3.3.2.7 Utility Stream Crossing

Source: VDEQ (2024)

Definition and Purpose

The utility stream crossing measure is to help protect water bodies from disturbed sediment during the construction of a utility line. Crossings entail temporarily diverting the stream from its normal flow course or can employ trenchless technologies like horizontal directional drilling.

Appropriate Applications

This is applicable where utility lines are crossing a stream, wetland, or other jurisdictional feature. These can be fiber, electric, water, sewer, storm sewer, or other utility pipes or conduits that are to be buried and pass under a waterbody.

Limitations and Maintenance

Care must be taken to inspect any stream crossing area at the end of each day to confirm construction materials cannot be moved downstream. Proper maintenance and inspection for each type of flow diversion measure ensures that best practices are followed, and the working area remains dry.

Utility crossings in jurisdictional waters require additional permits, such as an ARAP, and therefore, both the conditions of the CGP and ARAP must be followed. A Section 404 permit from USACE may also be required. If the proposed crossing is to be completed in a TVA reservoir, a TVA 26a permit may also be necessary. Consider the criteria and conditions of the necessary permits during the planning stages of the project and EPSC plans.

Planning and Design Considerations

Utility construction frequently crosses and impacts streams. Thus, there is potential for excessive sediment loss by both the disturbance of the approach areas and by the work within the stream. To the greatest extent possible utility line crossings are to be perpendicular to the stream so that it overlaps the streambed the least amount possible (VDEQ, 2024).

In cases where instream work is unavoidable, it is necessary to provide adequate protection for sediment loss while minimizing the amount of encroachment and time spent working in the channel. If the stream bed is to be disturbed for the utility crossing and can be completed within a few days, coordinate construction during dry weather for ephemeral and intermittent streams. If that is not possible, other measures can be taken to minimize siltation in the stream (WVDEP, 2016).

Selecting the appropriate method for a utility stream crossing can be challenging as it requires balancing environmental impacts, feasibility, and regulatory compliance. Horizontal directional drilling and Jack and Bore drilling are preferred techniques because they minimize disturbance to the waterbody by avoiding direct excavation of the streambed. These trenchless methods are particularly advantageous in environmentally sensitive areas, as they reduce sedimentation, protect aquatic habitats, and maintain natural stream flow (VDEQ, 2024; WVDEP, 2016). Horizontal direction drilling is ideal for long-distance crossings and challenging terrain, providing a cost-effective solution with minimal surface disruption. Jack and Bore is well-suited for shorter, more controlled crossings, especially in areas with high groundwater or unstable soils. Given the complexity of selecting the right approach, designers and plan reviewers may consider conducting on-site evaluations to determine the most suitable method for each project. When neither option is feasible, open trench methods exist, which are more intrusive and likely time-consuming.

Horizontal directional drilling is a trenchless construction method used to install underground pipelines, conduits, and cables with minimal surface disruption. Position entry and exit points at least 50 feet from the top of the stream bank, allowing the drill to achieve sufficient depth beneath the streambed and minimizing the risk of disturbing the stream environment. The bore depth must be adequate to prevent the inadvertent release of drilling fluids, which could contaminate the watercourse. Additionally, develop a site-specific contingency and containment plan to address any unintended release of drilling fluids, ensuring that it is readily available on-site during construction for immediate response.

Furthermore, conducting thorough geotechnical investigations is crucial to understanding soil composition and subsurface conditions. This information aids in designing an appropriate bore path and selecting suitable drilling techniques, reducing the likelihood of complications during operations.

Jack and Bore drilling, also known as auger boring, is a trenchless construction method used to install underground pipes, casings, or conduits beneath the stream. A bore pit is excavated at the entry point, and a receiving pit is established at the exit point, both of which are to be located at least 20 feet from the top of the stream bank. In this method, a steel casing is placed at the entry pit, and a hydraulic jack pushes the casing forward while an auger drill inside the casing removes the soil. The auger rotates and removes soil from the front of the bore as the casing is jacked forward, gradually advancing through the earth. Once the casing reaches the receiving pit, the auger is removed, and the utility pipe is installed inside the casing. Jack and Bore drilling is not ideal in loose or wet soils or where open space is limited.

An open trench requires clearing, excavation, pipe installation, riprap backfill, and bank restoration. This results in removing trees, vegetation, and root systems that hold stream banks together and could potentially cause additional bank stabilization issues.

a. *Stream Diversion Channel*: Consider this method if construction will remain in the area of the stream for an extended period (longer than 72 hours) and if site conditions are agreeable. See Section 3.3.2.4 for guidance on stream diversion channels. See below for notes that apply specifically to utility crossings.
   - This method allows continuous base flow of the stream around the construction of the utility crossing. Construct the utility trench perpendicular to the stream bank and fully cross the stream bed and bank prior to removing the diversion channel; and
   - Once the trench and surrounding area have been backfilled and stabilized, the stream can be rediverted back to the original streambed alignment. Stabilize the disturbed stream- bed and banks and the approach areas immediately following the attainment of the final grade.
b. *Instream Diversion*: This can be used when the stream is wide enough (10 feet or wider). See Section 3.3.2.3 for guidance on stream diversion channels. See below for notes that apply specifically to utility crossings.

- Remove large rocks, woody vegetation, or other material from the streambed and banks that may get in the way of placing the riprap, sandbags, sheet metal, or wood planks used for diversion or installing the utility pipe or line;
- When the stream flow is successfully diverted, dewater the work area;
- Excavate the utility trench in the work area and install the utility line in half of the streambed;
- Stabilize the stream- bed and banks and the approach areas for the initial half of the installed utility line immediately following the attainment of the final grade; and
- Shift the flow from one side of the diversion to the other, such that the next half of the utility crossing can be constructed, and the water can be diverted to the newly stabilized portion of the stream.

c. *Bypass Pumping*: Bypass pumping is beneficial for work that is to be completed within a week and for smaller streams with low baseflow. This is due to a person having to run the pump and be present to manually turn it on and off. See Section 3.3.2.4 for details on bypass pumping. See below for notes that apply specifically to utility crossings.
    - This method allows for the use of a temporary pump to transfer water from upstream to downstream and for placing berms across the streambed to prevent flow from entering the work area; and
    - If stormwater does enter the work area, it will need to be dewatered. This allows for work to be done in the dry and as well as allowing the streambed to be stabilized before reintroducing the stream's flow back into the channel.

There are a plethora of good practices when installing utility crossings.

- As with all utility line crossings, approach areas may need to be controlled with perimeter measures such as silt fence;
- For a sewer line crossing a stream, consider providing non-erodible fill and cover, such as concrete or controlled low-strength materials (flowable fill), and trench plugs at each end of the crossing;
- Avoid placing manholes in wetlands and consider providing a minimum distance of 50 feet from the stream bank to the nearest edge of the manhole;
- It is important that the utility crossing prevent permanent impoundment or loss of normal or baseflow;
- Dewatering of the utility trench and construction area may be necessary during construction. A good practice to use in this case would be to pump to a sediment filter bag that is located downstream of the work area. See Section 4.4.12.5 for guidance on the use of Sediment Filter Bags;

- It is best not to blast for the excavation of trenches that are parallel or lie within 50 feet of a stream or wetland. This can impact the streambed and cause the loss of baseflow;
- It is best practice to have a minimum of one trench plug between manholes and one trench plug at each end of the stream crossing or wetland; and
- It is important to be aware of existing erosion occurring near the proposed utility crossing. If the headcut is happening at a downstream point and there is potential for the erosion to continue upstream where the utility crossing is proposed. This may encourage the designer to try to pick a more stable portion of the stream for crossing or provide additional bank stabilization so there is little risk of the utility line becoming exposed due to bank erosion.

Example Application
For sizing, refer to Section 3.3.2.3. No formal design or quantities are required for trenchless technologies.

References
VDEQ. (2024). *Virginia Stormwater Management Handbook.*
WVDEP. (2016). *Erosion and Sediment Control Best Management Practice Manual*.