

Sloped channels - For optimum hydraulic performance

HOW DOES SLOPE IN A TRENCH DRAIN AFFECT HYDRAULIC PERFORMANCE

Draining large flat pavements can be a challenge. Poorly designed drainage systems are not only ineffective at clearing surface water quickly, but can be difficult to maintain and cause slip hazards from ponding. A good design along with a hydraulically efficient drainage system can eliminate these hazards and provide a long lasting, durable solution that performs as intended.



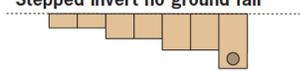
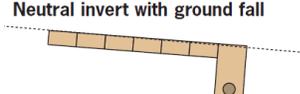
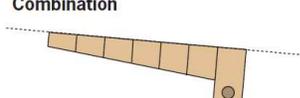
How to achieve optimum hydraulic efficiency?

There are a wide range of surface drainage systems for various applications, but when it comes to discharging surface water efficiently, it depends on how the trench drains are configured. These systems are designed to collect surface flows through the grate into channels that transport the flows to a point where it discharges into an underground pipe system or culvert. One key factor influencing the hydraulic performance of surface drainage systems is gravity and therefore the effect of ground slope and built-in slopes within the trench drain is critical.



How does the slope affect hydraulic performance?

As the degree of slope (fall) along the channel invert increases, the velocity of the flow within the trench drain will also increase resulting in a more hydraulically efficient trench drain. The slope can be introduced into the design of the trench drain by one or a combination of the following:

- | | |
|--|---|
| <p>Stepped invert no ground fall</p>  | 1. For flat pavements, introduce a stepped configuration using neutral channels with varying depths creating a stepped fall configuration |
| <p>Sloped invert with ground fall</p>  | 2. For flat pavements, introduce a slope along the base of the trench run using sloped channels with built-in falls to increase the invert depth |
| <p>Neutral invert with ground fall</p>  | 3. Existing pavement with natural ground fall using neutral channels with a constant depth resulting in an invert slope identical to the ground fall |
| <p>Combination</p>  | 4. Existing pavement with natural ground fall in combination with slope along the base of the trench run using sloped channels with built-in falls to further increase the invert depth |

Bulletin No.: TB201502
Date: 3 March 2015
Issued By: DC

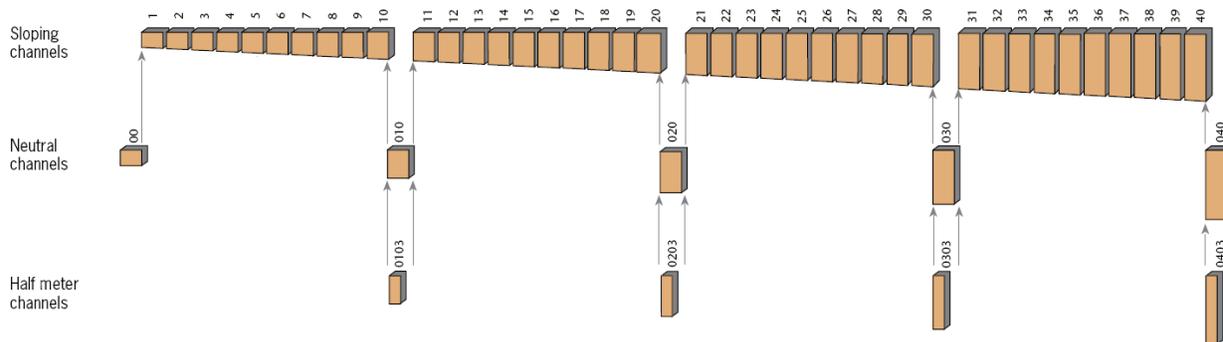
Introducing a stepped configuration has the least positive impact on a trench drain's hydraulic performance. This is because on flat level pavements, particularly with long runs, velocities are limited by significant lengths of neutral channels with no slope (fall).

In comparison, drainage runs comprising continuous sloped channels with built-in falls allow for positive drainage with greater flow velocities for optimum hydraulic performance.

ACO Drain offers channels with continuously sloped inverts for up to 40 metres in length with a 0.5% built-in slope (5 millimetres over 1 metre), in a range of widths and load classes. For more information on the ACO Drain range, click: <http://www.acodrain.com.au/index.htm>



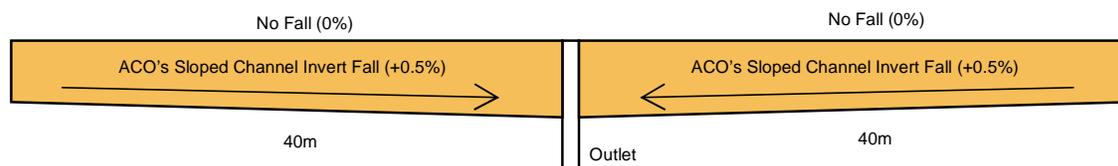
ACO Drain System Layout



Channel Run Flexibility

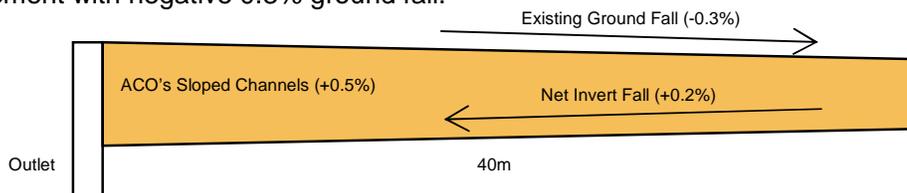
ACO's solution for flat pavements with no fall:

- Up to 40m of continuous 0.5% slope built-in to the channel invert
- 80m of 0.5% sloped channels with two 40m runs discharging into a central outlet



ACO's solution for pavements with negative fall up to 0.5% against the natural slope:

- Up to 40m of continuous 0.5% slope built-in to the channel invert can drain against a maximum negative fall of 0.5% resulting in a drain with a flat invert with no fall. Below is an example of a pavement with negative 0.3% ground fall.



ACO's Technical Service department can provide a recommendation for a sloped trench drain with optimum hydraulic performance. The online trench drain design request form can be accessed by clicking: http://www.acodrain.com.au/trench_request/trench_request.php

For more information on ACO's Technical Support click: <http://www.acodrain.com.au/technical-support.htm>