

TRENCH EXCAVATION AND BACKFILL ENVELOPE

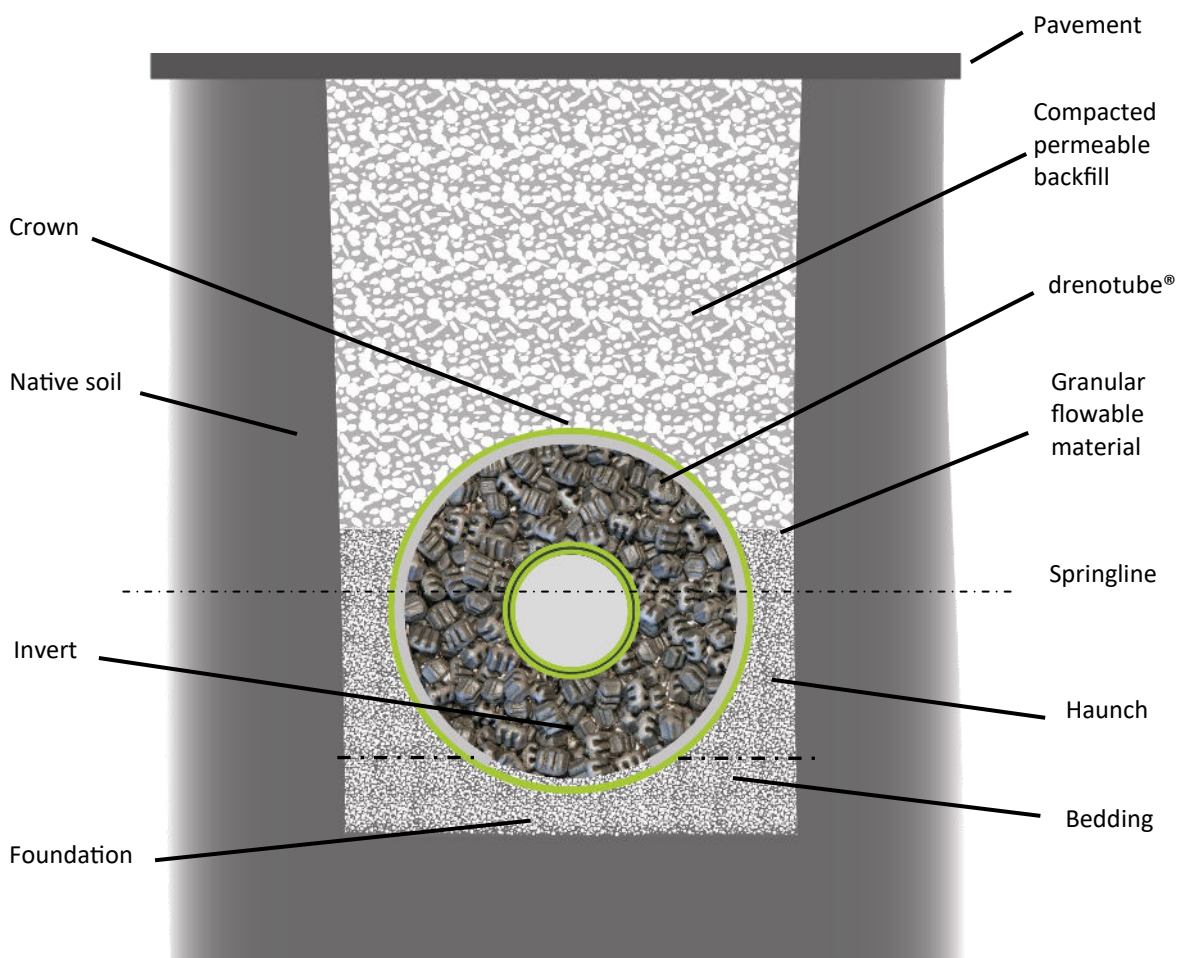


Trench needs to be just wide enough to place drenotube® and compact backfill around the entire segment. Increasing the trench width increases the soil load on the pipe. A minimum trench width is needed to ensure working space to properly and safely place and compact embedment materials.

Trench widths are often determined by the bucket size available for the excavator.

The strength of a pipe system shall be considered a combination of the pipe itself and the backfill envelope. Undisturbed native soil from a trench wall often provides additional support.

Sand bedding is recommended in cases where fine soil particles can be absorbed from the bottom of the trench into the pipe. In most of the cases drenotube® does not need bedding and can be settled directly on a firm sloped (drainage application) foundation.



Haunch is the volume of material backfilled on each side between the pipe and trench wall, covered from the top of the bedding up to the springline. Haunching, is the most important layer since it provides the pipe with support against the soil and traffic loads. A proper flowable and permeable material must be inserted into haunch area. Tamp or shovel by layers into the area to achieve the required compaction up to the springline.

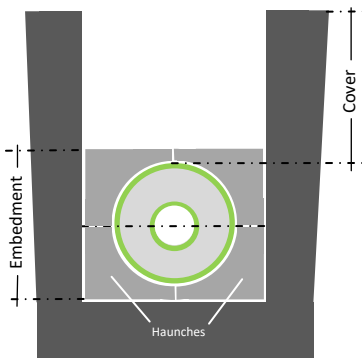
The purpose of the backfill envelope is to provide support to the segment. If properly constructed the loads are distributed across the crown of the pipe to the material along the sides and then to the pipe bedding and foundation. This load arching effect reduces the total load acting on the segment.



The backfill material and level of compaction will determine the load-carrying ability of the pipe/backfill system.

In general, backfill material should be of an aggregate nature, permeable and able to be compacted. A variety of materials, including some native soils, meet these requirements.

During installation and to avoid soil entering through the opening at the bottom of the drenotube® is advisable to ensure no water in the trench. It may be necessary to provide sump pumps and well points to dewater while installing. Excessive groundwater obstructs proper placement and compaction of bedding and backfill.



The embedment resists the deflection of the pipe due to load when properly backfill material is compacted by layers especially the haunching.

Using native soil avoids environmental impact of aggregate quarrying and saves cost of imported backfill and hauling of excavated material off site.

The minimum backfill cover shall be 40 cm for non trafficked areas.

When no pavement is installed, but vehicle traffic is expected (e.g. gravel driveway), a minimum cover of 0,8 m will be required. However, it is important to calculate the load acting on the drenotube® and never exceed our performance statement.

Normally pressure on the drenotube = P-soil + P-water + P-vehicles

P-soil = pressure caused by the weight of the soil above the drenotube®

P-water = hydrostatic pressure caused by the weight of the water above the drenotube®

P-vehicle = pressure caused by the vehicle load.

drenotube®	Minimum cover cm non trafficked area	Minimum cover cm trafficked area	Max pressure kPa	Max depth m	Trench width cm
DR300SN04 / IF300SN04	40	80	60	3	40 - 45
DR370SN04 / IF370SN04					50
DR300SN08 / IF300SN08	40	80	120	5	40 - 45
DR370SN08 / IF370SN08					50

Definitions

Foundation: is the material beneath the pipe.

Bedding: is the material placed in the bottom of the trench on which the pipe is laid.

Embedment: is the material placed to support the load on the pipe. Embedment resists the deflection of the pipe due to load.

Backfill: is the material used to refill the trench after the pipe and the embedment have been placed.

Cover: is the depth of backfill over the top of the pipe.

DRAINAGE DESIGN AND CONSTRUCTION SHOULD BE SUPERVISED BY SPECIALIZED ENGINEERS