

Replace the Section Title with the following:

**SECTION 602
STRUCTURAL PLATE, ALUMINUM PLATE, AND BOX CULVERTS**

602-1.01 DESCRIPTION. Add the following: Provide contractor-designed culvert bridges to meet the Contract and provide an independent design check. Inspect and perform quality acceptance on culvert bridges. Provide design calculations with load ratings for the culvert bridges.

Add the following Subsection:

602-1.02 DEFINITIONS.

Culvert Bridge. Culverts and buried structures meeting the requirements of National Bridge Inspection Standards (NBIS) CFR §650.305 and individual culverts and buried structures greater than 10 feet in width, as measured along the centerline of roadway crossing over the structure. When specified in the Contract or required by the DOR, this includes the headwalls, toe walls, wingwalls, and foundation.

Culvert Bridge Design Package (CBDP). DOR design calculations, DOR load ratings, IE design check calculations, IE load ratings, working drawings, and specifications.

Designer of Record (DOR). A civil engineer registered as a Professional Engineer in the State of Alaska, and in responsible charge of the work described. The DOR must have adequate and relevant prior structural design and inspection experience. The DOR may delegate portions of design, quality acceptance, and inspection work, to qualified technicians. The DOR and qualified technicians must not be supervised by, or under the direction of the Contractor's superintendent and work crew.

Independent Design Check (IDC). An independent design check of the design and load rating calculations including but not limited to: design, load ratings, location and dimensions of the foundation, structural members, connections, erection plan and temporary bracing (when required), safety barrier, and independent calculations of design loads, member stress, material properties, hydraulic capacity and scour protection.

Independent Engineer (IE). An engineer registered as a Professional Engineer in the State of Alaska, and in responsible charge of the independent design check. The engineer responsible for the check must have adequate and relevant prior structural design experience.

602-2.01 MATERIALS. Add the following:

Concrete	Section 501
Reinforcing Steel	Section 503
Structural Steel	Section 504
Riprap	Section 611

Add the following Subsection:

602-2.02 GEOTECHNICAL DATA AND HYDROLOGY INFORMATION. The Department may provide records of geotechnical investigations. The Contractor is responsible for obtaining additional geotechnical data necessary for the design and construction of the culvert bridge.

The Department may provide hydrology and hydraulics information. The Contractor is responsible for obtaining additional hydrology and hydraulics data necessary for the design and construction of the culvert bridge.

Add the following Subsection:

602-2.03 DESIGN REQUIREMENTS. Retain the services of a DOR to design and provide a CBDP for each culvert bridge. Retain the services of an IE to perform an IDC of each CBDP.

1. Design culvert bridges according to the following documents:
 - a. *Alaska DOT&PF Standard Specifications for Highway Construction* for recommended construction methods, material properties, and sampling and testing;
 - b. *AASHTO LRFD Bridge Design Specifications, as modified by Subsection 602-2.03*;
 - c. *Alaska Highway Preconstruction Manual*; and the
 - d. *Alaska Bridges and Structures Manual (BSM)*.
2. Design culvert bridges that:
 - a. support 100% of HL93 live loads or the Contractor's maximum construction load whichever is greater, without overstress. Follow the most recent version, including interim version, of the *AASHTO LRFD Bridge Design Specifications*. Indicate governing live load on working drawings;
 - b. meet the design life specified in *AASHTO LRFD Bridge Design Specifications* after allowing for metal section loss associated with abrasion and pH levels of the substrate and water;
 - c. meet the seismic acceleration values recommended in the *AASHTO LRFD Bridge Design Specifications*;
 - d. include the capacities and demands of load-supporting members in the design calculations;
 - e. meet the dimensions, stations, offsets and elevations of inverts and riprap requirements shown on the Plans;
 - f. provide the minimum hydraulic capacity shown on the Plans when openings are required to allow for the passage of water; and
 - g. provide the minimum horizontal and vertical clearances shown on the Plans when openings are required to allow the passage of traffic. If no vertical clearance is provided, follow the requirements in the *Alaska Highway Preconstruction Manual*.
3. Provide working drawings for culvert bridges including:
 - a. Dimensions controlling the culvert bridge design and erection, including proposed fill depth, corrugation spacing, corrugation depth, gauge thickness, concrete thicknesses, reinforcing steel size and locations, clear opening sizes, utility size and locations, and similar controlling dimensions;
 - b. Design loads and material properties; and
 - c. The soil bearing values.
4. Provide load ratings for the culvert bridges according to the most recent version, including interim version, of the *AASHTO Manual for Bridge Evaluation (MBE)* and the BSM. Load rate metal and concrete culvert bridges using the Load Factor Rating (LFR) and Load and Resistance Factor Rating (LRFR) methods.

Provide load ratings that reflect the bridge culvert final as-constructed condition. Include values for moment, shear and, where applicable, thrust for concrete culvert bridges. Include values for wall area, buckling, and seam strength for metal culvert bridges. Specify live load type, placement for maximum stress, distribution, and impact.

Include the following cases for LFR load ratings:

- a. Inventory with multiple lanes and impact included
- b. Operating with multiple lanes and impact not included
- c. Operating with one lane centered on the roadway and impact not included.

Include the following cases for LRFR load ratings:

- d. Inventory with multiple lanes and impact included
- e. Operating with multiple lanes and impact included
- f. Operating with one lane centered on the roadway and impact not included.

Add the following Subsection:

602-2.04 DESIGN SUBMITTALS AND REVIEW. Submit the following for review and approval at least 30 days prior to the beginning of fabrication or construction related to the culvert bridges:

1. The CBDP. The design drawings and load ratings in the CBDP must be stamped with the seal of, dated by, and signed by the DOR;
2. An IDC letter stamped with the seal of, dated by, and signed by the IE certifying: "The Culvert Design Bridge Package meets the *AASHTO LRFD Bridge Design Specifications*, the *AASHTO Manual for Bridge Evaluation*, and the Contract requirements".

Revise and resubmit the CBDP to incorporate any comments received during review. Resubmit the IDC letter after comments have been incorporated.

The approval of the CBDP shall not be construed as a complete review, but will only indicate that the general method of construction and working drawings are acceptable to the Department, that the CBDP appears complete, and that an IDC letter was provided. The Contractor shall remain responsible for all aspects of the culvert bridge.

602-3.01 CONSTRUCTION REQUIREMENTS. Add the following: When shown on the Plans, place riprap in accordance with Section 611.

Do not begin fabrication or construction of culvert bridges without the written approval of the Engineer. Do not open culvert bridges to traffic without the approval of the Engineer.

602-5.01 BASIS OF PAYMENT. Replace the first sentence with the following: Structure excavation, bedding, and backfill for culvert bridges is paid for under Section 204. The CBDP, engineering, inspection, labor, equipment, and materials necessary to design, load rate, and install culvert bridges are subsidiary.