Part 3. Correction Alternatives

Alternative 1 – Replace the existing barrier pipe with a ford. This option really isn't feasible for this site due to the high banks on either side of the stream channel. The grade of the approaches to the ford would be too steep without extensive excavation which would greatly increase the risk of sediment entering the stream from the road surface.

Alternative 2 – Replace the existing barrier pipe with a bottomless arch. The actual size of the arch would have to be determined during the design process but based on measurements of the average bankfull width upstream from the barrier pipe a 26 foot span would be necessary (20 ft. average bankfull width x 1.2 + 2 ft. = 26 ft.).

Alternative 3 – Replace the existing barrier pipe with a bridge. The actual length of bridge would have to be determined during the design process but based on measurement of the site (54 ft. measurement between the high banks on either side of the stream channel) a 58 foot long bridge would be recommended.

General Recommendation:

The topography at the site of the barrier pipe realistically limits the options to either Alternative 2 or Alternative 3. Alternative 3 would result in restoring the potential for fish passage at the lowest cost. By removing all fill material between the high banks the stream will be able to reestablish itself in a more natural manner. The stream is low gradient throughout the reach and flows year-round.

Due to the size of structures proposed extensive engineering will be needed. A detailed site survey and hydraulic calculations will allow a licensed engineer to complete a design of either type of structure.

Rough Cost Estimate*:

Alternative 3 – Replace culvert with a bridge

Engineering (including site survey, design, materials inspection, etc.)	$4,000
Permitting / Project Administration:	$3,000
Materials (including bridge, abutments, rock, etc.):	$47,000
Construction (including removal of existing structure, etc.):	$10,000
Total	$64,000

Alternative 2 – Replace culvert with a bottomless arch

Engineering (including site survey, design, materials inspection, etc.)	$6,000
Permitting / Project Administration:	$3,000
Materials (including arch, footings, rock, etc.)	$42,000
Construction (including removal of existing structure, etc.)	$20,000
Total	$71,000

*These estimates are provided as a rough approximation of project costs; actual costs will vary depending on specifications identified during project design.