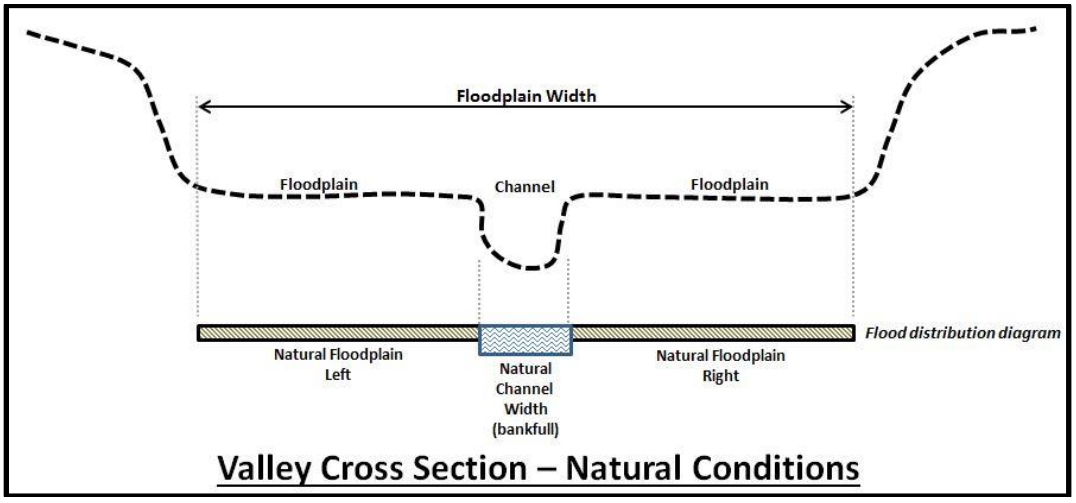
Floodplain Culvert Fact Sheet

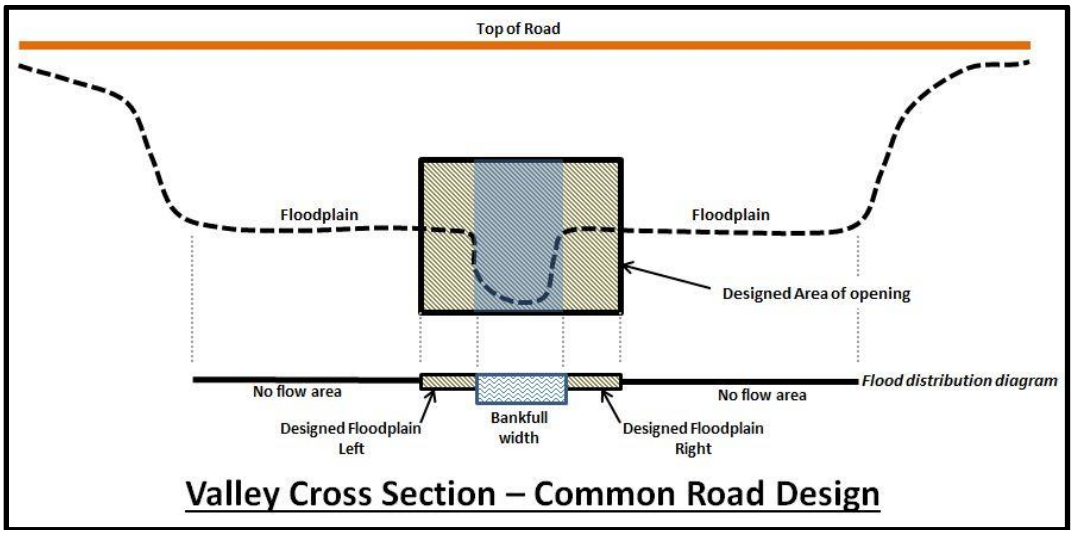
What are floodplain culverts?

Simply put, floodplain culverts are set under a road, trail or other infrastructure that crosses a floodplain to enhance floodplain conductivity. They are typically designed to allow runoff to remain in the natural floodplains during a flood instead of confining flow to a main channel culvert or bridges as often found in traditional culvert design. The following three graphics depict flow distribution through:

1. A Natural Floodplain - showing the main channel and wide left and right natural floodplain area
2. Traditional Culvert Design – showing a road bisecting the floodplain, with a culvert in the main channel and blocked floodplain areas
3. Floodplain Culvert Design – showing the same road bisecting the floodplain, but with additional culverts conveying flow in the left and right floodplain areas, allowing for floodplain conductivity.



1. *Natural Floodplain:* open natural floodplain without obstructions



2. Traditional Culvert Design: road bisecting the floodplain with on-channel culvert and blocked floodplain areas

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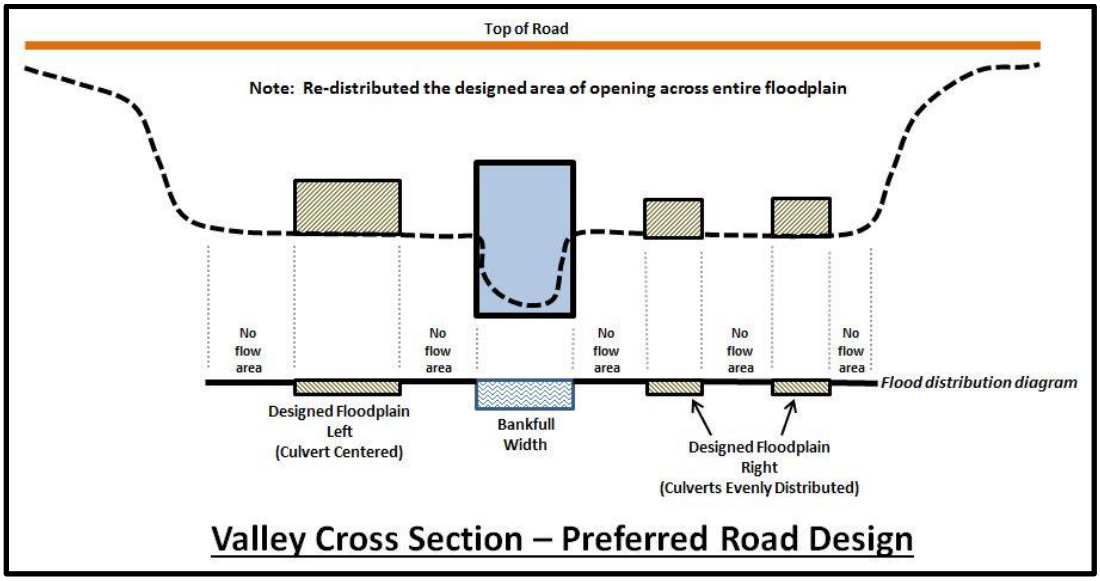

3. Floodplain Culvert Design: road bisecting the floodplain, but with floodplain culverts

What are the benefits of floodplain culverts?

Where a defined river or stream channel exists, there are many benefits of including floodplain culverts in addition to the main channel culvert. Floodplain culverts allow water, sediment, and biological communities to move freely between a river's banks and its floodplain. When a river and its floodplain are connected, water is able to flow above the banks and disperse excess velocity and sediment across the floodplain, thus providing the following benefits:

- Minimize bank erosion
- Reduce road maintenance costs
- Reduce risk of damage to roads from floods
- Improve water quality by protecting the natural beneficial functions of floodplains

How are floodplain culverts designed?

1. Determine the required cross sectional area for conveyance based on standard engineering practice and applicable regulatory requirements.
2. Perform a "desktop" Geomorphic Site Assessment to calculate:
    a. Channel bankfull width
    b. Floodplain width and elevation
3. Re-distribute cross sectional area determined by Step 1 as follows:
    a. The channel opening should be equal to bankfull channel width.
    b. The remaining required cross sectional area should be equally distributed across the entire floodplain width. Flowline elevations for floodplain culverts should be set to 'bankfull' and/or natural floodplain elevation.
4. Conduct hydraulic analysis/modeling to assess the design, modify design to optimize site constraints, and conform to applicable regulation.

For additional information on floodplain culverts, a Geomorphic Site Assessment Form, and design resources, please visit our website: http://www.dnr.state.mn.us/eco/streamhab/geomorphology/index.html

For questions, assistance and/or comments regarding floodplain culverts please contact:
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