

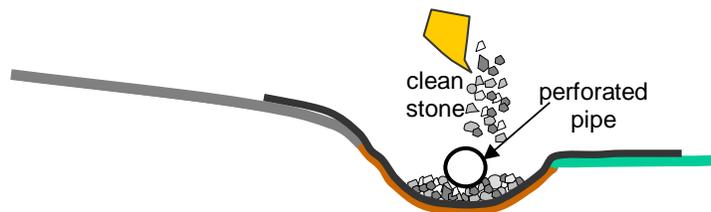
## Installation Sequence

The following illustrates the installation of a constructed stone underdrain using perforated pipe surrounded by clean stone and wrapped in geotextile fabric. In this example, the underdrain was placed in the existing ditch prior to raising the road profile. Where the elevation of the road will not be raised, you may have to excavate and place the underdrain in the new trench. In extremely wet areas, it may be beneficial to install underdrain under the road surface as well as in the ditches.

- 1 Place geotextile fabric in the ditch where underdrain is to be installed. (excavation may be required first)



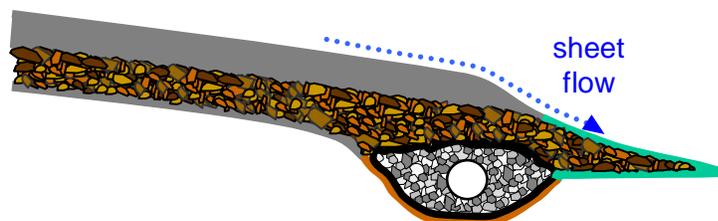
- 2 Lay down a bed of clean stone and, if desired, unroll a perforated pipe on top of it. Cover the pipe with clean stone.



- 3 Wrap the fabric around the stone to fully encase the drain.



- 4 Place fill material over the underdrain. If road is not being filled, use excavated material to fill trench over top of drain.



- 5 Outlet the downhill end of the underdrain to a stable area separate from road surface drainage.



## Types of Underdrains

All underdrains are designed to collect and transport subsurface water away from the road area. The type of underdrain used will depend on site conditions such as hydrology, soil properties and road characteristics.

### Prefabricated Underdrains

In most cases, prefabricated underdrains are the cheapest to purchase and easiest to install. They usually consist of a perforated plastic pipe wrapped in geotextile fabric (see picture at right). The permeable fabric allows water to pass through while keeping fine material from clogging the underdrain. Prefabricated underdrains typically come in 4" to 6" diameters, but many types are available.

#### Where to use:

Wet areas where the clay content of the soil is low. Because of their small size, they are also useful where there is not enough room to excavate.

#### Advantages:

- Inexpensive and easy to install
- Can be installed with a trenching machine

#### Disadvantages:

- Collects less water than constructed drains
- Will clog more readily than constructed underdrains
- Use is limited to soils with low clay content



This prefabricated underdrain is a perforated pipe with a geotextile fabric sleeve around it. Road fill will be placed directly on top of this underdrain.

### Constructed Stone Underdrains

Constructed underdrains typically consist of clean, free-draining stone that is wrapped in fabric. These are sometimes called French drains and are widely used. To increase capacity, a perforated pipe can be included within clean stone (see picture at right).

#### Where to use:

Wet areas where the clay content of the soil is high. They are also useful in extremely wet conditions where a prefabricated underdrain may not be sufficient for the high volume of water.

#### Advantages:

- Collects and carries more water
- Adjustable size and shape for site conditions
- Can be used with clay soils because of larger surface area of the drain

#### Disadvantages:

- More expensive and time consuming to install
- Requires additional excavation or fill material



The underdrain above is under construction. It is constructed of perforated pipe, bedded in clean stone and wrapped in fabric. Road fill will be placed directly on top of this underdrain.