THE RISK IS REAL

Mitigation Works





Private Water Crossings

Considerations before you build or rebuild

FEMA P-778 / June 2009

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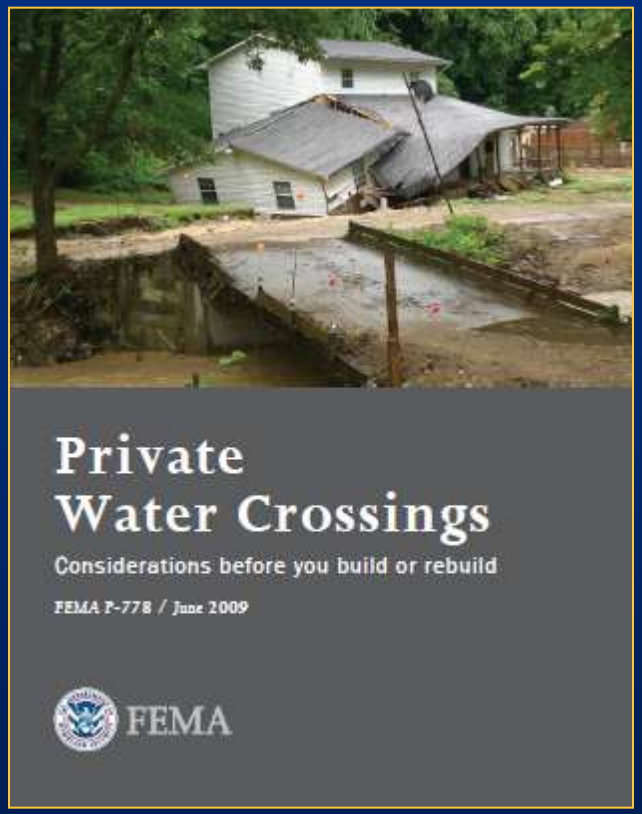
Design Considerations

- Construct during dry weather
- Design should be based on max. anticipated water depth and velocity
- Design should be based on intended use of crossing
- Maintain the overall integrity of waterway
- Coordinate design and construction with owner, engineer, contractor & governing agencies



https://www.fema.gov/media-library/assets/documents/17542

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Obtaining a Permit

- Check with local, state and federal agencies before design and construction
- Usually at least one if not more local, state and federal agency permits are required no matter where you live
- Perform hydrologic (volumetric flow rate of water) and hydraulic (depth of flow and velocity) (H & H) analysis as required
- Verify with Floodplain Manager that the flood carrying capacity of water course will be maintained
- Builder obtains necessary permits and follows all regulations, specifications and established construction guidelines

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Types of Water Crossings

- Bridges
- Culverts
  - Reinforced concrete
  - Corrugated steel
  - Polyethylene
- Low water crossings
  - Unvented ford
  - Vented ford

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Bridges

- If designed and constructed properly, bridges are preferred to culverts and low water crossings, since bridges can avoid altering the natural flow of the water
- Handrails or guardrails should be installed where necessary

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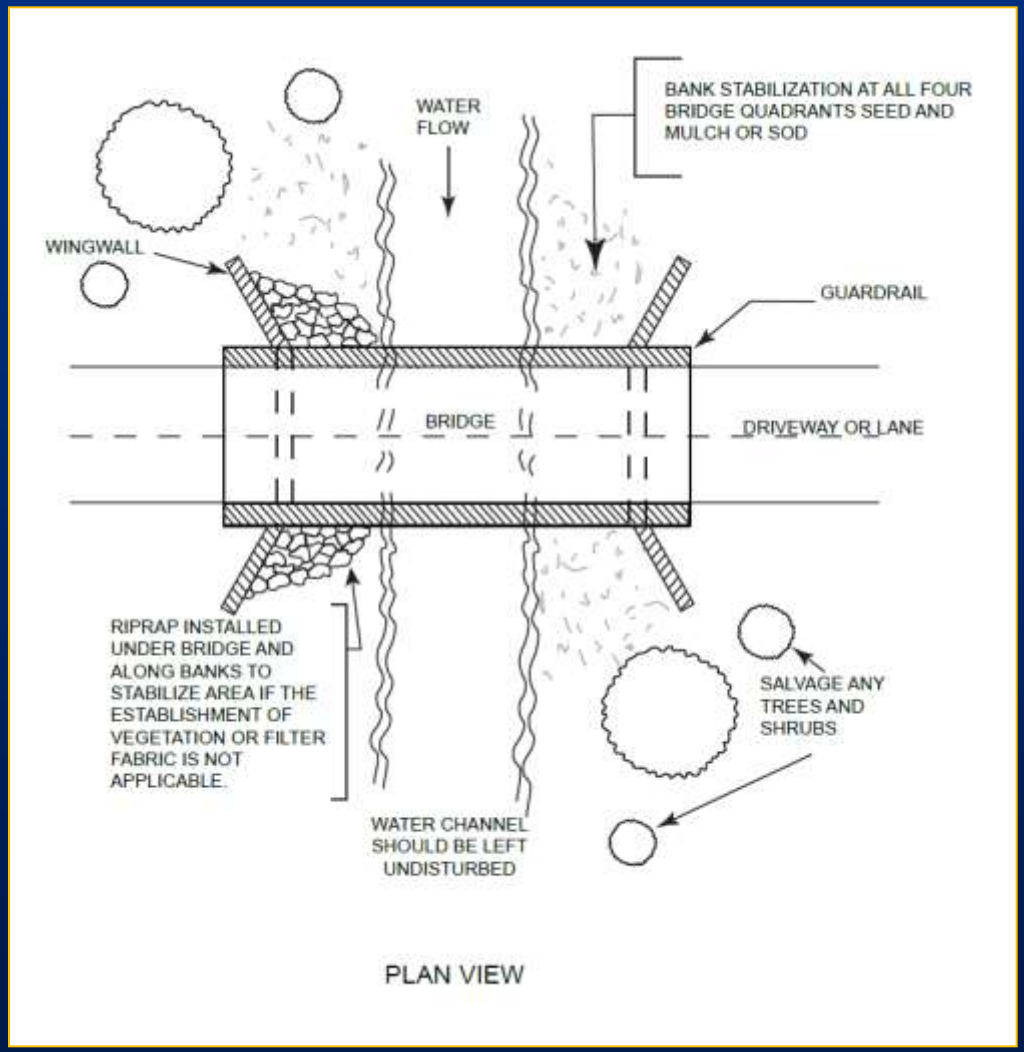
Bridges



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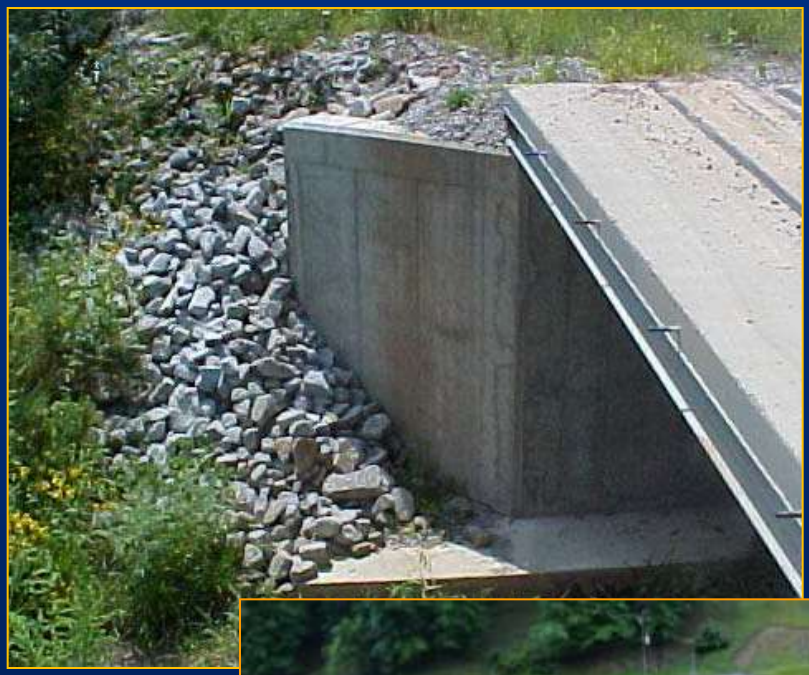
Bridges

- Install wing walls to direct the water flow into the bridge opening
- Wing walls help avoid potential erosion, scouring and structural failure
- Lack of wing walls can cause loss of bridge approach



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Bridge Crossing Problems

- Strive to avoid locating abutments and piers in the water channel
- Support piers located in a stream bed will create scouring and debris catch
- Causes a weakening of the structural integrity of the bridge

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Bridge Crossing Damage

- Bridge collapsed at property side with deck damage, scouring and loss of bridge approach
- Establish better water flow clearance if possible
- Bridge needs wing walls and new abutment or abutments
- Bank stabilization needed
- Add curbing and/or railing

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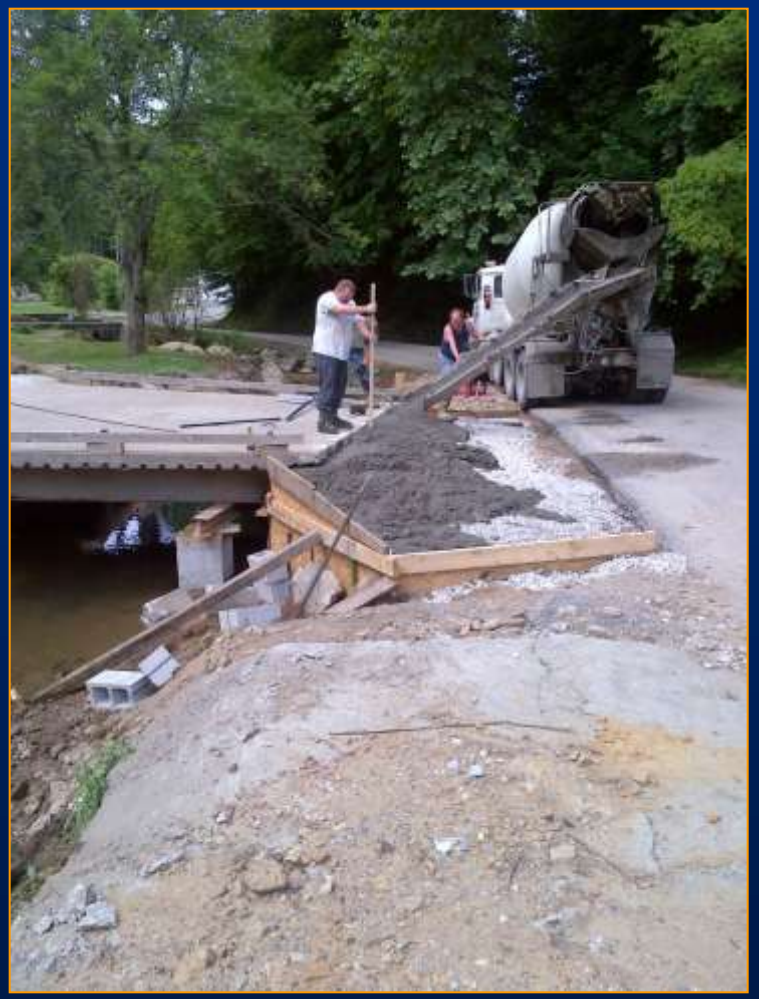
Bridge Crossing Repairs

- Bridge collapsed at road side with deck damage, scouring and loss of bridge approach
- Bridge end jacked up and supported temporarily
- Pour new supports and deck with rebar, wing walls
- Riprap/Gravel fill and bank stabilization



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Culverts

- Use where bridge installation is not feasible and impact on fish/aquatic life is minimal
- Use for access across drainage ditches, intermittent streams and small waterways
- Not for high water flows
- Avoid gang/multiple culvert installations
- Utilize headwalls and wing walls to aid in flow of water with natural alignment
- Always avoid any bends

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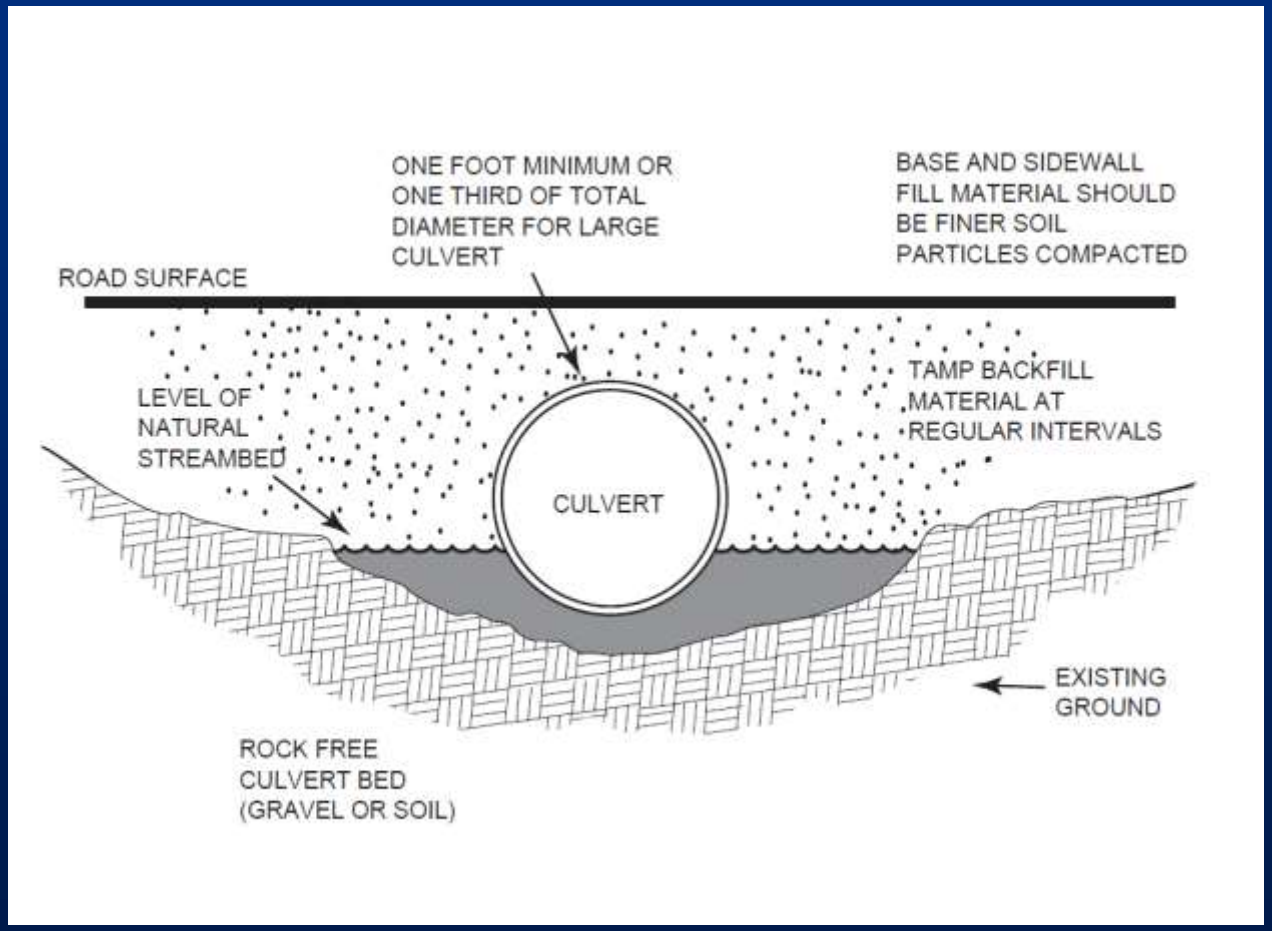
Culverts



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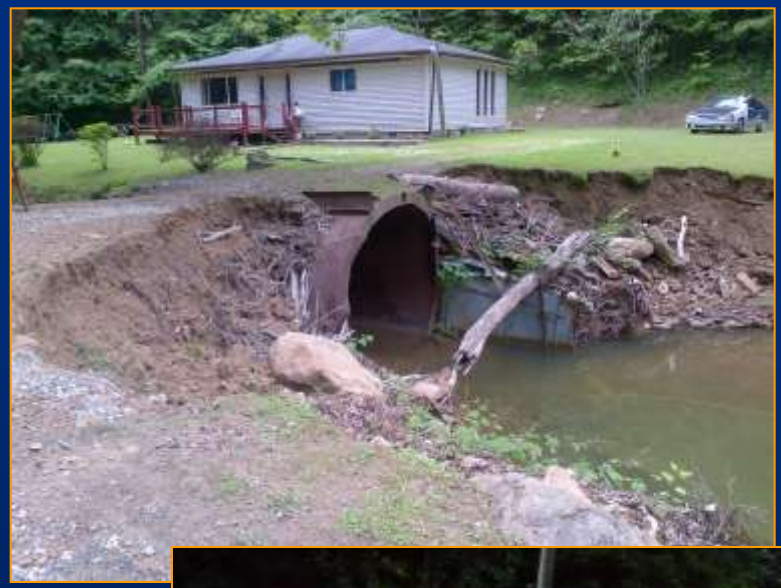
Culvert Repairs

- Repairs could involve installation of geo-tech fabric and riprap rock to stabilize bank and avoid future scouring and erosion
- Possible increase in culvert size to increase volume and velocity of flow will require an H & H study



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Culvert Repairs

- Repair to blown out culvert could involve replacing the undersized metal culvert with a bridge
- Bridge will maintain the original watercourse channel bed
- Bridge will provide better capacity to accommodate high water flow
- Site space permits avoiding stream bed encroachment

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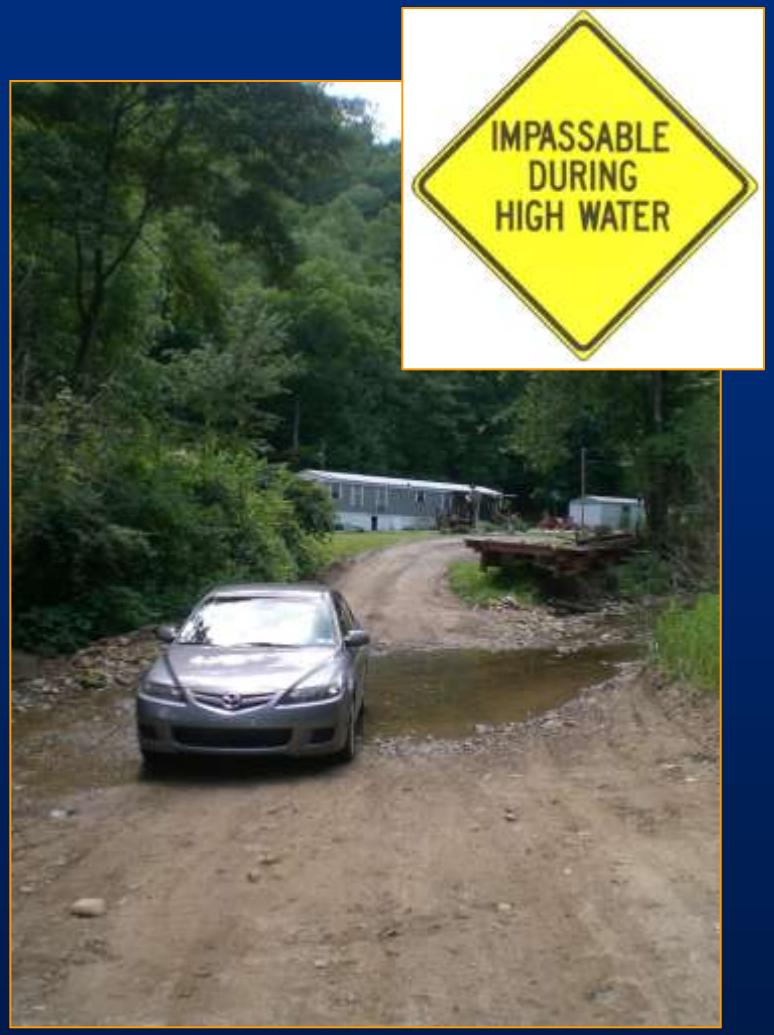
Low water crossings

- Suitable for low volume roads and relatively low volume water flow
- Not for servicing occupied dwellings
- Install proper signage warning of the dangers of high water
- Utilize only with suitable stable streambed and banks
- Unvented fords should have water depth flow under 6 inches



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Procedures for WVVOAD

- Contact property owner and discuss their needs as it relates to the disaster damage and what can be addressed
- Prepare a written, signed agreement with all affected homeowners:
  - Grants access to property by Volunteer Agency, agents, employees, contracted individuals
  - Agreement to indemnify and hold harmless for agency
  - Owner acceptance of responsibility and liability for new construction and it's maintenance
  - Written affirmation that property owner is actual owner of the land where water crossing work is being done

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Procedures for WVVOAD cont.

- Inspect site to determine existing conditions and needs
- Develop and determine a scope of work and costs
- Review scope of work with homeowner
- Contact the County Floodplain Manager to obtain any necessary permits (fee waved in designated counties)
- Contact the local municipality Code Enforcement Officer to comply with any building code requirements (if necessary, a small fee is charged)

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Procedures for WVVOAD cont.

- Contact WV Division of Natural Resources (DNR), Office of Land and Streams for an application to access waterway (no fee for homeowners and non-profits)
- The WV DNR biologist will contact the U.S. Fish and Wildlife for any endangered species or critical habitat issues
- Notify State Historic Preservation Office if there is expansion of footprint of project in previously undisturbed ground
- Coordinate and communicate throughout the project with all involved parties

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Questions/Comments?