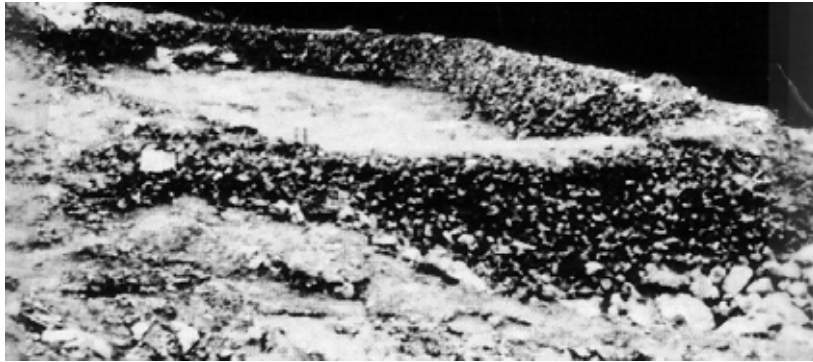


# CHAPTER 4. SPECIAL CONDITION EROSION CONTROL MEASURES

## 4.1 INFILTRATION BASIN AND TRENCH



**Figure 4.1. Infiltration basin and trench (Source: Department of Civil, Construction, and Environmental Engineering, Iowa State University)**

### Overview

**Description:** A depressed area formed by the removal of overburden to expose a porous or sandy soil that allows the flow of runoff water to be absorbed.

**Problem identification:** Storm water runoff needs to be disposed of. An infiltration basin or trench is used when the quantity of runoff water is small, the drainage area is less than one acre, and there is an area within the construction site in which the subsoil is sand.

**Design purpose:** A practical way of disposing of small quantities of storm runoff when the runoff is free of pollutants.

**Associated practices:** The infiltration basin or trench serves as the outlet of a waterway and is used for disposal of runoff water.

**Installation:** The overburden is removed to form a basin or a trench and to expose the porous soil. Care must be taken when the overburden is removed so that it is not disposed of in an area on the site where it will be eroded into the infiltration structure. The basin or trench should provide an estimated 35 cu yd of storage space per acre.

**Maintenance/inspection:** Inspect after each precipitation event. Remove weeds and debris, keep the basin or trench free of vegetative growth, and keep sediment out of the area.

**Design life:** Two to five years.

**Estimated cost:** Basin or trench costs \$210.00 for each option.

## 4.2 RETENTION POND



**Figure 4.2. Retention pond (Source: Department of Civil, Construction, and Environmental Engineering, Iowa State University)**

### Overview

**Description:** A permanent pool of water that has the capacity to store storm water temporarily until it is released from the structure.

**Problem identification:** A retention pond interrupts the transport phase of sediment and pollutants, store storm water, and improve the quality of water when released.

**Design purpose:** To reduce sediment, improve water quality, and store storm water runoff. Retention ponds are one of the better management practices for the handling of storm water runoff.

**Associated practices:** Used with sediment basins and waterways. With additional planning and design, detention ponds can be used for water quality improvement. Pollutants will be diluted when held or delayed in a retention pond. Retention ponds are also used for silt control and improvement of the runoff water quality.

**Installation:** The site for a retention pond should have suitable soils to prevent excessive seepage. The drainage area for a detention pond must be large enough to provide a permanent pool. Generally, four acres are required for each acre-foot of storage in the pond. Smaller drainage areas function best as a means of sediment control while maintaining a permanent pool. A qualified designer is recommended.

**Maintenance/inspection:** Retention ponds need to be monitored on a regular basis. Look for excessive seepage, the condition of the fill, and the amount of sediment present. Necessary

repairs to the structure should be done as soon as possible. Sediment should be removed when it is 1 to 1.5 ft deep. It should be placed in an area where it will not reenter the system. Grass should be mowed, weeds controlled, eroded areas repaired, and debris removed. Prompt repair action can reduce maintenance costs.

*Design life:* Ten years, based on sediment control.

*Estimated cost:* Variable, depending on the pond's size and effectiveness.

## 4.3 SERRATED CUT



**Figure 4.3. Serrated cut (Source: Department of Civil, Construction, and Environmental Engineering, Iowa State University)**

### Overview

**Description:** Serrated cut or stair-step grading used in soils containing large amounts of soft rock where it may be impractical to smooth grade.

**Problem identification:** Soft rock in cut areas prevents the area from being sloped to allow vegetation to be established after grading is complete.

**Design purpose:** Each step catches material from above and provides a flat area where vegetation can become established.

**Associated practices:** Used in soft rock when it is difficult to obtain a smooth slope.

**Installation:** Each step shall be constructed on the contour and will have steps at nominal 2 ft intervals with nominal 3 ft horizontal shelves. Steps may vary, depending on the slope ratio. The nominal slope line is 1.5:1. The steps will weather and act to hold seed and fertilizer and will produce quicker and longer-lived vegetative cover, as well as better slope stabilization. Surface water should be diverted from the face of all cuts.

**Maintenance/inspection:** Check on a monthly basis for any loose rock and any runoff flows that are detrimental to the finished product. Remove and dispose of loose rock and make any drainage corrections.

**Design life:** Permanent.

**Estimated Cost:** Costs are based on the material type to be excavated and the equipment selected for the construction.

## 4.4 TEMPORARY STREAM CROSSING



Figure 4.4. Temporary stream crossing (Source: F. X. Browne, Inc.)

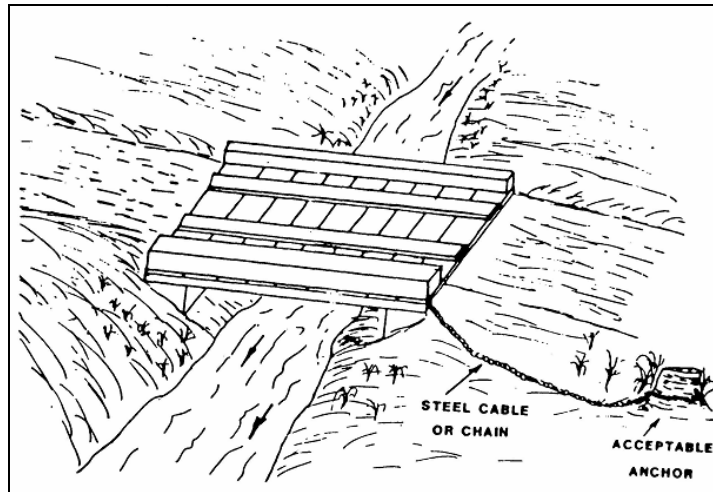


Figure 4.5. Temporary bridge for construction equipment access (Source: Department of Civil, Construction, and Environmental Engineering, Iowa State University)

## Overview

**Description:** A temporary structure, such as a bridge or pipe, installed across a flowing stream or waterway for use by construction equipment.

**Problem identification:** A crossing method is needed to prevent streambank damage and to control sediment where existing waterways must be crossed during construction.

**Design purpose:** To provide a structure large enough to carry a full bank flow without appreciably altering the stream flow characteristics.

**Associated practices:** Required when construction is necessary across a small stream with flowing water.

**Installation:** A bridge is considered more practical than pipes. If pipes are used, they should adequately carry the flow of water. The drainage area should be less than one sq mi. For larger drainage areas, a professional engineer should prepare the design.

Only rock can be used for backfill within the channel limits of the stream. The minimum width of roadway surface shall be 12 ft. The structure shall be removed within 14 days after the structure is no longer needed.

A permit may be required from the Department of Natural Resources to cover installation and removal of the crossing.

**Maintenance/inspection:** Inspect daily to prevent damage to the stream. After high-water events, the crossing should be carefully reviewed for any damage. All damage to the crossing shall be repaired at once.

**Design life:** Temporary; to be removed 14 days after it is no longer needed.

**Estimated cost:** Costs vary with materials used in the crossing construction.

## 4.5 WETLANDS



**Figure 4.6. Urban wetlands (Source: Department of Civil, Construction, and Environmental Engineering, Iowa State University)**

### Overview

**Description:** An important control measure for the removal of sediment, nutrients, and urban pollutants by passing runoff water through a constructed wetland area. Nutrients can be taken up and stored by wetland vegetation on a short-term basis. For a longer period of time, vegetation may remove nutrients and then lose them in the sediment below. Dense wetland vegetation also slows the flow of sediment-laden water. The slower the water, the greater the amount of sediment that sinks to the bottom along with the nutrients that become buried.

**Problem identification:** Some erosion planning can be used to provide long-term retention of runoff during and after construction for sediment collection and water quality improvement as part of a large-area water runoff control plan.

**Design purpose:** To effectively remove sediment, nutrients, and urban pollutants and release an improved quality of water from the site.

**Associated practices:** Built in conjunction with new permanent waterways and ditches for disposal of runoff. Note that natural wetlands should not be altered in any way. Any alterations to existing wetlands for use in construction site erosion control will require the review and approval of the Iowa Department of Natural Resources.

**Installation:** A successful wetland needs to be about 3% of the size of the drainage area. About 25% of the wetland needs to be 2 to 3 ft deep and the remainder needs to be 1 ft deep. All areas 2 ft deep or deeper will remain open water, while the remaining 1 ft deep areas will support vegetation. A good seal at the bottom of the wetland area is required.

The major concern with wetland treatment is damage that may be done environmentally to a natural wetland. Concern is also present for the large land area required for constructed wetlands.

Note that a permit is required from the Department of Natural Resources.

***Maintenance/inspection:*** Check for excess seepage and water level and repair any damage.

***Design life:*** Twenty-five years or longer, depending on maintenance activities.