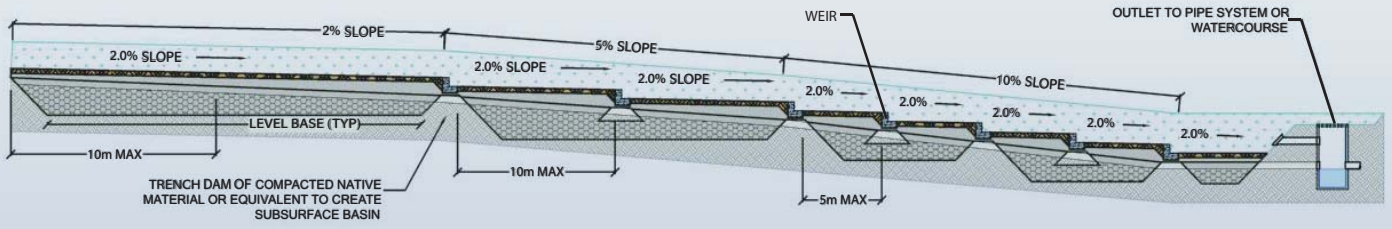
DESIGN PRINCIPLES

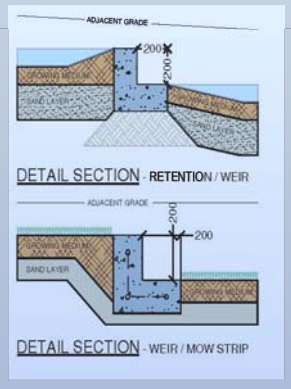
- Literature suggests swale areas of about 10-20% of upstream impervious area. For GVRD, calculate swale area by continuous flow modelling.
- Flow to the swale should be distributed sheet flow, travelling through a grassy filter area at the swale verges. Provide pre-treatment and erosion control to avoid sedimentation in the swale.
- Provide a 25mm drop at the edge of paving to the swale soil surface, to allow for positive drainage and buildup of road sanding/organic materials at this edge.
- Swale planting is typically sodded lawn. Low volume swales can be finished with a combination of grasses, shrub, groundcover and tree planting.
- Swale bottom - flat cross section, 600 to 2400mm width, 1-2% longitudinal slope or dished between weirs.
- Swale side slopes - 3(horizontal):1(vertical) maximum, 4:1 preferred for maintenance.
- Weirs to have level top to spread flows and avoid channelization, keyed in 100mm minimum.
- Maximum ponding level - 150mm. Drawdown time for the maximum surface ponded volume - 24 hours.
- Treatment soil depth - 450mm desirable, minimum 150mm if design professional calculates adequate pollutant removal.
- Design stormwater conveyance using Manning's formula or weir equations whichever governs with attention to channel stability during maximum flows.
- Drain rock reservoir and underdrain may be avoided where infiltration tests by a qualified professional, taken at the depth of the proposed infiltration, show an infiltration rate that exceeds the inflow rate.

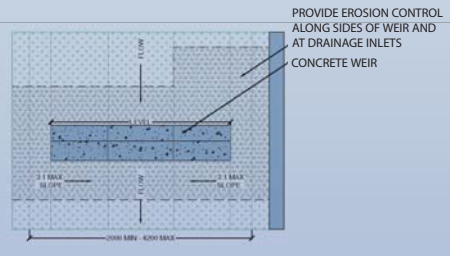


INFILTRATION SWALE

Not To Scale

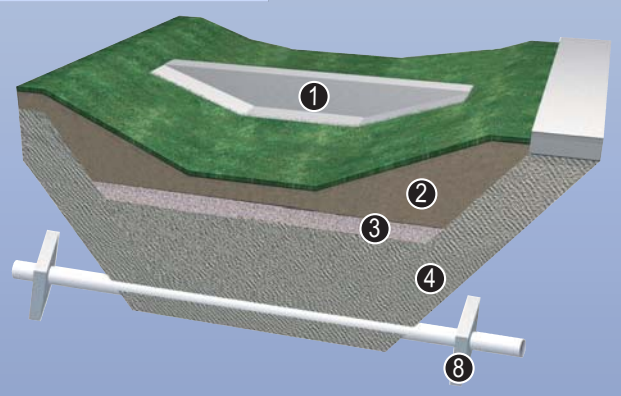
Longitudinal Profile





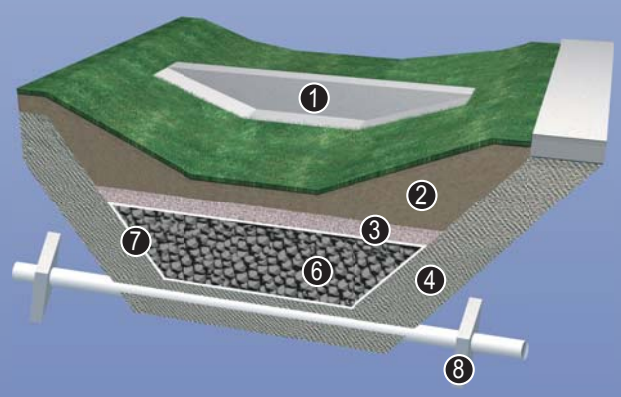
PLAN

An **Infiltration Swale** is a shallow grassed or vegetated channel designed to capture, detain and treat stormwater and convey larger flows. It takes surface flows from adjacent paved surfaces, holds the water behind weirs, and allows it to infiltrate through a soil bed into underlying soils. The swale and weir structures provide conveyance for larger storm events to the storm drain system. Variations on designs include an underlying drain rock reservoir, with or without a perforated underdrain.



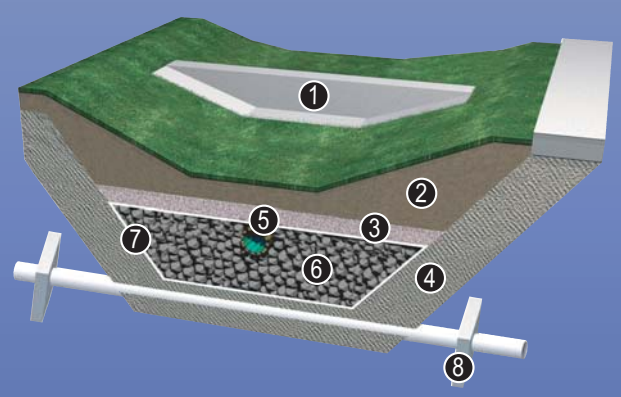
Full Infiltration

Where water entering the swale is filtered through a grass or groundcover layer, and then passes through sandy growing medium and a sand layer into underlying scarified subgrade. Suitable for sites with small catchments and subsoil permeability > 30mm/hr.



Full Infiltration with Reservoir

Designed to reduce surface ponding by providing underground storage in a drain rock reservoir. Suitable for sites with small catchments and subsoil permeability > 15mm/hr.



Partial Infiltration with Reservoir and Subdrain

Where a perforated drain pipe is installed at the top of the reservoir, providing an underground overflow that removes excess water before it backs up to the surface of the swale. Suitable for sites with larger catchments and low infiltration rates into subsoil permeability < 15mm/hr. Provides water quality treatment even if infiltration into subsoils is limited.

1. Weir Keyed into Swale Side Slope
2. Growing Medium (300mm Min.)
3. Sand
4. Existing Scarified Subsoil
5. Perforated Underdrain (150mm Dia. Min.)
6. Drain Rock Reservoir (300mm Min.)
7. Geotextile Along All Sides of Reservoir
8. Trench Dams at All Utility Crossing

Infiltration Swale System

Greater Vancouver Regional District

Stormwater Source Control Design Guidelines 2005

LANARC CONSULTANTS LTD

kwl

Goya Ngan
Landscape Architect

Detailed design guidelines can be found in the Design Guidelines 2005 report, available at www.gvrd.bc.ca