

Guidance to the Regional Conditions for PCNs that include culvert use: DRAFT ONLY

The intent of this document is to provide additional guidance and clarification to the Savannah District 2007 Nationwide Permit Regional Conditions for culvert Pre-Construction Notifications. It is NOT intended to replace the Regional Conditions. It also highlights common additional information needs that are often missing from PCNs, but are necessary for the U.S. Fish and Wildlife Service and the Army Corps of Engineers to evaluate conformity with the Regional Conditions.

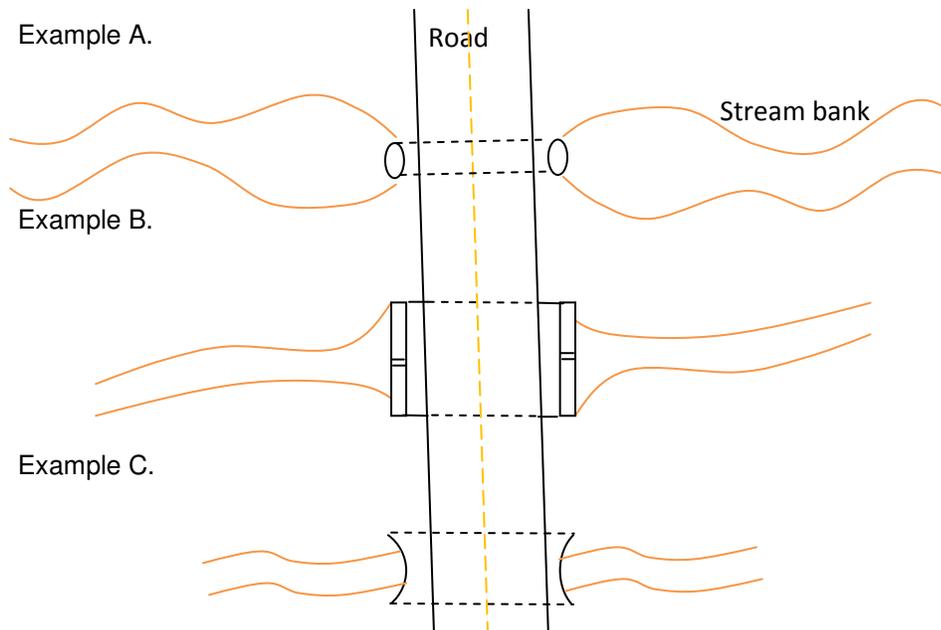
E.1. *The dimension, pattern and profile of the stream above and below a pipe or culvert should not be permanently modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity.*

Additional guidance:

Example A. View from above the stream crossing. The natural stream width upstream and downstream of culvert was widened either during the construction of the stream crossing or as a result of using an undersized pipe culvert. Undersized pipe culverts cause bank scour and/or sloughing during high flow events both upstream and downstream of the pipe. Dimension, pattern and profile of stream have been altered.

Example B. A double box culvert that was oversized. Baseflows are dispersed over a wide area in this box culvert, making the water shallow and inhibiting fish passage through the culvert. Dimension, pattern and profile of stream have been altered.

Example C. An arch-span culvert [or bridge] with footers away from the stream banks. Dimension, pattern and profile of the stream is maintained upstream, downstream, and within the culvert.



E.2. *For any crossing of a perennial stream where use of a culvert is proposed, an alternatives analysis must be prepared and submitted with the PCN..... At a minimum, the analysis must compare construction and compensatory mitigation costs for the above discussed alternatives.*

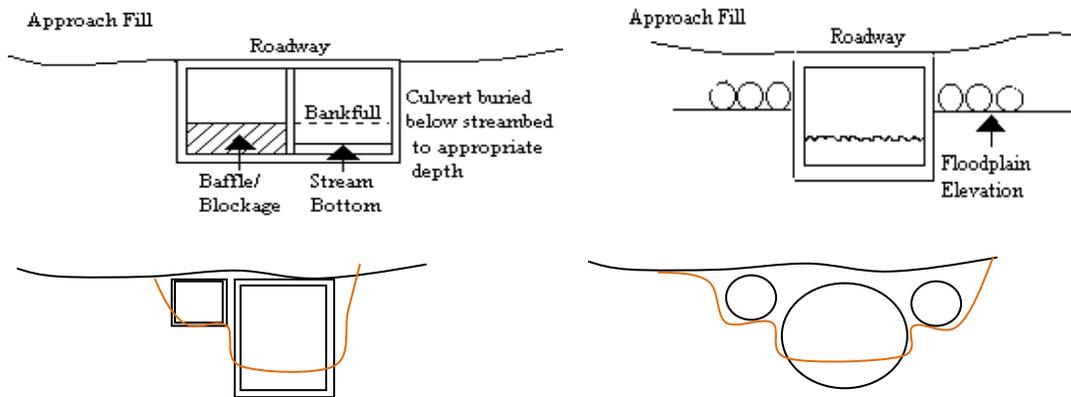
Additional guidance:

Below is a fictitious cost analysis that would meet the cost analysis requirement specified in the Regional Conditions.

Cost	Pipe culvert	Box culvert	Arch-span	Bridge
Materials	\$20,000	\$40,000	\$65,000	\$100,000
Construction	\$15,000	\$25,000	\$20,000	\$30,000
Excavation	\$2,000	\$2,000	\$8,000	\$2,000
Maintenance (over 20 years)	\$20,000	\$20,000	\$20,000	\$5,000
Stream credits	\$10,000	\$10,000	\$0	\$0
Total	\$67,000	\$97,000	\$113,000	\$137,000

E.3. 3. *Bank-full flows shall be accommodated through maintenance of the existing bank-full channel cross sectional area. Additional culverts at such crossings shall be allowed **only** to receive flows exceeding bank-full.*

Additional guidance: These are **acceptable designs**. Additional culverts are used here to receive flows that exceed bankfull.

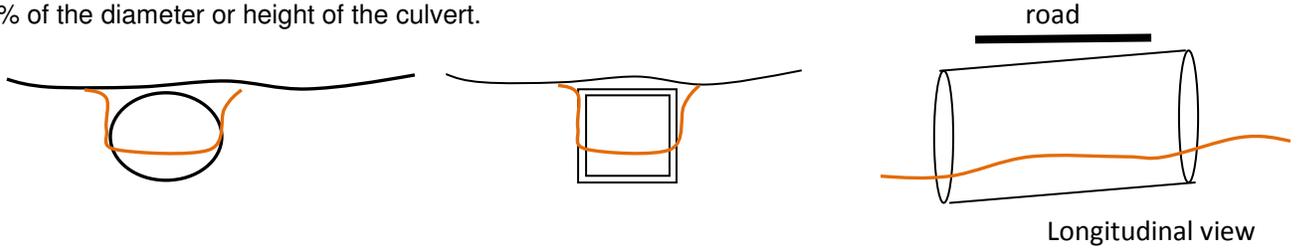


These are **unacceptable designs**. Multiple culverts cannot be used to receive baseflows. Baseflows should flow through one culvert. The two designs below differ from the designs above because baseflow is carried in one culvert (above) and two culverts (below).



E.4. *Unless clearly demonstrated that it would not be practicable, the upstream and downstream invert of culverts (except bottomless culverts) installed in perennial streams will be buried/ embedded to a depth of 20 percent of the culvert diameter (20 percent of the height of elliptical culverts), to allow natural substrate to colonize the structure's bottom, encourage fish movement and maintain the existing channel slope. Culvert slope should not exceed 4 percent.*

Additional guidance: We recommend that perennial stream culverts be embedded 20-50% of the culvert diameter. We recommend that culverts of intermittent and ephemeral streams also be embedded 20-50% of the diameter or height of the culvert.



E.5. *Culverts shall be of adequate size to accommodate flooding and sheet flow in a manner that does not cause flooding of associated uplands or disruption of hydrologic characteristics that support aquatic sites on either side of the culvert.*

Additional guidance: Undersized culverts such as these (below) can cause flooding upstream and scour downstream. These designs do not accommodate flows that exceed bankfull. Culverts depicted in E.4. and E.6. that are sized to the channel dimensions and accommodate stormflows are less likely to disrupt hydrologic characteristics upstream and downstream of the culvert.

Avoid these undersized designs:



E. 6. *Where adjacent floodplain is available, flows exceeding bank-full should be accommodated by installing equalizer culverts at the floodplain elevation.*

Additional guidance: Here are examples where equalizer culverts can be used to accommodate floodplain flows/ flows that exceed bankfull.



Common Additional Information Needs

Providing the following information in the PCN will greatly aid the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service in the review process. The information outlined below is essential for FWS to properly evaluate the PCN. Including this information will make the process more efficient.

- Culvert type, culvert size, depth to which culvert will be embedded, culvert design, floodplain culverting

- Channel dimensions upstream, downstream, and at the location of the stream crossing. This can be achieved through the use of a channel cross-section. At a minimum, depth of channel from top of bank to stream bed, and width of channel at top of bank should be included.
- A channel cross-section with the culvert included in the diagram is also helpful.
- An alternatives analysis that includes the cost analysis described above.

For additional information regarding information contained within this document, you may contact the following.

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