLEX BRIDGE TYPES AND COMPONENTS

Peer Reviews are required on the following bridges and bridge components:

a. Spans where either 2D or 3D refined analysis is required by either AASHTO LRFD Bridge Design Specifications or SCDOT Bridge Design Manual (BDM)

b. Horizontally curved steel girder bridges, with or without skews (including constructability designs/checks). Where multiple curved steel girder bridges are designed by the same firm, a minimum of 2 representative bridges shall be selected for peer review, one of which shall contain the most severe curvature and/or skew. The same design and analysis procedures shall subsequently be applied to the remaining curved steel girder superstructures on the project. The representative steel girder superstructures selected for Independent Peer Review are subject to SCDOT approval.

c. Seismic design of bridges with Operational Classification (OC) I, requiring a detailed seismic analysis. Seismic design of bridges that utilize isolation bearings or dampers. Seismic design of bridges with irregular geometry that are designed using a time-history analysis. Where multiple bridges on the same project require seismic design, a minimum of 2 representative bridges, including the longest and shortest bridges that require a detailed seismic analysis, shall be selected for peer review.

d. Movable bridge spans (Independent Peer Review is required for the mechanical, electrical, and structural components)

e. Bridges/spans with specified vessel collision requirements that include a collision vessel in excess of the AASHTO standard hopper barge [LRFD article 3.14.11] travelling at a speed greater than 2 knots

f. Straddle bents (Concrete or Steel, integral and non-integral)

g. Integral interior bents

h. Single-column bents

i. Post-tensioned concrete components

j. Precast columns and/or bent caps

k. Bridge spans with less than 3 girders in the cross-section, including pedestrian bridges

l. Superstructure types other than the types listed in BDM Section 12.3.2, or Superstructure spans which exceed 300 feet in length

m. Braided underpass structures where the beams or slab superstructure element is not oriented parallel to traffic of the overlying roadway

n. A jointless bridge with integral end bents supported by vertical concrete abutment wall(s).

o. Continuous-for-live-load prestressed concrete girder superstructure span units where a different number of girders in adjacent spans frame into an interior bent continuity diaphragm.

p. Superstructures constructed off-alignment and subsequently moved into place

q. Components of bridge spans in which the superstructure is subject to wave loading

r. Design concepts, components, elements, details, or construction techniques not typically used in South Carolina and deemed complex by SCDOT through the ATC process or through the design-build team's change in the conceptual design (i.e. the addition of a complex element not anticipated through conceptual design).

For bridges where only certain spans have complex spans or components listed above, Independent Peer Review is only required for those complex spans or components.

Approvals of qualifying complex bridge types and components will be in accordance with milestone schedule requirements of the RFP.

2. SCOPE OF PEER REVIEW WORK

Independent Peer Reviews shall include but are not limited to the independent confirmation of the following when applicable:

a) Compatibility of bridge geometry with roadway geometrics including typical section, horizontal alignment, vertical alignment, minimum lateral offset requirements, and minimum vertical clearance requirements.

b) Compatibility of construction staging with Traffic Control Plans.

c) Conflicts with underground and overhead utilities.

d) Compliance with AASHTO, SCDOT, and FHWA design requirements. Compliance with railroad company requirements for complex spans over railroad tracks.

e) Use of structural analysis methodologies appropriate to the nature and complexity of the given structure.*

f) Correctness of design assumptions.

g) Correctness of design results appearing on the plans, including review of the design during all stages of construction.*

h) Adequate strength of structural elements in accordance with specified design criteria.

i) Adequate serviceability of structural elements and appurtenances in accordance with specified design criteria (including deflection, vibration, stiffness criteria, durability criteria, accommodation of anticipated thermal movements, etc.).

j) Global and local analyses including nodal forces, considering structural members, connections/nodes and boundary conditions consistent with the structure type.*

k) Specific areas of concern include post-tensioning anchorages, situations where constraint of structure displacements cause redistribution of load (secondary moments and shears), voids in areas of high stress, and relative displacements between stages of construction.*

l) Correct representation of structural design values in the plans (does not replace the EOR design QA/QC requirements of the contract).

m) Technical Special Provisions or modified Special Provisions where necessary (including Special Provisions provided by the EOR and not included in the plans, or modifications to Special Provisions contained in TP-1000 of the RFP).

n) Constructability of the structure (this assessment is limited to looking for “fatal flaws,” and is not intended to identify a single, “most constructible” design).

o) Proposed materials and details are in accordance with industry standard construction practices, and which would be expected to meet the intended structure design life with routine maintenance.

*When complex spans or components are designed with software using refined analysis (e.g. 2D grid analysis, 2D plate-and-eccentric beam analysis, 3D finite element analysis, or similar), the Independent Peer Review consultant shall verify the design results using a different program/method unless specifically allowed otherwise by SCDOT. One exception is the Multimodal Spectral Analysis for seismic design, in which case the same software program may be used, but the Independent Peer Review consultant will perform input calculations independently and must conduct an independent interpretation of their model's output results.

3. INDEPENDENT PEER REVIEW LETTER

Include with the letter:

a) A statement that Independent Peer Review has been performed in accordance with the requirements of the RFP.

b) A statement that confirms the Independent Peer Review consultant was allotted the appropriate amount of hours to complete the full Independent Peer Review for all complex bridge components of the project. Identify the total number of labor hours utilized to complete the Independent Peer Review.

c) A description of Independent Peer Review work performed, including a list of the bridges or components addressed by the Independent Peer Review.

d) A comment log (either PDF document comment matrix or Bluebeam session comment log is acceptable) with responses and resolutions documenting the interaction between EOR and Independent Peer Review consultant, and indicating that each comment was resolved to the mutual satisfaction of both the EOR and the Independent Peer Review consultant.

e) SCDOT reserves the right to request design calculations, models, and supporting documentation utilized by the Independent Peer Review consultant.

Following Final Bridge Plan QA review by SCDOT, incorporate design and detailing changes that might affect results into the modeling used in the Independent Peer Review. Update and finalize the Independent Peer Review Letter and report, stating that the changes from final bridge plan review have been incorporated. Provide a report documenting the Independent Peer Review (the "Independent Peer Review Letter") with the revised final bridge package submittal.

Submit the signed and sealed Independent Peer Review Letter with the Released-For-Construction (RFC) package. The Independent Peer Review Letter shall be signed and sealed by the responsible Independent Peer Review Professional Engineer, who shall be licensed as a Professional Engineer in South Carolina.

After plans have been released for construction, subsequent construction plan revisions to complex bridges or components, for example superstructure changes after RFC package for substructures is submitted, may require further Independent Peer Review and a new Independent Peer Review Letter, including comment log(s), at the discretion of SCDOT.