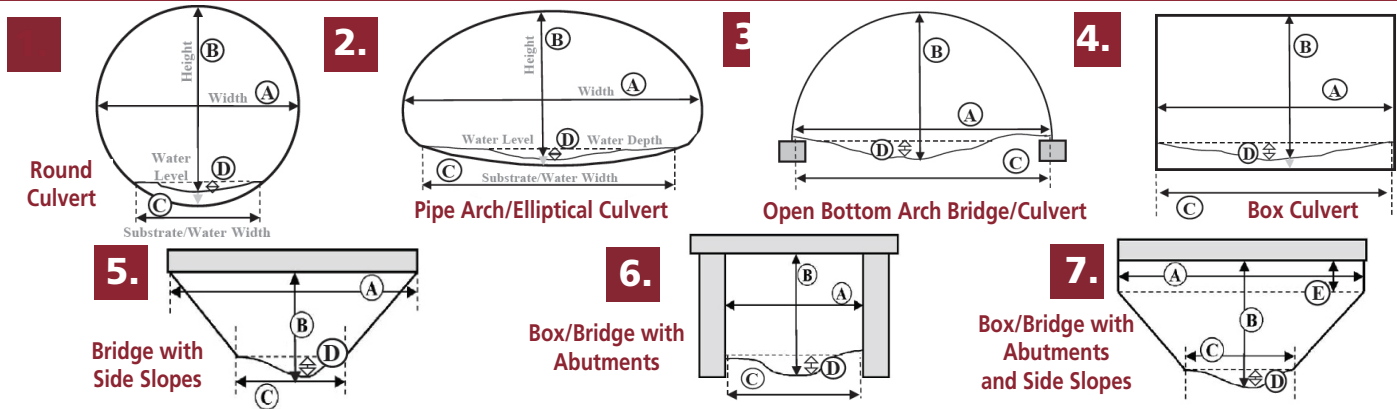


Culvert Assessment Reference Chart

CULVERT SHAPE & DIMENSIONS



CULVERT CONDITION REFERENCE

Structural (Longitudinal) Alignment

Poor: Significant horizontal or vertical misalignment of the pipe (Note: do not confuse this with constructed pipe bends).

Critical: Significant misalignment resulting in deformation of pipe or embankment/roadway damage.

Channel Alignment

Poor: The stream channel approaches the crossing at an angle of 45-70 degrees from the centerline of the structure.

Critical: The stream channel approaches the crossing at an angle of 70-90 degrees from the centerline of the structure.

Level of Blockage

Poor: Debris/sediment/vegetation blocks 1/3 or more of the inlet/outlet opening.

Critical: Sediment blocks more than 1/2 the inlet/outlet opening (and not designed that way for aquatic organism passage).

Flared End Section

Poor: Significant cracks, piping or undermining affects >50% of section. End crushed or separated from barrel.

Critical: Deterioration is significantly affecting performance and/or causing embankment/roadway damage.

Invert Deterioration

Poor: Perforations visible and/or connection hardware failing (metal). Heavy abrasion and scaling with exposed steel reinforcement (concrete). Heavy abrasion or scour damage (plastic). Displaced mortar and/or blocks, holes in invert area (masonry)

Critical: Holes or section loss with extensive voids beneath invert and/or embankment/roadway damage. Holes and gaps with extensive infiltration of soil, bedding or backfill material (masonry).

Bouyancy or Crushing

Poor: Light to moderate denting or deformation of inlet and/or outlet end of flexible pipe culvert. The invert of the inlet is at the streambed elevation (no uplift).

Critical: Invert of inlet bent upward above streambed or mitered edges crumpled inward.

Cross-Section Deformation

Poor: Significant perceptible deformation. Deformation with accompanying longitudinal cracking (concrete).

Critical: Excessive deformation resulting in significant reduction of available flow area, and/or extensive infiltration of soil, voids, structural failure or embankment/roadway damage.

Structural Integrity of Barrel

Poor: *Concrete:* Open cracks >1/8" wide with voids and significant infiltration of soil and/or leakage of water. Heavy rust staining and/or exposed steel reinforcement in sides and top of barrel. *Masonry:* Missing and/or displaced blocks *Plastic:* Several splits, tears and cracks >6" long. Significant deformation of liner or wall buckling.

Critical: Cracks, tears, splits, bulges, holes or section loss have led to extensive infiltration of soil, structural failure, voids and embankment/roadway damage.

Joints and Seams

Poor: Open or displaced with significant infiltration of soil and/or leakage of water and voids visible. Missing mortar or displaced blocks (masonry).

Critical: Open or displaced with significant infiltration of soil and accompanying embankment/roadway damage.

Footings

Poor: Top portion of footing exposed, but no cracking or breaking off of flakes or chips.

Critical: Footing exposed with signs of cracking or breaking off of flakes or chips. Bottom of footing exposed and/or undercut.

Headwall/Wingwalls

Poor: Cracking or breaking off of flakes or chips affecting >50% of area and/or exposed steel reinforcement. Gap >4" between barrel and wall. Footing exposed and undermined.

Critical: Partially or totally collapsed with damage to embankment/roadway.

Armoring

Poor: Significant displacements, undermining or deterioration affecting the performance of the culvert structure.

Critical: Partially or totally failed, significantly affecting performance and/or causing embankment/roadway damage or undermining of the culvert barrel or footings.

Apron

Poor: Significant cracking affects >50% of apron. Significant piping or undermining.

Critical: Partially or totally collapsed, significantly affecting performance and/or causing embankment/roadway damage.

Embankment Piping

Poor: Slight pavement cracking above the culvert, perhaps with a noticeable bump/depression when driving, but no evidence of holes in the embankment or soil infiltration in the culvert barrel.

Critical: Partially or totally failed, significantly affecting performance and/or causing embankment/roadway damage or undermining of the culvert barrel or footings.