ILLINOIS URBAN MANUAL
PRACTICE STANDARD

TEMPORARY STREAM CROSSING

(no.)

CODE 975

Source: Hey and Associates, Inc.

DEFINITION

A bridge or culvert crossing installed across a stream or watercourse for short-term use by construction equipment and traffic.

PURPOSE

The purpose of this practice is to minimize or limit the impact of Temporary Stream Crossings that enable construction traffic to cross streams or watercourses. The intent is to minimize, to the extent practicable, the discharge of erodible soil into the waterway, the damage or alteration of the stream banks and stream channel, the adverse alteration of flood flows, and the impact to stream flora and fauna.

CONDITIONS WHERE PRACTICE APPLIES

1. Where any construction equipment must be moved from one side of a stream channel to another, and/or where construction traffic must cross the stream channel for a short period of time.

2. Where an existing permanent stream crossing is not available.

3. Where no endangered or threatened species are present that would be impacted by the crossing.

4. Where the stream bed can support culverts, or where stream banks can support a bridge.

5. Where the drainage area is one square mile or less in an urban/suburban watershed, or ten (10) square miles or less in a rural watershed.

6. Where riparian wetlands along the stream channel would not be impacted by the temporary crossing unless compensatory

mitigation or credits are purchased or restored in accordance with any permits.

7. Where the temporary crossing can be removed within a year or less.

8. Where crossing intermittent or flowing streams, and non-navigable waters.

9. Where there are no underlying utilities.

More exacting and site-specific engineering analysis and design than contained in this standard shall be used for crossing streams with larger tributary drainage areas (as defined above) or as dictated by site-specific conditions such as base flow, or local regulations.

CRITERIA

Professional engineering analysis and design shall be completed for all temporary stream crossings.

Temporary stream crossings shall be designed to be overtopped by high flows or by debris or ice-laden flows.

Design the crossing to pass the peak flow from a 2-year frequency, 24-hour duration storm event (using ISWS Bulletin 70 rainfall data and applicable local rainfall data requirements). The design shall include a designated overflow route for storm events greater than the 2-year frequency, 24-hour duration storm event and provide a protected overflow path.

In cases where channel banks are overtopped by this design storm event, the crossing structure shall be designed and constructed such that it will not cause erosion or damage due to increases in water surface profiles to adjacent properties.

The design capacity of the crossing structure shall not create a damaging or potentially damaging increase in flood heights (<0.10 feet) or velocities over existing conditions.

It shall not create a threat to public health, safety and welfare, or impair the natural hydrologic functions of the floodplain or channel.

Erosion and sediment control, structural stability, utility protection, and overall safety must all be evaluated when designing temporary stream crossings.

Approach grades to the temporary crossing shall be less than 10%.

The width of the crossing shall be sized to the vehicles using the crossing and to prevent spillage directly into the stream.

Placement of temporary structures in or over a surface water will likely require permits from state, local, and/or federal regulatory agencies. Local, state or federal requirements supersede and may go beyond the criteria in this standard.

Temporary stream crossings represent channel constrictions in most cases and thus they shall be in service for the shortest practical period of time and shall be removed as soon as their purpose is complete to avoid the potential to cause or exacerbate flooding.

Select locations for stream crossings where erosion potential is low by evaluating channel geometry, slopes and side slope material. Evaluate the stream channel conditions, overflow areas, and surface runoff control at the site before choosing the location and type of crossing.

Ensure that velocity at design flow at the outlet of the crossing structure is non-erosive for the receiving stream channel. This shall be accomplished by carefully evaluating the placement of the crossing, the size of the downstream opening in the crossing, and flow velocities under all conditions.

Aggregate used for the roadway approach and crossing shall be properly sized based on expected flows and velocities. A minimum layer of stone or recycled concrete that is ½ the diameter of the culvert pipe or 12 inches thick, whichever is greater shall be used. Aggregate meeting one of the following IDOT coarse aggregate gradations: CA-1, CA-2, CA-3 or CA-4 shall be used unless conditions warrant larger material. The aggregate used shall be sized to meet site specific conditions to ensure stability in the design storm event.

The aggregate shall be placed on geotextile fabric meeting the requirements in Material Specification **GEOTEXTILE 592** Table 2, class I, and/or the appropriate IDOT material specification.

Streams shall be crossed in a straight reach, rather than on a bend, if possible. Crossings shall be installed as close to perpendicular to the stream channel flow path as possible.

Ensure that all necessary materials and equipment are on-site before any work is begun. Complete construction in an expedient manner so that the crossing can be removed and then any disturbed areas stabilized immediately.

Equipment or vehicles shall not be stored on the crossing.

Upon removal of the crossing, the portion of the side slope that is above the observed water elevation shall be stabilized as specified in the plans prior to accepting flows. The substrate and toe of slope that has been disturbed due to construction activities shall be restored to proposed or pre-construction conditions and fully stabilized prior to accepting flows.

Limit the area of ground disturbance and implement appropriate soil erosion and sediment control measures. Alteration to the stream banks and bed shall be kept to the minimum necessary for an effective and safe crossing.

Fish passage shall be evaluated when crossing a stream with aquatic life, which may require an assessment of what is present in the stream. Timing of crossing activities shall avoid impacting fish spawning runs. Impacts to mussel beds and endangered or threatened species shall be avoided.

Plans and specifications shall be followed by the site superintendent and field personnel during the construction process.

Stream crossings are of two general

types:

1. bridges
2. culverts

Determine which method best suits the specific site conditions.

Bridges

Bridge designs shall be completed by an Illinois Licensed Structural Engineer.

Materials and designs shall be adequate to bear the expected loading. This requires site-specific engineering analysis.

The design adequacy of the bridge supports shall be based on site soil borings and geotechnical evaluation.

Bridges shall be properly supported and anchored to prevent, at a minimum, settlement, uplift, and overturning. The design evaluation shall include hydraulic loading, impact loading, and live loads.

Culvert crossings

If not sized correctly, culverts can offer the greatest obstruction to flood flows and are subject to blockage and washout. Culverts shall be sized and materials specified based on site-specific conditions and meet all flow criteria described above.

Culverts shall be installed with the inverts at the same elevation as the stream bed to allow for fish passage and to maintain low flow conditions. This may involve slight excavation of the channel bed to place a riprap base and then set culvert inverts at the proper elevation relative to the streambed.

The downstream invert of the culvert shall be lower than the upstream invert to allow for positive drainage at low flow conditions.

Both the length and diameter of the culvert must be determined in the design. Multiple pipes shall be evaluated to provide adequate flow capacity while keeping the vertical height of the crossing at a minimum.

Aggregate cover over the culvert pipes shall be at least ½ the diameter of the pipe, or 12 inches thick, whichever is greater, to support anticipated loads.

CONSIDERATIONS

Careful planning can minimize the need for stream crossings. Use existing crossings whenever possible. Consider completing the project on each side of the watercourse separately and leaving a natural buffer zone intact along the stream.

Most projects that impact surface waters require permits, and it may take several months to obtain the necessary permits. A temporary stream crossing may be considered an impact under local, state or federal regulations. Advance planning can help avoid costly permitting delays.

If a temporary stream diversion is needed to divert flow during the installation of a temporary stream crossing, Practice Standard **TEMPORARY STREAM DIVERSION 976** shall be followed.

Bridges usually cause the least disturbance to the streambed, banks,

and surrounding area. They provide the least obstruction to flow and fish passage. They generally require little or no maintenance, can be designed to fit most site conditions, and can be easily removed. 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.

Temporary bridges can be constructed of wood, steel, or pre-cast concrete. They can be pre-fabricated or constructed on site.

Culverts are the most commonly used temporary stream crossing. 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 often be salvaged for reuse.

The installation and removal of culverts can cause considerable disturbance to the stream and surrounding area if not done properly.

In-stream construction projects such as utility crossings, may include a temporary stream crossing, but will likely include other in-stream work with their own set of considerations and criteria.

To the extent possible, work that requires a temporary stream crossing should be timed to take place during low or no-flow conditions.

When practical and if applicable, locate temporary stream crossings where permanent crossings will be constructed to minimize the total area of disturbance.

PLANS AND SPECIFICATIONS

Plans and specifications for temporary stream crossings shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. At a minimum include the following items:

1. The location of the crossing.
2. Required material specifications.
3. Crossing geometry and dimensions.
4. Any necessary engineering design for flow capacity and loading considerations.
5. Removal and restoration plan.
6. Soil erosion and sediment control plan.
7. Soil boring and geotechnical analysis to determine bridge support design/capacity if needed.

All plans shall include installation, inspection, and maintenance schedules with the responsible party identified.

OPERATION AND MAINTENANCE

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

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.

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August 2015