CULVERT PLAN REVIEW CHECKLIST

County: _____ **Design No.:** _____ **By:** _____ **Date:** _____
Project Name: _____

1. GENERAL - ALL PROJECTS

1.1 Title Block

___ "Design For (xx Skew) (RA)(LA)" "Design For Repair To (xx Skew (RA)(LA))."

___ Structure Type and Size (Ex.: "Twin 12' x 12' x 240'-0 RCB Culvert" "10' x 10' x 320'-0 RCB Culvert").

___ For culverts with multi-project staging, the structure length listed should be the length of the current stage from back of parapet to stage joint plus all previously completed stages. (Ex.: if stage 1 construction length is 100 ft. and stage 2 construction is 120 ft., the first project title block should show 100 ft. from back of parapet to joint and the second project title block should show 220ft from back-to-back of parapets). Add to the Culvert title the stage (Ex.: "Concrete Box Culvert – Stage 1").

___ Sheet Title (Ex.: "General Notes & Culvert Quantities").

___ Station of culvert (mainline). Mainline culvert station should agree with T.S. & L. for new structure or previous plans for repair. Verify that Masterworks (PPMS) matches.

___ Turn In to Contracts Date (Ex.: "December 2013").

___ County

___ For design numbers located in a county different from the project number county, enclose the project number county in () after the design number county in the title block and sheet border (e.g. Johnson (Washington) County).

___ "Iowa Department of Transportation"

___ "Design No.", "Design Sheet No. x of x", "FHWA/Asset No."

1.2 General

___ Check plan constructability. Sufficient details included to guide contractor. Staging sequence provided if required.

___ Scale not shown on situation plan or any details.

___ Details consistent with culvert standard sheets.

___ Non-standard details reviewed with appropriate personnel.

___ Soil sheets (as provided by Design Bureau) included in the plan set as necessary.

___ CADD files drawn with the correct levels for printing color plans.

___ Project (Phase) number in the border all sheets for each design. 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).

___ Standard abbreviations used. See [LRFD BDM 13.1.4].

___ Precast culvert alternate is included for culverts meeting the alternate criteria. See [LRFD BDM 7.3].

___ Bent bar details include the note, "Note: All dimensions are out to out. D = pin diameter."

___ Asbestos clearance has been verified for bridge removals when replacing bridges with culverts. Include note E485 and appropriate bid item if Asbestos is present.

___ Iowa DOT requirements for sheet callouts is to use Design Sheet Numbers (Ex. Refer to Design Sheet No. ?? for Class 20 Excavation details).

___ Validate any "By Others" notes referenced in plan set. Only work items in a separate contract are considered "By Others". Tied projects are not considered separate contracts.

___ Staged culverts and extensions reviewed for temporary shoring needs in roadway embankments. Provide necessary details, plans notes, and bid items if temporary shoring is required to support earth below adjacent roadways.

___ Replace all "?" characters on working standards with appropriate information (e.g. dimensions, elevations, etc.).

2. TITLE & LOCATION MAP SHEETS- ALL PROJECTS

2.1 Title Sheet

___ Title sheet conforms to current DOT format in the Bridge Plan production Seed File.

___ Correct Project (Phase) Number (upper right side, right lower border and top left border of sheet).

___ Correct File Number (lower left border).

___ Correct PIN Number and Project Directory Number (upper right side of sheet)

___ "Letting Date" filled in with the letting date (upper left border).

___ Table of applicable Culvert Standards included if necessary.

___ Boxed note referencing Road Standards on road sheets. Include the roadway and roadside sheet number(s).

___ Index of Seals (sheet number seal is located on, name and expertise). Add consultant firm information below this by asterix when needed.

___ County Name (center of sheet, lower border and bottom left border).

___ Proper sheet heading ("Primary", "Interstate", etc.).

___ Proper 'Work Type'. See Masterworks (PPMS) (Ex.: "RCB Culvert New – Twin Box") (center of sheet, top left border). Extensions on bridge-sized culverts should be 'Work Type': Reconstruction – RCB Culvert Ext. - ___ Box.

___ Verbal location at the center of the sheet should follow format "Route over feature crossed" and "Distance from major feature or intersection" (US 69 over Iowa River, 0.25 Mi. S. of S. Jct of C20).

___ Traffic data shown on title sheet unless more than one structure is included in the plans. For multi-structure plans show the traffic data on each individual situation plan and use the traffic data note on the seed title sheet that refers to individual situation plans for traffic data information. See [LRFD BDM 1.8.1.2].

___ Traffic data includes % trucks.

___ "Sheet No. A.1" bottom right border.

___ ROW project # - leave blank

___ Iowa One Call logo on title sheet.

___ Value Engineering Note

___ Overall Iowa map in lower left-hand corner with county highlighted.

2.1.1 Index of Sheets

___ List Title Sheet and Map Sheet separately in the table. (if needed)

___ List Revision Sheet (if needed)

___ List sheet containing 'Estimated Culvert Quantities' tabulation referenced (e.g. Estimated Quantities – Design No. xxxx)

___ List remaining detailing sheets. Do not itemize culvert details sheets for standard projects; Indicate “Design No. xxxx”.

___ Projects with Precast box culvert alternates. List in the index the details for the Precast Box culverts separate; indicate “Design No. xxxx Precast Alt.”

___ List soil profile sheets with “SPS” convention (e.g. SPS.xx – SPS.xx).

___ List overall sheet range for Road Plans (A.??– X.??)

___ List separately sheet containing ‘Estimated Roadway Quantities’ in table (e.g. “C.1 Estimated Quantities – Road”).

___ List standard “Road Plans” table (e.g. “C.2 Standard Plans – Road”).

___ List separately summarizing pay quantities not included in the bridge and road tabulations above referenced (e.g., Roadside sheets, R sheets).

___ Separate “Index of Sheets” included for larger projects on Estimate Sheet or General notes sheet (generally culvert plans in excess of 50 details sheets).

2.2 Location Map Sheet

___ Location map has its own page.

___ Overall Iowa map in lower left-hand corner with county highlighted.

___ Remove references to scales.

___ North arrow, North is up

___ Map Township/Range (Ex.: “T-87N”, “R-2W”).

___ For larger scale urban map, “Part of City of xx.”

___ Leader to Culvert location with text “Design No. xx”, and “FHWA or Asset ID No. xx” if applicable (arrowhead should be larger than normal).

___ Standard Legend associated with county or city map as appropriate.

___ “Sheet No. A.2” bottom right border.

___ Ensure county or city map is properly scaled for legibility of the map on a printed page. Labels around the structure are visible. Location of structure needs to be obvious within a display region.

___ Region shown on the map includes at least one major feature nearby, such as a town/city, two primary roads intersecting, a county or state park, or a major body of water (lake or river).

3. ESTIMATE SHEET AND GENERAL NOTES – ALL PROJECTS

3.1 Estimate Sheet

3.1.1 Estimated Quantity Tabulation

___ Quantity tabulation for design provided on this first V-sheet.

___ Tabulation title “Estimated Culvert Quantities”. Include appropriate title from Masterworks (PPMS) for cast-in-place or precast alternates.

___ All Item Codes and Descriptions agree with Masterworks (PPMS).

___ Divisions in Masterworks (PPMS) are in proper order. For B03 plans, the Culvert Item Division(s) should be first followed by the Roadway Division(s). For B04 plans, the Roadway Item Division(s) should be first followed by the Bridge Item Division(s).

___ Estimated quantities reflect addition of itemized tables in plans.

___ Include Construction Survey for all new culverts, culvert extensions, and new flumes.

___ Mobilization bid item located with Estimated Culvert Quantities and not Roadway Quantities if the plans are to be turned in by the Bridges and Structures Bureau.

___ Roadway quantities note, in box.

___ If a working blanket or granular blanket is required in SPS sheets, include the appropriate bid items (e.g., “Granular Material for Blanket”). For core-outs, other subgrade material may be requested by Soils design. (e.g. “Macadam Stone Base”.).

___ Include quantity for excavation for a working blanket, granular blanket, and/or core-out as appropriate in the Class 20 excavation bid item.

3.1.2 Estimate Reference Information Notes

3.1.2.1 All Projects

___ Estimate reference notes listing includes all applicable default notes stored in Masterworks (PPMS).

___ Modify the Class 20 excavation estimate reference note to include excavation for any working blanket, granular blanket, or core-out as required by Soils Design.

___ Removal of Existing Bridge item should include Inspection Information regarding Asbestos for all removals on replacement projects.

___ Delete default estimate reference notes that are specific to roadway work or not applicable to design.

3.2 General Notes Sheet

3.2.1 General

___ Traffic Control Note, in box.

___ Pollution prevention plan note. See [LRFD BDM 13.2.2] note E40, E40B, or E40C.

___ Repair, extension, and replacement projects: Include structure design history at this site” tabulation (see standard sheet 1038). New projects should not include a “Design history at this site” tab.

3.2.2 Specifications ‘Note’

___ Correct ‘Specifications’ note. Replace “????” with “2023” specification series year. See [LRFD BDM 13.7.2] note E601_.

___ Supplemental specifications, developmental specifications and special provisions listed by name. Do not include the specification number.

___ Electronic copy of supplemental specifications, developmental specifications and special provisions shall be uploaded into Masterworks (PPMS) prior to turn-in date (if necessary).

___ If Standard ‘G1’ applies, do not duplicate.

3.2.3 Design Stresses ‘Note’

___ Correct ‘Design Stresses’ note’. See [LRFD BDM 13.2.2] note E50_.

___ If Standard ‘G1’ applies, do not duplicate.

3.2.4 General Notes

3.2.4.1 All Projects

___ All applicable ‘standard’ general notes (per design manual) provided. ‘Non-standard’ notes checked for need and do not conflict with standard specifications and standard plan details.

___ If Standard ‘G1’ applies, do not duplicate General Notes.

___ Scrape test note provided if painted steel is to be removed with bridge removal. See [LRFD BDM 13.5.2] notes E480. Include note E481 when scrape test sample indicates hazardous material.

___ Working drawing and Calculation submittals item list note included for elements requiring submittals (e.g. temporary shoring). See [LRFD BDM 13.2.2] notes E65.

3.2.4.2 Repair Projects

___ 'Removals, As Per Plan' [LRFD BDM 13.5.2] note E440 provides complete listing of work included in item.

3.2.4.3 Cast-in-Place Projects

___ Include applicable culvert standard tabulation.

___ Include quantity tabulation for cast-in-place culvert (structural concrete and reinforcing steel).

3.2.4.4 Precast Projects

___ Include installation notes.

___ Include applicable culvert standard tabulation.

___ Working drawing and Calculation submittals item list note included for precast culvert projects requiring submittals. See [LRFD BDM 13.2.2] notes E65.

4. SITUATION PLAN (Placed after Estimated Quantities sheet and General Notes sheet)

4.1 New Construction and Extensions

4.1.1 General

___ Review and verify Preliminary Design Checklist for TSL.

___ Hydraulic seal included on all design numbers including alternates.

___ Profile data. Verify profile information with roadway design.

___ Remove "Design Notes" from Preliminary TSL for final Situation Plan.

___ Provide NBIS structure length note to the nearest 0.1 ft. See LRFD BDM 3.2.1 [e.g. NBI Structure Length = 20.5']

4.1.2 Plan

___ Shoulder and approach pavement widths and slopes (include foreslope) shown for main and crossing roadway, check for coordination with roadway design.

___ Horizontal curve data, check for coordination with roadway design.

___ Alignments and stationing along CL of approach roadway (and equations), check for coordination with roadway design. Label profile grade line.

___ Utilities information cell references Roadway plans (or correct roadway project number).

___ Proposed ditches and pipes shown, check for coordination with roadway design.

___ Any removals to be performed by culvert contractor designated.

___ Lengths of individual sections dimension shown for cast-in-place.

___ Overall barrel length of precast culvert rounded to the nearest foot. Dimension excludes end section.

___ Label headwall size and skew angle. Indicate "Inlet" and "Outlet".

___ Highway name.

___ Label Working Blanket limits/Class 20 excavation.

4.1.3 Longitudinal Section

___ Label Working Blanket limits/Class 20 excavation.

___ Bell joints standard note, if necessary.

___ "Anticipated settlement = ___" below view title.

___ "Fill Height =__" below view title.

4.2 Repair Projects

4.2.1 General

___ Location information near title block. Example:
US 151 Over Maquoketa River
T-87N R-2W
Section 36
Cascade Twp.
Dubuque County
City of _____
Bridge Maint.No.3609.9S137 - on all RCB culverts > 20' along roadway
FHWA # _____ - on all RCB culverts > 20' along roadway or
Asset ID # _____ - on all RCB culverts ≤ 20' along roadway
Latitude XX.123456°
Longitude XX.123456°

___ Traffic counts for current year.

4.2.2 Plan

___ Alignments and stationing.

___ 'Back to Back of Parapets' dimension shown.

___ Highway name shown.

___ Legend of work to be performed.

5. DETAILS - REPAIR/EXTENSION PROJECTS

5.1 General

___ For an existing culvert that is being extended and the headwall is at a skew to the culvert (not perpendicular) the culvert is "not" to be squared up. The headwall is to be removed but the proposed culvert is to be attached along the skew line.

___ If an existing culvert is being extended at a different skew, for spans less than 8', a minimum 3' section (on the shortest wall) is to be attached to the existing culvert prior to the proposed bend. For spans 8' or longer, a minimum 5' wall section is to be used.

___ If an existing culvert is non-standard, it is to be extended with the same size non-standard culvert (assuming an RCP would not work).

___ Adequate details provided to define location and scope of concrete repair work.

5.2 Temporary Barrier Rail

___ Reduced width signing plan provided if lane width less than 14'-6. See [LRFD BDM 12.1.8.2].

___ 'F-Shape' used for min. lane 12-5 interstate mainline, 10'-6" primary. H-Pile section used when these minimums cannot be provided.

___ Traffic lane and work area shall be correctly shown on the staging cross sections of the culvert sheets for each construction stage with location of the TBR shown. The staging widths shall be coordinated with the traffic control details of the roadway plan. Traffic lane width should be noted as "minimum" on the culvert sheets.

___ Typical layout of the rail for one-way and two-way traffic is shown on Road Design Details 8210 and 8212. See [LRFD BDM 12.1.8.3] for details of the placement policy.

CULVERT PLAN REVIEW CHECKLIST

6. RCB CULVERTS

___ If fill exceeds maximum used for standards, check that culvert program has been run and output matches values on plan.

___ Check that fill height is included in general notes. Design assumption is that floor of culvert is not placed on bedrock.

___ On all culverts, provide a standard 1'-0" thick working blanket as bedding material for both cast-in-place and precast box designs, unless geotechnical report dictates a different material and thickness to be used as the bedding.

___ Prefer to use bid item "Granular Material for Blanket" when a granular blanket or working blanket is necessary. Add standard bid item and default estimate reference notes.

___ Use "granular blanket" to refer to required material and "working blanket" to refer to optional material for the contractor.

___ Check if openings for pipes, or weepholes are necessary.

___ For culverts without fill current notes and details are used. See [LRFD BDM 7.2.4.5.1].

___ Show typical detail on General Notes sheet of Class 20 excavation limits. If working blanket or granular blanket is required, show extent of blanket material on this detail.

___ For riprap around culvert inlet and outlet headwalls, include the appropriate standard details sheets. Include working standard 1092 for Cast-in-Place culverts and list standard 'PEP' for Precast culverts.

7. CAST-IN-PLACE CULVERTS

___ When using a non-standard barrel, the bell joint sheet must also be modified.

___ Check for appropriate use of bell joints. If flume, include bell joints at junction of culvert end barrel section and flume. If tapered inlet, include a bell joint at junction of tapered inlet and culvert barrel section.

___ When bell joints are used, include "Bell Joint Orientation Detail" which is in the CADD cell library.

___ Bends located internal to section, not at joint locations.

___ End barrel section minimum/maximum lengths. See [LRFD BDM 7.2.4.5.2.1].

___ Avoid joints below centerline of roadway (especially for 5' of fill or less), if possible. See [LRFD BDM 7.2.4.5.2.1].

___ Locate construction joints on Situation Plan and Longitudinal Section.

___ Preferred construction joints placed at equal intervals and no more than 38 feet maximum. Barrel lengths preferred to be compatible with 3-foot intervals (38 feet, 35 feet, 32 feet, etc.) to follow the standard plan details. See [LRFD BDM 7.2.4.5.2.1].

8. PRECAST CULVERTS

___ Dimension length of straight barrel sections on Situation Plan.

___ Dimension "G" length as indicated on precast culvert end section standards on Situation Plan.

___ Multiple barrel culverts include Standard Sheet 1082P.

___ Include Installation Plan when using precast boxes under existing bridges. See [LRFD BDM 13.7.2] note E685.

___ On Class 20 excavation detail, include 6" Granular Leveling Material under the precast box. The Granular Leveling Material shall overlay a sheet of engineering fabric and any additional blanket or core-out material. [LRFD BDM C7.2.4.4.2]

___ Type 1 precast headwall standards only listed for precast boxes for skew of 7.5 degrees or less. List type 3 for all culvert skews.

___ Alternate curtain wall detail standard listed (PES).

9. FLOWABLE MORTAR

___ Proposed flowable mortar RCB culverts for bridge replacement should allow a minimum of 3'-0 vertical clearance for bridge beam spacing less than 6'-0, minimum 1'-0 vertical clearance for bridge beam spacing 6'-0 or greater and minimum 1'-6 horizontal side clearance. See [LRFD BDM 7.2.4.10].

___ Provide a detail in an elevation view showing dimension of vertical clearance from top of culvert to bottom of existing bridge low beam or deck.

___ Provide a detail in an elevation view showing dimension of horizontal clearance from sides of culvert to existing bridge substructure.

___ Vent hole layout for flowable mortar placement. See [LRFD BDM 7.2.4.10].

___ Show removal limits if required. (Removal of railing, end sections, curbs, etc.) Coordinate roadway pavement cross sections with bridge deck removals. Deck removals may be necessary to accommodate a cross-section change.

10. ROADWAY PLANS

___ Check that roadway plans are either in the culvert project plans (preferred) or a tied roadway plan associated with the culvert project.

___ Road sheets include necessary PE seals for roadway and geotechnical design. (Typically, a CS sheets requires a geotechnical seal).

___ R sheets with site maps (RC, RR and RU) are included. Landscape design seal included if applicable. (For projects with tied roadway plans, the R sheets will be included in the tied project.)

___ Erosion control, including seeding, fertilizing, and mulching, bid items (all projects) - do not include as incidental items. Items should be in the R sheets.

___ Traffic control bid items (all projects where required by traffic control plan).

___ Traffic control plan current and acceptable to Design Bureau and District. (For projects with tied roadway plans, the J sheets will be included in the tied project.)

___ PPP current, consistent with grading plan and acceptable to Design Bureau. PPP should be in the R sheets. (For projects with tied roadway plans, the PPP will be included in the tied grading project.)

___ "Temporary Stream Diversion" bid item and Road Standard EW-402 to be included and Road Standard applied for any river, stream, creek, or drain ditch. (See Design Manual 1E-6)

___ "Box Culvert (Backfill)" Road Standard DR-111 applied, unless flowable mortar project. (See Design Manual 1E-6)

___ For flowable mortar projects, include Road Design Details 4317 or 4318. (See Design Manual 1E-7) Coordinate any bridge removals with Design Bureau to accommodate cross-section of the roadway (typically shown on B sheets).

___ Channel riprap (revetment, engineering fabric, class 10 excavation, etc.) quantities shown on the situation plan to be included with the Roadway, R sheet bid items.

___ Road standard PR-120 "Double Reinforced Pavement over Box Culverts" included in Standard Roads Plans when using PCC pavement.

REFERENCE ABBREVIATIONS

BDM – Bridge Design Manual
CADD – Computer Aided Drafting and Design
EW – Earthwork
FHWA # – Federal Highway Administration Number
LA – Left Ahead
LRFD- Load and Resistance Factor Design
PE - Professional Engineering
PEP – Precast Embankment Protection (standard)
PES – Precast End Section (standard)
PPMS – Program and Project Management System
PPP – Pollution Prevention Plan
RA – Right Ahead
RCB – Reinforced Concrete Box
RCP – Reinforced Concrete Pipe
SPS – Soil Profile Sheets