

## 3.12 ROCK OUTLET PROTECTION



Figure 3.24. Rock outlet protection (Source: Iowa DOT)

### Overview

**Description:** A structurally lined apron or other energy dissipating device placed at the outlet of a drainage pipe.

**Problem identification:** Scour at pipe outlets needs to be prevented and the potential for downstream erosion needs to be reduced by slowing the velocity of concentrated storm water flow.

**Design purpose:** To reduce the velocity of the flow from the outlet of a pipe before the water enters the receiving channel to reduce erosion and prevent scour.

**Associated practices:** This condition applies to all pipes and paved channel sections where the outlet's velocity of flow at design capacity exceeds the velocity of the receiving channel. This method can also be used as way to reduce water energy and velocity in the case of level spreaders.

**Installation:** Structurally lined aprons at the outlets of pipes and paved channel sections should be designed according to the guidelines found in the SUDAS Design Manual, Chapter 7, Section 7E-18, Rock Outlet Protection.

**Maintenance/inspection:** Periodic inspection is required. Repair as necessary.

**Design life:** Temporary or permanent.

**Estimated cost:** Riprap costs \$32.20 per ton.