

Chapter 4 - BEST MANAGEMENT PRACTICE STANDARDS

STREAM CROSSING

(Temporary Practice)

Definition

A bridge, ford, or temporary structure installed across a stream or watercourse for short-term use by construction vehicles or heavy equipment.

Purpose

To provide a means for construction vehicles to cross streams or watercourses without moving sediment into streams, damaging the streambed or channel, or causing flooding. Permanent stream crossings must be undertaken by a qualified engineer so that the structure is not subject to overflow.

Conditions Where Measure Applies

Where heavy equipment must be moved from one side of a stream channel to another or where light-duty construction vehicles must cross the stream channel frequently for a short period of time.

Planning Considerations

Careful planning can minimize the need for stream crossings. Try to avoid crossing streams. Whenever possible, complete the development separately on each side and leave a natural buffer zone along the stream. Temporary stream crossings are a direct source of water pollution; they may create flooding and safety hazards; they can be expensive to construct; and they cause costly construction delays if washed out.

Select locations for stream crossings where erosion potential is low. Evaluate stream channel conditions, overflow areas, and surface runoff control at the site before choosing the type of crossing. When practical, locate and design temporary stream crossings to serve as permanent crossings to keep stream disturbance to a minimum.

Plan stream crossings in advance of need and, when possible, construct them during dry periods to minimize stream disturbance and reduce cost. Ensure that all necessary materials and equipment are on-site before any work is begun. Complete construction in an expedient manner and stabilize the area immediately.

When construction requires dewatering of the site, construct a bypass channel before undertaking other work. If stream velocity exceeds that allowed for the in-place soil material, stabilize the bypass channel with riprap or other suitable material. After the bypass is completed and stable, the stream may be diverted.

Unlike permanent stream crossings, temporary stream crossings may be allowed to overtop during peak storm periods. However, the structure and approaches should remain stable. Keep any fill needed in flood plains to a minimum to prevent upstream flooding and reduce erosion potential. Use riprap to protect locations subject to erosion from overflow.

Stream crossings are of three general types: bridges, culverts, and fords. Consider which method best suits the specific site conditions.

Bridges - Where available materials and designs are adequate to bear the expected loadings, bridges are preferred for temporary stream crossing.

Bridges usually cause the least disturbance to the streambed, banks, and surrounding area. They provide the least obstruction to flow and fish migration. They generally require little maintenance, can be designed to fit most site conditions, and can be easily removed and materials salvaged. However, bridges are generally the most expensive to design and construct. Further, they may offer the greatest safety hazard if not adequately designed, installed, and maintained, and if washed out, they cause a longer construction delay and are more costly to repair.

In steep watersheds it is recommended to tie a cable or chain to one corner of the bridge frame with the other end secured to a large tree or other substantial object. This will prevent flood flows from carrying the bridge downstream where it may cause damage to other property.

Culvert Crossings - Culverts are the most common stream crossings. In many cases, they are the least costly to install, can safely support heavy loads, and are adaptable to most site conditions. Construction materials are readily available and can be salvaged. However, the installation and removal of culverts causes considerable disturbance to the stream and surrounding area. Culverts also offer the greatest obstruction to flood flows and are subject, therefore, to blockage and washout.

Fords - Fords made of stabilizing material such as rock are often used in steep areas subject to flash flooding, where normal flow is shallow (less than 3 inches deep) or intermittent. Fords should only be used where crossings are infrequent. Fords are especially adapted for crossing wide, shallow watercourses.

When properly installed, fords offer little or no obstruction to flow, can safely handle heavy loadings, are relatively easy to install and maintain, and, in most cases, may be left in place at the end of the construction.

Problems associated with fords include the following. (1) Approach sections are subject to erosion. Do not use fords where bank height exceeds 5 feet. (2) Excavation for the installation of the riprap-gravel bottom and filter material causes major stream disturbance. In some cases, fords may be adequately constructed by shallow filling without excavation. (3) The stabilizing material is subject to washing out during storm flows and may require replacement. (4) Mud and other contaminants are brought directly into the stream on vehicles unless crossings are limited to no flow conditions.

Design Criteria

In addition to erosion and sedimentation control, structural stability, utility, and safety must also be taken into consideration when designing temporary stream crossings. Bridge designs, in particular, should be undertaken by a qualified engineer.

The anticipated life of a temporary stream crossing structure is usually considered to be 1 year or less. Remove the structure immediately after it is no longer needed.

As a minimum, design the structure to pass bankfull flow or peak flow, whichever is less, from a 2-year peak storm, without over topping. Ensure that no erosion will result from the 10-year peak storm.

Ensure that design flow velocity at the outlet of the crossing structure is nonerosive for the receiving stream channel.

Consider overflow for storms larger than the design storm and provide a protected overflow area.

Design erosion practices associated with the stream crossing to control erosion from surface runoff at the crossing and during a 10-year peak storm runoff.

Plans and Specifications

Plans for constructing and installing the stream crossing shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve the intended purpose.

Specifications for installing the stream crossing shall use or be in conformance with the following. Any variation from these specifications shall be approved by an engineer.

1. Installation

Keep clearing and excavation of the stream banks, bed, and approach sections to a minimum.

Divert all surface water from the construction site onto undisturbed areas adjoining the stream. Line unstable stream banks with riprap or otherwise appropriately stabilize them.

Keep stream crossings at right angles to the stream flow. This is particularly important when culverts are used.

Align road approaches with the center line of the crossing for a minimum distance of 30 feet. Raise bridge abutments and culvert fills a minimum of 1 foot above the adjoining approach sections to prevent erosion from surface runoff and to allow flood flows to pass around the structure.

Stabilize all disturbed areas subject to flowing water, including planned overflow areas, with riprap or other suitable means if design velocity exceeds the allowable for the in-place soil.

Ensure that bypass channels necessary to dewater the crossing site are stable before diverting the stream. Upon completion of the crossing, fill, compact, and stabilize the bypass channel appropriately.

Remove temporary stream crossings immediately when they are no longer needed. Restore the stream channel to its original cross-section, and smooth and appropriately stabilize all disturbed areas.

2. Maintenance

Inspect temporary stream crossings after runoff-producing rains to check for blockage in channel, erosion of abutments, channel scour, riprap displacement, or piping. Make all repairs immediately to prevent further damage to the installation.