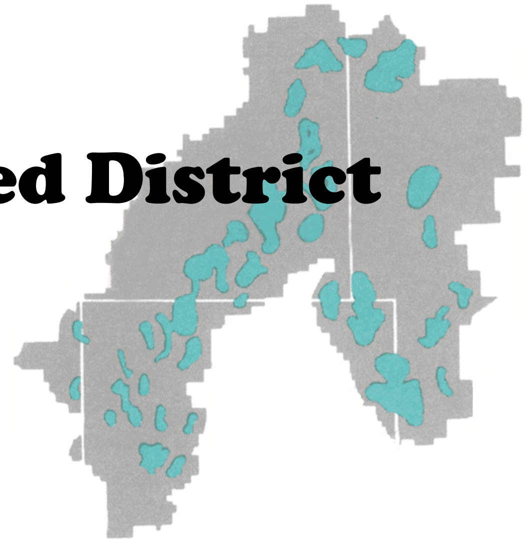

Rice Creek Watershed District

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Mission:
Prevent flooding and enhance water quality in harmony with development for the common good.

Stormwater Infiltration

Introduction

This document presents guidance for infiltration practices in the Rice Creek Watershed District. Historically, stormwater management in the District focused on controlling peak runoff rates. However, scientists and engineers now understand the need to also manage the volume of runoff. Management of runoff volume benefits developers, residents, cities, and the natural environment.

Developers benefit from reduced pipe size and cost. Cities and residents benefit from reduced frequency and duration of flooding and improved water quality. This is particularly important in basins with restricted outlets. Controls targeting peak runoff rates may decrease flood stages in these areas, but without volume control, flood inundation is longer and storage volumes fill increasing the risk of flooding from the next rainfall.

The environment benefits because infiltration duplicates “natural” rainfall absorption mechanisms, better mimics natural groundwater stream baseflow relationship, traps pollutants, slows runoff velocities, sustains base flows, and protects aquatic organisms from high turbulent flows.

The Rice Creek watershed District’s goals with respect to infiltration are straightforward:

- To reduce runoff
- Infiltrate runoff which occurs

These will be accomplished by:

- Maximizing pervious surfaces and minimizing impervious surfaces from development.
- Retaining the condition of landlocked basins.
- Promoting practices that minimize soil compaction during construction and maximize post-construction infiltration.
- Promoting construction of infiltration Best Management Practices.

Rules and Regulations

Development resulting in the creation of impervious surfaces will be required to explicitly address the feasibility of Best Management Practices to first, limit the loss of pervious area and second, to infiltrate runoff which occurs from impervious areas.

Documentation of the feasibility will need to address the extent to which items in the checklist on the last page of this guild are included or excluded from the final plan.

Design Parameters

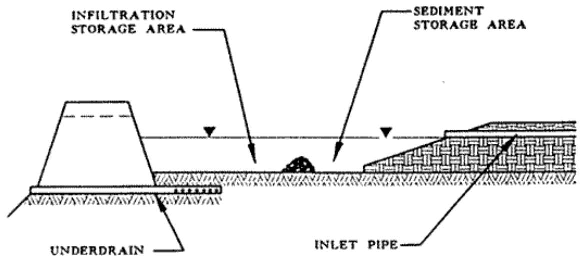
This section of the guide presents design parameters for infiltrating runoff which occurs from impervious surfaces. Note that design parameters apply to runoff from impervious areas and there is a direct benefit in terms of reduced infiltration system sizing from minimizing the loss of pervious surfaces.

Documentation of feasibility must be completed showing systems are capable of infiltrating site runoff from the Minneapolis-Saint Paul median storm runoff of 0.34 inches in 72 hours. Infiltration volume shall be calculated using the appropriate Hydrologic Soil Group Classification and saturated infiltration rates from the following table unless specific rates are measured by a registered soil scientist. Permanent pool areas of wet ponds tend to loose infiltration capacity and will not be accepted as an infiltration practice.

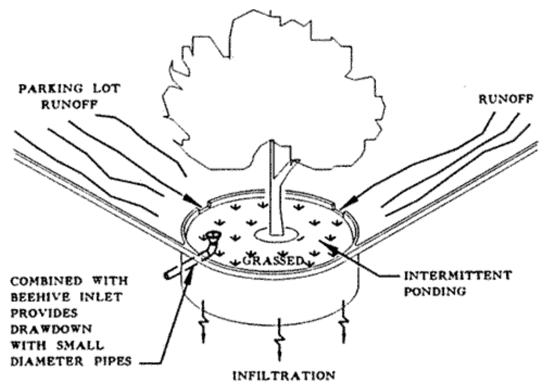
Hydrologic Soil Group	Infiltration Rate	Soil textures
A	0.50 in/hr	Sand, loamy sand, or sandy loam
B	0.25 in/hr	Silt loam or loam
C	0.10 in /hr	Sandy clay loam
D	0.03 in/hr	Clay loam, silty clay loam, sandy clay, silty clay, or clay
Source: Urban hydrology from small Watersheds, SCS June 1986.		

Design Parameters

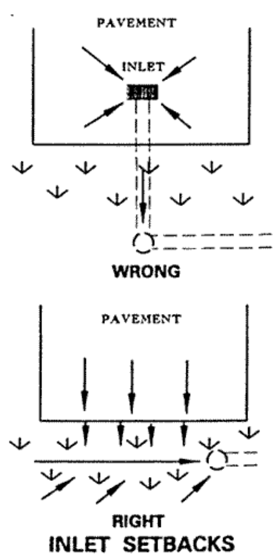
Potential practices are provided in the checklist on the last page with selected practices detailed below.



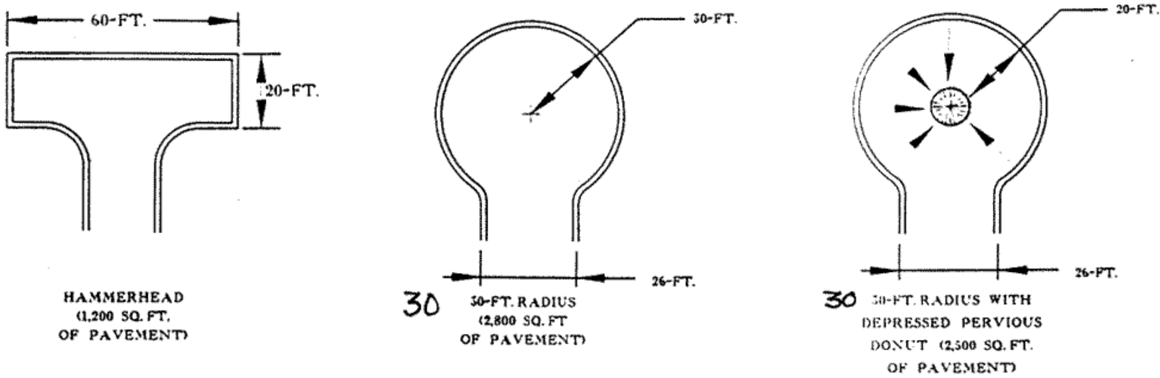
INFILTRATION BASIN



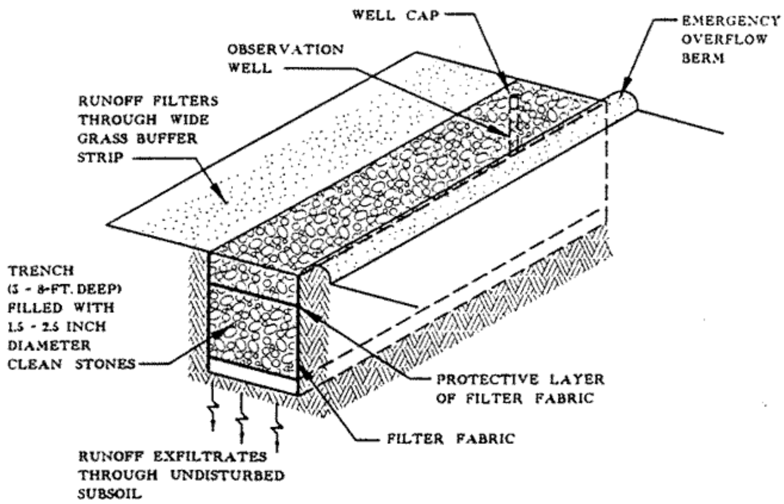
DEPRESSED PERVIOUS AREA



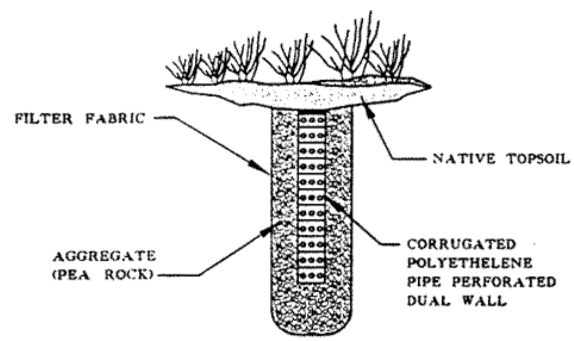
INLET SETBACKS



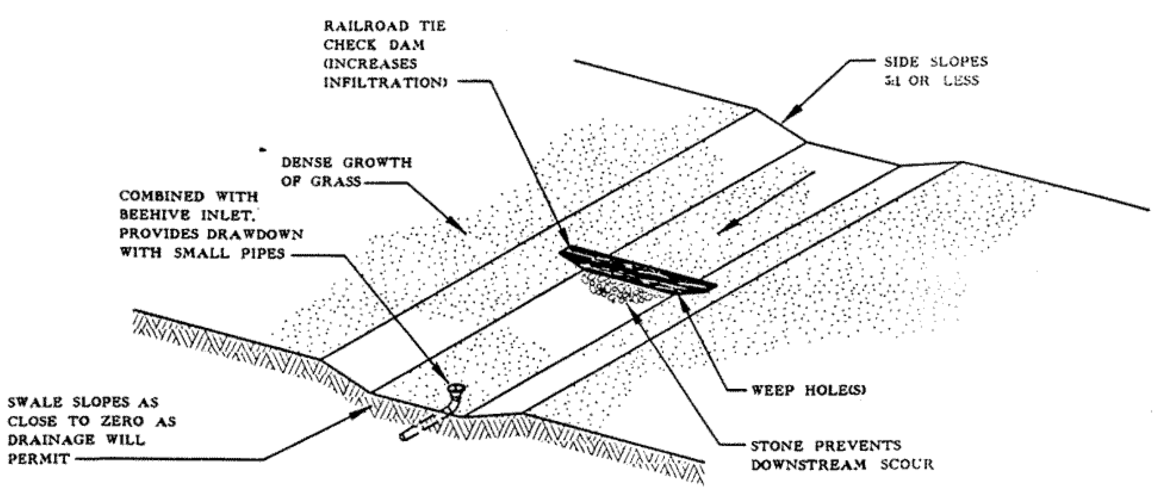
ALTERNATIVE CUL-DE-SAC TURNAROUNDS
(SOURCE: METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS, 1995)



INFILTRATION TRENCH
(SOURCE: SCHUELER, 1995)



INFILTRATION TUBE
(SOURCE: CITY OF MAPLEWOOD)



GRASSED SWALE
(SOURCE: SCHUELER, 1995)

Infiltration Checklist

All development in the District needs to document the feasibility and extent to which the following items are included or excluded from plans.

Runoff Prevention

- ❑ *Upper limit of 80% impervious surface*
- ❑ *Street widths ≤ 26 feet and appropriate for projected traffic load*
- ❑ *One side parking, one side sidewalk ≤ 4 feet*
- ❑ *Parking stalls (9ft by 18 feet)*
- ❑ *Joint/shared parking*
- ❑ *Parking wavier (demonstrated need)*
- ❑ *Pervious overflow parking (pavers, turf, porous pavement)*
- ❑ *Natural vegetation covenant*
- ❑ *Cul-de-sac terminus (hammerhead, 30-ft diameter, pervious center*
- ❑ *Vegetated swales*
- ❑ *Depressional storage*
- ❑ *Prevention of compaction during construction*
- ❑ *Mitigate disrupted soil structure*
- ❑ *Short, crowned driveway (less than 40 feet*

Infiltration systems

- ❑ *Depressional storage incorporated in landscaped areas*
- ❑ *Retention pond/dead storage*
- ❑ *Storm sewer inlets set back from curb inlets/pavement*
- ❑ *“Rural” section road which minimize curb and gutter*
- ❑ *Swales (wet and dry) in place of storm sewer pipe*
- ❑ *Roof drains directed to pervious areas*
- ❑ *Depressed pervious areas (below parking lot or street grade)*
- ❑ *Infiltration galleries/basins/trenches*

Maintenance

- ❑ *Snow storage area*
- ❑ *Sand management areas*
- ❑ *Sweeping interval (vacuum trucks)*
- ❑ *Swale Maintenance*
- ❑ *Pond Maintenance*
- ❑ *Routine inspection(s)*
- ❑ *Sediment traps, inspection, and clean-out*

Rice Creek Watershed District

INFILTRATION WORKSHEET

PERIMT NAME: ____PERMIT NO. ___________________

STEP 1: Determine impervious and pervious areas.

Note: Include all pervious and impervious areas located in any rights-of-way.

(a) Total Site Area: _____________ac

(b) Impervious Area: _____________ac (examples: roads, roofs, parking lots, gravel drives)

(c) *Effective Pervious Area: _____________ ac **[not (a) - (b)]**

Undisturbed: _____________ac Disturbed: _____________ac

* Only use horizontal component of surface area which is subject to intermittent prolonged wetting. Do not include area of permanent pools of ponds or wetlands (see *Stormwater Infiltration Guidance Design Parameters).*

Note: The effective area available for infiltration must be capable of receiving the runoff from impervious surfaces. Pervious "islands" located above adjacent parking lot surfaces, for example, will not be credited.

STEP 2: Demonstrate % imperviousness for the site.

[(b) ÷ (a)] x 100 = _____________% **(d)** **(d) MUST BE ≤ 80%**

STEP 3: Determine runoff volume from impervious surfaces generated by median storm of 0.34 inches.

____________ **(b)**	x	0.9	x	0.34 inches	x	1 foot / 12 inches	=	____________**(e)**
Impervious Area (acres)		Coefficient		Mpls-St. Paul Median Storm Rainfall				Volume needed to be infiltrated (acre-feet)

STEP 4: Calculate volume capable of being infiltrated on site within 72 hours. Use infiltration rates listed on page 2 of *Storm water Infiltration Guidance Design Parameters.*

Saturated infiltration rate (if multiple on-site soil types, use most restrictive) for Type _____________soils =_____________ **(f)**
inches/hour

____________ **(c)**	x	____________**(f)**	x	72	x	1 foot / 12 inches	=	____________**(g)**
Effective Pervious Area (acres)		Infiltration Rate Corresponding to Soil Type (inches/hour)		Hours				Volume infiltrated in 72 Hours (acre-feet)

STEP 5: Compare volume generated to volume infiltrated.

____________ **(g)** *MUST BE GREATER THAN OR EQUAL TO* ____________ **(e)**.

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