

**F-1 TEMPORARY STREAM DIVERSION****PURPOSE & APPLICATIONS**

A temporary stream diversion is the diverting of the base flow of a perennial stream around a construction site by use of a conduit (pipe) or small diversion ditch.

Its purpose is:

- To maintain stream flow continuity, quality and habitat and provide a dry working environment for the construction activities.
- To allow the installation of a structure in a perennial stream with minimal impacts on stream turbidity. By temporarily diverting the stream's base flow away from the construction areas and into a stable pipe or channel system, clean water is kept out of the active construction area.

This practice applies where flows are low enough and/or the watershed is small enough to allow normal base flows to be handled practically in a conduit (pipe) or small diversion ditch. It is intended for those situations where the temporary stream diversion will only be needed during the summer-fall months of low stream flow, where the time of construction can be minimized, and the site can be stabilized before winter. For projects involving large streams or rivers that are expected to be under construction for a long period of time, more permanent engineered structures will be needed.

**CONSIDERATIONS**

Any work with a stream is subject to the rules and regulations of the U.S. Army Corps of Engineers for in-stream modifications (404 permits), the Maine DEP, and the Land Use Regulation Commission regulations.

**Timing:** Timing the installation of this measure is critical to minimize impacts on fisheries.

**Phasing:** To minimize the impact to the stream, phasing the operations must be considered before the stream is diverted. This measure needs to be quickly and carefully installed, well maintained and removed as soon as possible when the construction area is stable.

**Constriction of the channel:** These practices will increase the velocity of flow due to constriction of the channel and will create a higher potential for erosion and movement of sediments in the stream channel.

**Flooding:** Any flood flows during the construction period can be expected to damage or destroy this practice. It may contribute to the flooding effects.

**Maintenance:** This practice is a high maintenance item, and should be considered for use in a cautious manner. The impact of failure on downstream facilities should be carefully considered. In addition, aquatic needs such as fish passage may preclude the use of this practice.

**DESIGN CRITERIA**

Refer to the guidelines and graphics of the TEMPORARY SLOPE DRAIN BMP.

The construction of any specific temporary stream diversion shall not cause a significant water level difference between the upstream and downstream water surface elevations (not to exceed 1%) and the velocity should be maintained at a rate similar to existing flow conditions.

**Fish Passage:** Consult with the Inland Fish and Wildlife Department for dates of fish spawning or migration within the waterway the work is to occur. Standard blocked out dates are from October 1 to April 30 for some streams and from March 15 to June 15 for other streams.

**Water Fluctuation:** The base flows of all streams must be maintained at all time. In addition, for bass and warm water species, the water level fluctuation should be no greater than one (1) foot during the time period from May 1st - July 1st.

**Time of Operation:** All temporary stream diversions shall be removed within 2 calendar days after the structure is no longer needed. Unless prior written approval is obtained, all structures shall be removed and the area stabilized before winter.

**Aggregate:** There shall be no earth, sands, silts, clays or organic material used for construction within the waterway channel. Washed coarse aggregate (3/4 inch to 4 inches) referenced, as AASHTO designation No. 1 shall be the minimum acceptable aggregate size for temporary stream diversions. Larger clean aggregates will be allowed.

**Sandbags:** Sandbags shall consist of materials, which are resistant to ultra-violet radiation, tearing and puncture, and woven tightly enough to prevent leakage of fill material (i.e., sand, fine gravel, etc.).

### **Planning Criteria**

Select a design method that will least disrupt the existing terrain for the stream reach. Consider the effort that will be required to restore the area after the temporary stream diversion is removed. The following criteria must be considered when selecting a temporary stream diversion method:

**Time of year:** The time of year may preclude the selection of one or more of the standard methods due to fish spawning or migration restrictions.

**Site Location:** Locate the temporary stream diversion where there will be the least disturbance to the soils of the existing waterway banks.

**Removal of the structure:** Ease of removal and subsequent damage to the waterway should be primary factors in considering the choice of a design of the stream diversion.

**Maintenance:** This is a high maintenance item. Weather reports need to be monitored and the structure prepared for anticipated storm events.

### **Design Criteria**

Provisions for temporary stabilization of the inlet, outlet, and return channel shall be included in the design. The materials used in construction must be sound, and capable of withstanding the loads applied. The materials must also be durable and maintain their integrity for the life of the project.

- Excavation of the channel shall begin at the downstream end and proceed upstream. All excavated materials shall be stockpiled outside of the floodplain and temporarily stabilized to prevent re-entry into the stream channel.
- The height of the diversion structure shall be one half the distance from the streambed to stream bank plus one foot.
- All dewatering of the construction area shall be pumped to a dewatering basin prior to re-entering the stream.
- All excavation materials shall be disposed of in an approved disposal area outside the 100-year floodplain unless otherwise approved.
- The downstream and upstream connection to the natural channel shall be constructed under dry conditions. Sandbags shall contain the stream.
- The process of excavation and stabilization shall be a continuous (uninterrupted) operation. All materials shall be on-site prior to channel construction.
- Periodic inspection and maintenance shall be performed as needed to ensure that the diversion, streambed and streambanks are maintained and not damaged. Maintenance shall include removal and disposal of any trapped sediment or debris. Sediment shall be disposed of outside of the flood plain and stabilized.

### **Sandbag-Conduit Diversion**

This practice should be limited to streams, which drain less than 1 square mile. It should be used only for very short time duration. Because the potential for wash out is high, it must be carefully monitored. It should not be left unattended for any 24-hour period. If a major storm event is expected, the site must be stabilized in preparation for it. The conduit shall have the hydraulic capacity to handle the flow rate of 30 cubic feet per second per square mile of drainage area above the site.

### **Sandbag-Stone Diversion**

This practice should be limited to streams, which drain less than 5 square miles. The temporary channel should be able to convey the 2-year storm event. The diversion structure shall be installed from upstream to downstream. Sheeting shall be overlapped such that the upstream portion covers the downstream portion with at least an 18-inch overlap.

### **Fabric Based Channel Excavation**

This practice should be limited to streams, which drain less than one (1) square mile. The temporary channel should be sized to convey the 2-year storm event. All debris (rocks, sticks, etc.) shall be removed and the channel surfaces made smooth so that the fabric will rest flush with the channel sides and bottom.

#### **Stabilization with Geotextile Fabric**

- The fabric shall have a minimum width such that it is keyed in and anchored at the top of the stream bank.
- The fabric shall be placed so that it rests flush with the channel at all points of contact.
- The fabric shall be placed such that one piece will line the entire channel. If this is not possible, the fabric shall be placed so that it overlaps along the channel's transverse. Longitudinal overlaps shall not be allowed. Upstream sections shall overlap downstream sections. The overlap shall equal 2 feet minimum.
- The fabric shall be keyed into 2 x 2-foot trenches located at the upstream edge and at 50 foot intervals (the overlap nearest to each 50-foot increment). The key-in shall be from top of channel to top of channel. Riprap shall be carefully placed into the trench (without dropping onto the fabric).
- The fabric sections shall be secured with pins (length of 18 inches minimum) and washer (diameter 1 inch minimum). Overlaps shall be pinned along transverse and longitudinal axes with spacing equal to 3 feet maximum.
- The spacing of the pins must follow the manufacturer's specification and is dependent on the anticipated velocities and thickness and type of geotextile fabric.
- The entire bottom of the channel could be riprapped if high velocities were anticipated. When the area is riprapped, it is not required that the geotextile fabric underneath the riprap be pinned.
- An impervious plastic lining can be used in lieu of geotextile fabric. The plastic liner shall be 6 mil or thicker and shall be capable of maintaining strength against the effects of ultraviolet light for a period of at least 60 days.

#### **Removal of the Diversion**

- Water shall not be allowed through the natural stream until all construction is completed.
- When the diversion is no longer needed, all structures shall be removed within 2 calendar days.
- After diversion of the stream back to the natural streambed, the temporary diversion channel shall be backfilled and stabilized. Points of tie-in to the natural channel shall be stabilized in accordance with the STREAMBANK STABILIZATION BMP

### **MAINTENANCE**

**Inspection:** Periodic inspection must be performed to ensure that the structure is maintained and not damaged, that sediment is not entering the stream or blocking fish passage or migration.

**Maintenance:** Maintenance shall be performed, as needed, to ensure that the structure complies with the standards and specifications. This shall include removal and disposal of any trapped sediment or debris. Sediment shall be disposed of outside of the floodplain and stabilized.

**Storm Events:** Anticipate major storm events. If a major storm is predicted, emergency measures must be taken to minimize damage.