Design Choices for Effective Infiltration Practices
Infiltration Performance

After two decades, only a few studies on topic. It should be good, but take these with grain of salt:

- Sediment and bacteria (90%)
- Phosphorus (65%)
- Nitrogen (35 to 50%)
- Metals (Zn, Cu, Pb) (65% or more)

Great for Temperature and runoff reduction

* Limited or zero removal of soluble metals & chlorides
## Infiltration Design Guidelines

<table>
<thead>
<tr>
<th>Level 1 Design (RR:50; TP:25; TN:15)</th>
<th>Level 2 Design (RR:90; TP:25; TN:15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV = (Rv)(A)</td>
<td>TV = 1.1(Rv)(A)</td>
</tr>
<tr>
<td>Maximum CDA of one acre</td>
<td>Max CDA of 0.5 acre, nearly 100% IC</td>
</tr>
<tr>
<td>At least one form of pretreatment</td>
<td>At least two forms of pretreatment</td>
</tr>
<tr>
<td>Soil infiltration rate of 0.5 to 1.0 in/hr</td>
<td>Soil infiltration rates of 1.0 to 4.0 in/hr</td>
</tr>
<tr>
<td>Underdrain needed due to soils</td>
<td>No underdrain utilized</td>
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</tbody>
</table>

**All Designs**: no hotspot runoff
Infiltration Design Choices: Small Scale or Large Scale

Put a Max Limit on CDA or Require 100% IC in CDA?
Infiltration Design Choices: Minimum Design Infiltration Rate

Minimum of 0.5 inches/hr measured on-site

The real infiltration rate is what the practice actually does several years after construction – research indicates it should be reduced in half

Trees and shrubs promote infiltration through macro-pores

Try not to force a lot of infiltration depth over a small surface area
Infiltration Design Choices: Single versus Combo Systems

For larger system, a combo of filtration or bioretention prior to infiltration provides greater:

- Groundwater protection
- Pollutant treatment
- System reliability
- Pretreatment

Can be in bottom of a quantity pond
Infiltration Design Choices: Degrees of Pretreatment

• Try to have at least two levels of pretreatment to keep sediment out
• Keep contributing drainage area as close as 100% IC as possible
• Factor in road sanding loads
Design Choices for Infiltration: Underground Injection Permit?

- These pesky permits are needed when discharging into a sinkhole or when the depth of infiltration is larger than the maximum surface distance.
Design Choices for Infiltration: Exfiltration Interface

- Lose the bottom liner—bottom sand filter instead
Infiltration Design Choices: Snowmelt and Sediment Management

- Understand how winter operations will impact the infiltration area
Infiltration Design Choices
Hotspot Runoff

Soluble pollutants will not be treated by infiltration practices and will enter groundwater
So will spills and leaks
Preventative approach:
Restrict infiltration near groundwater supply areas (wells) and restrict infiltration at hotspot land uses
Hotspot List

Need to define a local list of operations, activities and land uses that are considered a hotspot risk and where infiltration without treatment is prohibited.
Infiltration Design Choices: Construction Sequence

• Even stricter than bioretention
• Reserve infiltration areas inside limits of disturbance
• Use silt fence to prevent any clearing or access by construction equipment
• Wait until rest of site is fully stabilized