Preliminary Design – Preliminary Plan and Model Deliverables for B01 July 2026

The intent of this document is to define the Bureau's current expectations for preliminary design B01 deliverables using Bentley CONNECT software. The following list primarily applies to the Bureau's common structure types such as PPCB, CWPG, Rolled Steel (RS), CCS, and single and multi-cell RCB culverts.

New and Replacement Bridges (PPCB, CWPG, RS, and CCS)

1. Delivery of Traditional B1 Level Plans
   a. The Preliminary Situation Plan also known as the Type, Size, and Location (TS&L), shall be delivered as a 2D pdf file with a State of Iowa Professional Engineering Seal covering hydraulic design for each structure when applicable.
   b. Plan sheets shall be developed using OpenRoads Designer (ORD).
   c. "Preliminary Bridge Design TS&L Plan Sheet(s) Layout Guidelines" are available in BDM C3.9.
   d. All applicable information for Connect TS&Ls listed on the "Preliminary Design Checklist – Bridge" should be included. The current checklist shall be downloaded from the BSB website.

2. Development of the B1 Level Bridge Model
   a. OpenBridge Modeler (OBM) shall be used to develop the 3D bridge model.
   b. The OBM model file(s) shall be stored in ProjectWise at all stages of development.
   c. DOT Policy describing the method for file creation and naming convention is available on the DOT Bridge Bureau website, Automation Tools, Connect Application under workspace documents.
   d. The Bureau's current bridge modeling expectations are as follows:
      i. Superstructure models shall include the preliminary design for deck, barrier rail, sidewalk, and beams.
      ii. Substructure models shall include preliminary (general representation) for piles and drilled shafts. Include preliminary abutments, piers, and retaining walls. Typical abutments are covered with Generative Components (GC). ~~parametric cells. Current custom abutment (parametric cells)~~ GC abutments may have modeling limitations depending on design. Custom abutments may need additional modeling effort using solids modeling tools. The scope of effort for custom abutments will be determined on a case-by-case basis. It is expected that final design will address modeling ~~parametric cell~~ limitations and refine the 3D model details as needed. Key items covered by preliminary design: gutterlines, bottom footings, paving notch, and end of wing locations.
      ~~ii.~~iii. For beam bridges, bearings should be included at the abutments to assist in the modeling of accurate preliminary bottom abutment footing elevations. Placement of bearings at piers is optional.
   e. Creating and utilizing an existing bridge OBM model to aid in TS&L sheet development and identify conflict areas with a proposed bridge is acceptable but not required.
   f. The Longitudinal Section shall be cut from the OBM 3D bridge model(s).
   g. Consultant contracts shall not designate additional (extra) hours for cutting details from the models.

h. Preliminary design for a staged bridge will require the ultimate bridge 3D model within a single OBM file. The ultimate bridge 3D model shall be provided with the OBM file for the first stage project (phase) number; even when subsequent stages are being constructed under separate project numbers. A new file should be created and named appropriately for each project number proposed to construct the bridge. The ultimate bridge model will be referenced from the first stage OBM file for drawing and sheet creation of subsequent projects. Each stage shall be dimensioned appropriately on the TS&L.
i. All files used in the development of the bridge model and the development of the B1 plans shall reside in the project folder within ProjectWise.

3. OBM Bridge Input Documentation
   a. The following report/documentation shall be exported from the OBM bridge model
      i. An OBM Input Report shall be developed from the OBM bridge model and saved in an Excel format.
      ii. ~~Parametric~~GC abutments cell input for the custom abutments that is not included within the Input Report shall be documented through use of screen shots.
      iii. Example is available on the BSB website.
   b. The OBM Input documentation will serve as a record of the preliminary 3D model.

4. Development of the bridge berm/grading surface terrain model
   a. ORD shall be used to develop the 3D bridge berm/grading surface terrain, terrain breaklines, and revetment models. The 3D berm terrain and breakline model files shall be clean of all other elements.
   b. A separate .xml file exported from the grading surface terrain model for each berm and special grading area shall be provided.
   c. Policy describing the method for file creation and naming convention is available on the DOT website, Connect Application under workspace documents.
   d. The proposed bridge berm terrain and revetment shall be incorporated as a reference on the TSL sheets.
   e. Expectations are as follows:
      i. The appropriate Standard Road Plan (SRP) EW series available on the DOT Design Bureau website shall be utilized.
      ii. Berm grading surface A, B, C, D, W, or G points shall be included at accurate locations (x,y,z). Point locations shall be labeled on the Site Plan.
      iii. Ditch flowline, proposed grading, or existing ground information (as applicable) and the appropriate SRP EW series shall be utilized to estimate the berm grading surface extents. It is typically assumed that the preliminary bridge berm grading surface will tie-in to the approach roadway foreslope grading surface at the end of wings.
      iv. Special grading related to the proposed bridge shall be included. Examples include channel grading, wing dikes, and benches at waterway crossings, or recoverable berms associated with grade separation structures.
      v. Ditch grading and associated let downs are not required to be included in the bridge berm grading surface. However, elevations and location of ditch grading may need to be considered/coordinated in order to provide an accurate depiction of the bridge berm.

vi. Proposed revetment 3D modeling should be included (when applicable). Modeling can be completed using 3D breaklines or revetment templates which are available for this purpose.
vii. Cutting revetment or miscellaneous details from the terrain model is not required but is encouraged. Adding isometric details to the plan is also encouraged when needed to improve understanding of the design.
viii. 3D modeling of proposed concrete or macadam berm slope protection utilized for grade separation structures is not required.
ix. 3D modeling of the standard erosion stone wing armoring is not required.
x. The ultimate berm TRN grading surface model, with no other elements in a "clean" file, is the deliverable. Staged berm grading is typically not included with preliminary design. Details for staged grading will be included with the grading plans. However, the preliminary designer shall ensure that the concept for bridge staged grading is feasible.

New and Replacement RCB Culverts (Cast in Place (CIP) or Precast)

1. Delivery of Traditional B01 Level Plans
   a. The Preliminary Situation Plan also known as the Type, Size, and Location (TS&L) for the CIP culvert option (or the precast option if a CIP option is not being offered) shall be delivered as a 2D pdf with a State of Iowa Professional Engineering Seal covering hydraulic design for each structure when applicable.
   b. Plan sheets shall be developed using OpenRoads Designer (ORD).
   c. The longitudinal section shall be cut from the model.
   d. Consultant contracts shall not designate additional hours for cutting details from the model.
   e. All applicable information for Connect RCB TS&Ls listed on the "Preliminary Design Checklist – RCB Culvert" should be included. The current checklist shall be downloaded from the BSB website.

2. Development of the Preliminary Design RCB Culvert Model
   a. DOT Policy describing the method for file creation and naming convention is available on the DOT Bridge Bureau website, Automation Tools, Connect Application under workspace documents.
   b. Use ORD Drainage and Utility (D&U) tools or barrel templates to develop the 3D culvert models.
   c. Creating and utilizing an existing bridge or culvert 3D model to aid in TS&L sheet development and identify conflict areas with a proposed structure is acceptable but not required (Example: "flowable mortar" projects).
   d. Each ORD file should include:
      i. The 3D Cast-in-Place (CIP) model
      ii. Models associated with preparing CIP TS&L sheets are ~~preferred~~ to be created and stored in a separate file.
      iii. Final design will create and manage additional files if they are needed due to construction staging, conflict resolution with existing structures, or as a result of packaging decisions made after the B01.

e. A separate ORD file containing the precast alternate 3D model is required (when a precast option may be offered). Preliminary precast culvert option TS&L sheets are required. Precast culvert Situation Plans will be prepared in final design if they are needed.
f. Preliminary design for a staged RCB culvert will require the ultimate culvert model within a single ORD file. The ultimate culvert model shall be provided with the ORD file for the first stage project (phase) number; even when subsequent stages are being constructed under separate project numbers. A new ORD file should be created and named appropriately for each project number proposed to construct the culvert(s). The ultimate RCB model will be referenced from the first stage ORD file for drawing and sheet creation of subsequent projects. Each stage shall be dimensioned appropriately on the TS&L.
g. ASCII Input file(s) may be used to create the 3D culvert model points and lines for proposed RCB's.
h. ~~There is no requirement to include a model of the proposed grading surface.~~ A separate TRN grading surface model file for each the inlet and outlet, containing the proposed grading of the channel that matches the proposed design of the RCB. Collaborate grading recommendations with the road designer regarding intent for ~~special~~ grading, revetment, or channel change if needed. Show intent for ~~special~~ grading, revetment, or channel change on structural design TS&Ls.
i. Proposed revetment 3D modeling should be included (when applicable). Modeling can be completed using 3D breaklines or revetment templates which are available for this purpose.
j. Cutting revetment or miscellaneous details from the model is not required but is encouraged.
k. The culvert information shall be entered into the project Bridges&Structures.accdb Database.

Drainage or Flowage Easement File

1. Development of a Drainage or Flowage Easement File
    a. ORD shall be used to indicate the preliminary drainage or flowage easement boundary.
    b. DOT Policy describing the method for file creation and naming convention is available on the DOT Bridge Bureau website, Automation Tools, Connect Application under workspace documents.
    c. Expectations are as follows:
        i. The preliminary boundary would typically be provided as 2D linework elements or a 3D shape file.
        ii. The preliminary boundary should be referenced into the Structures Overview file.

Structures Overview File

1. Delivery of a Structures Overview File
    a. An ORD STRUCTURES OVERVIEW file shall be created to simplify the referencing workflow.
    b. At all stages of development, the Structures Overview File includes the appropriate referenced preliminary models for all proposed structures within a project code (formerly known as the PIN).

2. Development of the Structures Overview File

a. DOT Policy describing the method for file creation and naming convention is available on the DOT Bridge Bureau website, Automation Tools, Connect Application under workspace documents.
b. Examples of typical models to be referenced include proposed bridges, bridge berm terrains showing proposed contours/revetment, CIP RCBs, pipe culverts (except entrance pipes), CIP retaining walls, noise walls, flowage/drainage easements, temporary easement for jacked pipes, or miscellaneous structures. Terrain and revetment working file information (e.g. Breaklines, corridors, etc.) shall not be referenced into the Overview file.
c. There are no live elements contained within this file.

~~Date:~~
~~Original: August 12, 2022, Revision: August 1, 2023~~