

## GENERAL GUIDELINES FOR STRUCTURE REPLACEMENT CONCEPTS

The preliminary design process for replacement structures typically begins with a Concept Statement developed by the Preliminary Road Design Unit within the Design Bureau (Pre-Design). The Preliminary Bridge Design Unit within the Bridges and Structures Bureau (BSB) contributes to the Concept Statement by providing the type and size of the proposed structure along with its estimated construction cost. Completion of the project Final Concept Statement for a replacement bridge is identified as the D0 event date. Consultants may be contracted to complete the Preliminary Bridge Unit portion and/or the Pre-Design portion of the concept development effort, requiring close coordination with the Iowa DOT.

The Preliminary Bridge Design Unit becomes aware that a concept process has been initiated upon receipt of a "Bridge Proposal for Concept Statement" memo, submitted by Pre-Design to the BSB. Designers should review the memo prior to initiating a concept. The memo is typically located within the project directory, PreDesign\Docs subfolder. It will include site information, project number, project directory, and ProjectWise location for support information. Also included will be the project clear zone, traffic estimates, and replacement bridge width. In response, the Preliminary Bridge Design Unit will provide information on possible structure types, cost, and ABC rating for incorporation into the Concept Statement.

The following guidance and sample documents apply primarily to the Preliminary Bridge Design Unit related responsibilities in the development of Concept Statements.

### **Pre-Contract Project Scoping Meeting**

For consultant projects, a meeting shall be conducted to discuss the tasks required and the overview of the project to assist in the development of the project scope and fee.

### **Project "Kick-off" Meeting**

Consultant developed concepts shall be started with a "Kick-off" meeting that includes the District, Project Management Bureau, Design Bureau, Bridges and Structures Bureau and the Consultant. The meeting can be conducted remotely (e.g. Microsoft Teams) in the interest of time and resource efficiency. The Iowa DOT Prelim Design Unit engineer assigned to the project shall be responsible to set up and lead the meeting. The purpose is to have an early discussion about the project requirements before any work progresses too far. Topics include:

- geometric needs;
- hydrology (AEPD Spreadsheet);
- replacement structure options;
- maintenance of traffic options;
- local issues; and
- project schedule.

Any special survey needs should also be discussed and requested for inclusion in the BSB attachment. In advance of this meeting, the preliminary bridge designer (consultant or in-house) should complete the initial hydrologic analysis as described in the following section. This will help in discussing the potential structure replacement options for the site.

The consultant shall prepare kick-off meeting minutes to ensure project understanding and requirements. Meeting minutes shall be stored in the project directory.

### **Hydrology and Hydraulics**

The preliminary bridge designer is responsible for developing the project hydrology and hydraulics.

The project hydrology shall be developed per the guidance in BDM Chapter 3. Use of the AEPD spreadsheet is required to document and compare the various hydrologic methodologies.

Consultants shall have the project peak discharges reviewed and accepted by BSB preliminary bridge design staff before hydraulic modeling begins. For most efficient turn around, discharges should be submitted to the DOT preliminary design unit staff reviewer or Consultant Coordinator a few days in advance of the kick-off meeting.

When topographic survey is not scheduled as part of the project concept scope, a concept level hydraulic modeling effort shall be completed. Hydraulic modeling should utilize all available resources, including statewide LiDAR data. When using LiDAR in advance of project topographic survey, the channel carve-out shape and depth below the LiDAR assumed water surface will need to be estimated through use of site review, photos, and maintenance report sketches. A concept hydraulic analysis shall be sufficient to determine appropriate structure type alternatives and estimated sizes. For these projects, the final hydraulic analysis and verification of proposed structure type/size will be completed later in the design process.

Some projects may have the topographic survey complete which should be used with the statewide LiDAR data to complete the project hydraulic modeling during concept development. In this case, any adjustments needed following the final concept statement are expected to be minor.

When using the statewide LiDAR dataset with a project survey, the LiDAR data will always require an evaluation of a potential systematic error adjustment also known as a BIAS correction. Different than the projection, this adjustment (when required) should be made on all projects prior to completing the hydraulic modeling. Refer to BDM 3.2.2.9 for additional information.

### **Review of Maintenance and Inspection Reports**

The preliminary bridge designer should review the [Iowa DOT Structure Inventory and Inspection Management System \(SIIMS\)](#) for the following information:

- Maintenance and inspection reports;
- Structure Inventory and Appraisal Report (SIA);
- Inspection photos; and
- As-built plans.

Use these reports to help determine any site-specific issues like stream erosion or degradation that may impact the recommended structure size and location.

Consultants will need to request **SIIMS** access for the assets related to their project site.

### **Coordination**

Consultants shall coordinate with the Bridge Bureau Rating Engineer at the link below to obtain a description of the "Need for Project" and for an evaluation of the suitability of any local bridges needed for detours.

### **Cost Estimates**

Structure cost estimates for the D0 are typically parametric estimates based on square foot of bridge deck or cubic yards of concrete for RCB culverts. Refer to BDM 3.8 for guidance.

### **Deliverables (to be stored in ProjectWise):**

- Kick-off meeting summary (consultants only).
- Structure selection statement; a brief summary of the preferred option and accepted by the DOT design team.
- Concept level 3D Cadd models, design and sheet files, and TSL .pdf files. The level of completeness can vary; however, the primary purpose is to show the proposed plan and profile views with any anticipated constructability conflicts with the existing structure foundation and any known utilities.
- Hydrology and hydraulic design calculations and technical memo. Support data shall include, but is not limited to:

- the Iowa DOT AEPD spreadsheet, including documentation of design discharges, rationale for selected methodology, and DOT review approval date;
- the site StreamStats report;
- documentation of stream slope and method used to determine the stream slope used in the hydraulic modeling• summary of appropriate hydraulic design criteria for the project
- a summary of concept level hydraulic model input and output results; and
- certification by an Iowa P.E. is only required for sites where project survey was utilized in the analysis, and the hydraulic design is considered complete. The certification for post-survey final hydraulics typically will be part of the B01 event.
- Bridge Bureau Cost Estimate and Analysis for Concept Statement (only required if Iowa DOT Pre-Design is preparing the project concept statement). See the DOT web site for the most current form. For an example of a completed form, See BDM C3.11.
- Bridge Bureau Attachment for Concept Statement. This is to be attached to the final concept statement within the same document file to ensure that it is not overlooked. See the DOT web site for the most current form. For an example of a completed form, See BDM C3.11.
- Cost Estimate; delivered through MasterWorks and the iPDWeb application. The preliminary designer (or reviewer for consultant projects) shall verify that cost estimates are being transferred into MasterWorks appropriately.
- Staging Sketches, when a structure option will be constructed in stages. For staging examples, see BDM C3.6.9.

### **Project Concept Review Meeting**

Each project will have a Concept Team review meeting, typically set up by Pre-Design. The Concept Team for bridge projects includes Pre-Design, Preliminary Bridge Design, and the District at a minimum. The meeting has historically been held on-site, but may be conducted with a virtual meeting for some sites. The intent of the meeting is to get the team together to review the site, answer questions, confirm maintenance of traffic for the project, and ultimately select the preferred replacement structure. These decisions and project estimated costs are then documented as part of the project Concept Statement.