

Geomorphic Compatibility



What is Geomorphic Compatibility (GC)? This describes the long-term compatibility of a stream crossing with river channel form and sediment transport.

Channel form is the shape of a stream within its floodplain and is determined by local topography and streamflow patterns. To evaluate if a stream crossing is compatible with channel form we ask:

- Is the culvert aligned with the channel or is it set at an angle?
- Does the culvert span the stream banks or is it too narrow?
- Is the slope of the structure similar to that of the stream channel?

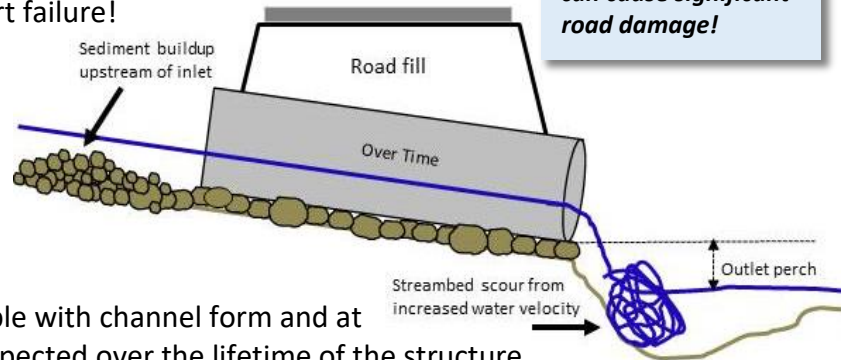
Sediment transport refers to how water moves rocks and sand along the stream bed. Undersized or improperly-angled stream crossings increase the potential for sediments to deposit upstream of a culvert. Sediment that accumulates in front of the culvert reduces the amount of water that can pass through the pipe and increases velocity – during a storm this can lead to catastrophic culvert failure!



Undersized culverts can cause significant road damage!

How do we evaluate Geomorphic Compatibility?

Information is collected on the culvert and river in the field and used to assign a score. The score acts as a guide for which culverts are more likely to fail and need to be replaced or upsized.



Fully Compatible – The structure is fully compatible with channel form and at a low risk of failure. Culvert replacement is not expected over the lifetime of the structure.

Mostly Compatible – The crossing is mostly compatible with channel form and has a low risk of failure. Culvert replacement is not expected over the lifetime of the structure, but if a replacement does occur, minor design adjustments are recommended to make the culvert fully compatible.

Partially Compatible – The crossing is either compatible with channel form or sediment transport, but not both. Compatibility is likely only in the short term. Culvert replacement may be needed, given the moderate risk of failure during its design lifetime.

Mostly Incompatible – The crossing is undersized, poorly aligned, and not compatible with channel form or sediment transport. As a result, these structures are at a moderate to high risk of failure.

Fully Incompatible – The structure is severely undersized, impeding sediment transport, and causing streambed scour and bank erosion. Crossings in this category are not compatible with channel form or sediment transport process and are at a high risk of failure.



An undersized culvert ranked as “fully incompatible” that has significant downstream bed scour and bank erosion.



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