Flared Culvert End Sections



Description

Devices placed at the inlet or outlet of pipes and channels to enhance hydraulic operation while minimizing scour and erosion.

Applications

- Flared culvert end sections may be placed at inlets and outlets of slope drains and culverts.

Installation and Implementation Requirements

- Construct on level ground where possible. Flatter slopes reduce the potential of erosion and scour.
- Supplement with additional outlet protection devices.
- Protect the transition to the flared end section at inlets to prevent scouring.
- Extend additional rip-rap downstream of outlet to reach stable conditions and minimize scouring. Ensure geotextile filter fabric is installed under rip-rap.
- All disturbed areas must be immediately stabilized with native vegetation once construction is complete.



Additional rip-rap with geotextile filter fabric installed underneath can be extended downstream of outlet to reach stable conditions and minimize scouring.

Flared Culvert End Sections

Installation and Implementation Requirements *(continued)*

- Monitor accumulation of debris and sediment and remove within 60 days of notification. Immediately clean culverts located where Class AA or Class 1 waters or highway safety may be adversely affected. Refer to Hawaii Administrative Rules (HAR) Title 11, Chapter 54 for state waters classification.
- Obtain guidance from the District Maintenance Engineer or Highways Division's Hydraulic Section and refer to Highways Division's Standard Plans.

Considerations

- Limited use as an erosion control measure. Primarily used to increase hydraulic efficiency.
- Improperly designed culverts could result in erosion, scouring, or ponding.
- Pipes can clog if they are not adequately protected from litter.
- Pipe outlets may cause critical levels of erosion if devices are not installed to dissipate the velocity of storm water flow.
- Additional erosion control BMPs will need to be added to slope drains on slopes greater than 10%, due to highly erosive velocities.
- The contractor may need to temporarily remove rip-rap to repair/replace geotextile filter fabric under rip-rap.

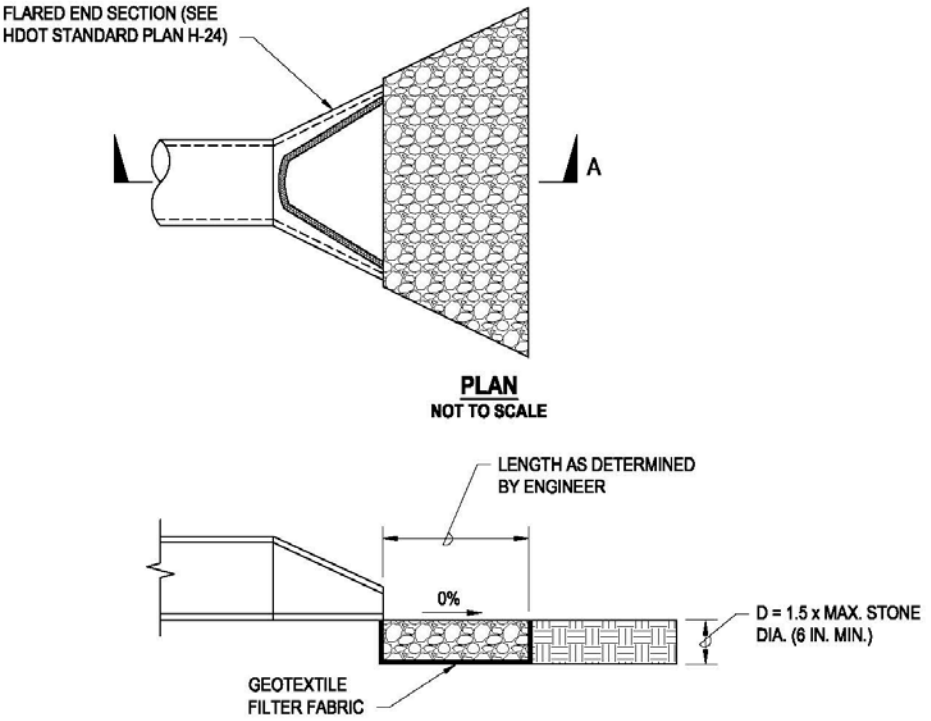
What to Inspect

- Is flared culvert end section installed correctly, per manufacturer's specifications?
- Is there evidence of scour around and beneath flared culvert end sections?
- Is there a non-storm water discharge observed from pipes?
- Is ponding occuring in traffic lanes or private property?
- Is geotextile filter fabric installed under rip-rap?

Maintenance

- Remove accumulated sediment from inlets, outlets, and rip-rap.
- Refresh rip-rap that has been dislodged.
- Add additional BMPs if erosion and scouring are observed.
- Repair geotextile filter fabric that has rips and/or tears.
- Remove temporary BMPs when drainage area is stabilized and construction is complete.

Flared Culvert End Sections



FLARED CULVERT END SECTION