PRELIMINARY DESIGN CHECKLIST – RCB CULVERT (CONNECT)

Date: July 2025

County:_____ **Design No.:**_____ **Check By:**_____ **Date:**_____

Project Location:_____ **Consultant:**_____

GENERAL

___ Abbreviations – Use as needed. Reference [BDM 13.1.4]

___ Survey Control Point – Use coordinates/description per plan set

___ For RCB with multi-project staging, the structure length listed should be the length of the current stage plus all previously completed stages. (e.g. if stage 1 construction is 20 ft. and stage 2 construction is 30 ft., the first project title block should show 20 ft. and the second project title block should show 50 ft.) Show text: Stage 1, Stage 2 as needed

___ Vertical curve data detail. May need to include sta/elev of g1 org2 end points. When the existing roadway is used and there is not a proposed roadway profile grade, indicate Use as Constructed (U.A.C.) and list relevant survey points on which the design is based.

___ Horizontal curve data

___ Traffic Data as shown in Road Plans – see CADD cell

___ Hydraulic Data – All RCB sizes. See cell for required information. Include Q_{100} hydraulic information in the following situations:

- ○ A flood plain permit is required
- ○ To document checks for high damage potential structures
- ○ When the 100-year headwater exceeds the elevation of the roadway shoulder.

___ For drainage areas greater than 10 sq. mi. a Riverine Infrastructure Database (RIDB) dataset is to be developed. Verify the stream ID and river mile. [BDM 3.2.2.8]

___ General Utility Symbols and Utilities Note Cell. Place a label on the plan view to identify areas that may be of potential conflict.

___ Location: Road over road/stream
Township/Range (e.g. “T-86/87N”, “R-2/3W”)
Section (e.g. “35/36”)
Township Name
County
City of _____ (if needed)
Bridge Maintenance Number – (if applicable)
Asset ID No. (or FHWA No. ≥ 20 ft. total spans): New number shall be provided and shown
Latitude/Longitude (6 decimal) at centerline of approach rdwy/centerline of RCB (e.g. “12.345678/-12.345678”)

___ Size in Title Block – New RCB – W x H x L
Extension – W x H only

___ Skew angle –‘design for’ in Title Block to nearest whole degree

___ File number, design number, CADD file name

___ Scale bar

___ North arrow

___ Staging – show sequence details as needed

___ Project (Phase) number in the border for all sheets. For routes and paren numbers that are not three digits, include the leading zero(s) before the route and paren numbers (e.g. BRF-063-3(046)--38-62).

___ State of Iowa Professional Engineering Seal covering H&H on TSL for all RCB’s and extensions. Include a seal on Precast alternative sheet.

___ Check all corners of the proposed parapet for adequacy with regard to foreslope elevation and clear zone.

___ Revetment – Cast-in-Place and Precast RCB: Propose only when justified [BDM 4.5.8]. When proposed, show cross section, quantities table and revetment station/offset limits (see CAD cell for details), and utilize standard sheet 1092 or PEP 12-20 details along headwall. Include a designer note on the TS&L listing the justification when proposing revetment.

___ All RCBs with precast option: see culvert standards for details. CIP and precast culvert TSLs are developed during preliminary design

___ Twin and triple precast RCBs: see culvert standards for details. For skewed culverts where the culvert skew is different than the headwall skew, include a multi-cell precast barrel layout detail similar to C4.5.2.

___ A non-standard CIP should be proposed to match larger sized precast twin or triple boxes.

___ Precast RCB – Limited to fill height 2’ – 25’ for 6’ to 12’ spans and 2’-16’ for 14’ and 16’ spans. Also, if anticipated settlement is less than 12 inches for a single line of single cell boxes and less than 6 inches for side-by-side single cell boxes and multiple cell boxes under these fill heights (determine during final design)

___ Precast RCB - If culvert bends or extensions are required, discuss with section leader before proceeding

___ Parallel wing headwalls are used for all typical CIP and precast RCBs – see culvert standards for details.

___ Flared wing headwall usage (CIP or Precast barrel):

- ○ Slope tapered inlet (generally with flume outlet)
- ○ Scour floor (use flared wing headwall at inlet also)
- ○ Pedestrian/Multi Use trail structures

___ Pedestrian/Multi Use trail RCB structures:

- ○ Layout CIP and Precast
- ○ 12’ x 11’-4” minimum size

- Minimum 0.5% longitudinal slope to prevent ponding (includes the headwall sections)
- Use CIP flared-wing headwalls for both CIP and Precast options. Therefore, the back-to-back of parapet lengths will typically be the same.
- Show standard safety rail along wing headwall and parapet
- Add Note: Lighting inside culvert may be required
- Pedestrian Tunnel Standards are available.

General Notes

General Notes shown on the TS&L are to be incorporated into the General Notes of the final plan set. The final designer shall delete these notes from the final TS&L. Example note:

___ This design is for the replacement of the existing 40' x 24' Steel I-Beam Bridge, Keokuk Design No. 5137, FHWA No. 32680, Maint. No. 5406.0S078.

Design Notes

Design Notes shown on the TS&L are intended to inform the final designer of design decisions and other requirements. The final designer shall delete these notes from the final TS&L. Example notes:

___ Revetment is proposed at the culvert outlet due to the outlet velocity exceeding policy limits.

___ An Iowa DNR Flood Plain Permit is required. Preliminary Design will submit the application and place the permit in the PW Regulatory_Permits subdirectory folder upon receipt.

___ The proposed RCB will be constructed using accelerated bridge construction (ABC) methods. The ?? method has been chosen as the preferred method with a selected closure duration of ?? days.

___ Fill height exceeds the maximum design value; therefore the structure will require a non-standard design.

___ Prelim has corresponded with the Soils Unit, and flowable mortar has been determined to be feasible. The Final Design shall include effort to coordinate with the design team to address or mitigate the potential for replacement bridge piling downdrag. Coordination may include structural calculations for bridge pile loading or pile capacity checks for mitigation options. [BDM 4.2.5]

___ Density used for Class ?? quantity calculations is?? T/cy (e.g. 1.5 for Class E, 1.6 for Class B and C, 1.6 for Erosion Stone)

Plan Notes

Plan Notes should remain on the final TS&L. Example note:

___ Flow line of the culvert has been set 1' below streambed.

___ Safety rail needed (e.g. urban areas, pedestrian tunnels, drop inlets)

___ The project is proposed to be constructed with flowable mortar methods.

PLAN VIEW

___ Label "Situation Plan"

___ The RCB is oriented horizontal on the sheet based on the culvert centerline.

___ Ground elevations, contours, and topography. Label contour elevations.

___ Existing utilities shown, referenced line styles are at an appropriate scale for readability (include fence-lines, tiles);.

___ Existing structures (bridge, culverts); label - type/size/station and design number

___ Proposed length (back-to-back of parapet) for CIP culverts is a whole foot increment (for precast, use whole foot barrel increment).

___ Proposed length for RCB extensions, show existing lengths right and left as well as proposed extension length to a whole foot increment (CIP) or whole foot barrel increment (Precast).

___ Precast RCB –use a 6-inch gap between twin/triple culvert barrel walls

___ Proposed station on road construction centerline

___ Skew angle of culvert to roadway. A whole degree skew is preferred.

___ Skew of headwalls, if different than skew to roadway

___ Proposed lane and shoulder widths

___ Show proposed roadway embankment contours and ditch grading if available. Show channel grading intent.

___ Label all centerlines

___ Label stationing on at least two "tic" marks in the plan view

___ Stream name and direction of flow

___ Check that all text and dimensioning is legible and not placed on top of other text or features

___ Show revetment (if applicable) label type, location, and limits of features such as riprap and channel changes. Provide typical cross section(s)

___ For RCB extension details, reference [BDM 7.2.4.9]

___ Show existing ROW lines, if they are available in the project directory for referencing.

LONGITUDINAL SECTION

___ Roadway cross section along centerline culvert. True length is shown. Culverts with bends are matched with the plan view at centerline roadway to the extent practical.

___ Existing ground line and proposed grade line shown and labeled

___ Show existing structure.

___ Proposed flowlines at inlet, outlet, or other features (slope taper, drop inlet, flume, etc.)

___ Proposed roadway embankment shaping shown with slopes labeled. (Typically, 3:1 for replacement projects, 3.5:1 new construction)

___ Profile grade elevation and location shown at intersection with centerline of culvert

___ Q 'Design' water surface elevation at inlet (per data block)

___ Show maximum fill height and location.

___ Revetment is shown (if applicable)

___ For flowable mortar bridge replacement project, the existing structure low beam elevation, top of proposed culvert slab, and minimum horizontal clearances are labeled. Preliminary assumed top of slab depth and wall thickness are indicated.

CADD Checklist

Refer to: CONNECT Applications

___ Verify Iowa Regional Coordinate System is correct for the project site.

___ Correct CONNECT ProjectWise folder structure is being used.

___ Correct seed files are being used.

___ Correct MicroStation File naming conventions are being followed.

___ Correct MicroStation Model naming conventions are being followed.

___ The proposed structure models are accurate to the extent practical for preliminary design.

___ The correct levels, element templates, and features are being used (this will ensure the correct font style is being applied).

___ Combine multi-sheet designs into one file named TSL_CC_DDDD.pdf

___ The Iowa DOT Environmental Resource Survey Area (ERSA) design file showing potential project impact limits has been reviewed to ensure that all defined work limits in the bridge project are included.