



Infiltration Overview

Natural or constructed depressions located in permeable soils that capture, store and infiltrate the volume of stormwater runoff associated with a particular design event.

Design Criteria:

- Contributing drainage area
- Underlying soil types
- Depth to the water table, bedrock or other impeding layer
- Proximity to buildings, drinking water supplies, Karst features, etc.
- Source of stormwater runoff



Lino Lakes City Hall - Infiltration trench
Lino Lakes, MN



Bradshaw Celebration of Life Center - underground storage & infiltration Stillwater, MN

Benefits

- Reduces volume of stormwater runoff
- Increases ground water recharge
- Improves surface water quality
- Provides thermal benefits (e.g. to cold water fisheries)
- Mimics pre-development hydrology

Limitations

- Unusual construction considerations
- Potential for ground water contamination
- Tendency to lose effectiveness over time due to clogging – if not properly constructed or maintained
- Not recommended for areas with steep slopes
- May require landscaping: consideration should be given to periods of inundation and drought

Description

In general terms, infiltration systems can be described as natural or constructed depressions located in permeable soils that capture, store and infiltrate stormwater runoff within 48 hours. These depressions can be located at the surface of the ground (e.g. infiltration basin) or they can be designed as underground facilities (e.g. structural chamber or excavated pit filled with aggregate such as an infiltration trench). Typically, infiltration systems are designed with one or more pre-treatment facilities or they are designed as off-line facilities.

Infiltration systems should be located in permeable soils and a minimum 3-foot distance is REQUIRED

from the bottom of the practice to the seasonally high water table, bedrock or other impeding layer per the Minnesota Pollution Control Agency Construction General Permit (CGP). Dry wells and Trenches should be designed to handle the smaller, more frequent rainfall events. Stormwater associated with the larger rainfall events should bypass these practices by a separate pipe or an overflow device. Infiltration basins and underground infiltration systems should be designed to handle both the water quality volume and as the water quantity volume.

Infiltration systems can be designed to address a number of stormwater management issues including: water quality, stormwater runoff reduction, flow attenuation, thermal impacts to cold water fisheries, and ground water recharge.

Maintenance Requirements

- Establishment of native vegetation may require weeding, watering, pumping, replacement of plants and tree/shrub trimming
- Inspection and removal of sediment accumulation
- Street sweeping of impervious areas adjacent to infiltration practices
- Avoid the application of fertilizer or herbicide in or near infiltration practices

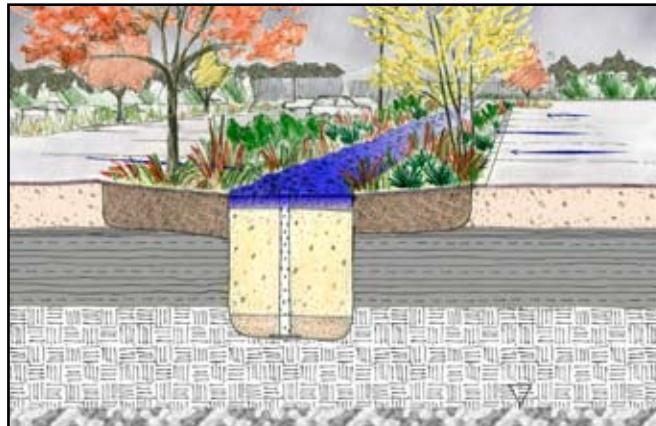
Infiltration Practices



SITE FACTORS

1/ 5/ 50 AC Max	Drainage Areas: Dry Well/ Trench/ Basin
20%	Max. Site Slope
3'	Min. Depth to Bedrock
3'	Min. Depth to Seasonally High Water Table
A,B,C*, & D*	NRCS Soil Type *C & D soils have limited infiltration ability but can be used to match pre-development conditions
Poor - Good	Freeze/ Thaw Suitability
NO	Potential Hotspot Runoff

STORM SEQUENCE



Start of Storm Event - Initial runoff & storage

MANAGEMENT SUITABILITY

High	Water Quality (V_{wq})
Med.	Channel Protection (V_{cp})
Low/Med.	Overbank Flood Protection (V_{p10})
Low	Extreme Flood Protection (V_{p100})
High	Recharge Volume (V_{re})

MECHANISMS

X	Infiltration
X	Screening/ Filtration
X	Temperature Control
	Settling
	Evaporation
X*	Transpiration *if vegetated
X	Soil Adsorption
X	Biological/ Micro. Uptake

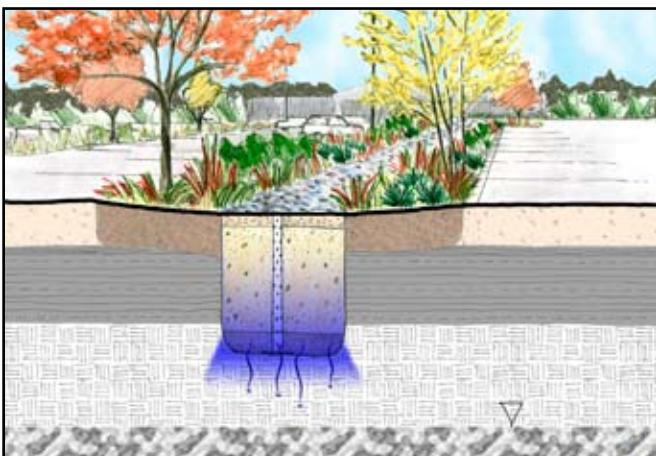
POLLUTION REMOVAL*

100%	Total Suspended Solids
100%/100%	Nutrients - Total Phosphorus/ Total Nitrogen
100%	Metals - Cadmium, Copper, Lead, and Zinc
100%	Pathogens - Coliform, Streptococci, E. Coli
100%	Toxins - Hydrocarbon

*This addresses only the impact on surface water, as there could be some transfer of pollution to the soil layer and groundwater



Duration of Storm Event - Storage & filtration/infiltration



Following Storm Event - Remaining storage drawdown

Courtesy of Rice Creek Watershed District