Design of Infiltration BMPs

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Site Selection

- Preliminary Screening
  - Low Point Watershed
  - Tributary Area
    - Trenches : 10 ac maximum
    - Basins: 50 ac maximum
  - Soil Type (SCS A or B)
  - Proximity to structures
  - Proximity to highway pavement
  - Available space

Site Selection (Cont.)

- Site Investigation
- In-drill hole permeability test
  - Place ‘test zone’ at invert of basin or in lower portion of trench
  - Locate groundwater
  - Measure permeability
  - Sample and measure laboratory permeability

Design Guidance

- Minimum acceptable infiltration rate is 0.3 in/hr (2.1×10^{-4} cm/s)
- Calculate basin volume - design storm
- Size basin to have maximum 72 hour drain time
  - Recommended depth 3 feet
  - T = d/f (d is design depth, in, f is infiltration rate, in/hr, T is time, hrs)
  - Trench - assume fill material has 30% voids, base surface area effective

Design Guidance

- Select Factor of Safety
  - FS of 1.5 to 2 is recommended
  - Depends on soils/space available/maintenance
- Pretreatment
  - Inlet energy dissipation
  - Sediment pretreatment
    - biofilter
    - forebay
- Inline vs. Offline

Design Guidance

Design Element	Criteria Description	Recom. Criteria
Ponding Time	72 hrs (Mn, Md, Fl) 48 hrs (Wa, CT) 12 hrs (WEF/ASCE)	72 hrs
Drainage Area	*Basin* 50 acres (Wa, Mn,FHWA) 5 acres (CT)	50 acres
	Trench 15 acres (Wa) 10 acres (FHWA) 5 acres (CT)	10 acres
Infiltration Rate	0.25 in/hr (CT) 0.27 in/hr (Mn) 0.3 in/hr (ASCE/WEF) 0.5 in/hr (Schueler) 4.0 in/hr (Wa)	0.3 in/hr

Design Guidance

Design Element	Criteria Description	Recom. Criteria
Design Storm	6-month/24 hr (Wa) 0.5 in. runoff (Fl) 1-year/24 hr (CT) 1 in. runoff (Mn) 0.5 in. from imperv. Area (Md)	1 to 3 year storm runoff
Depth	*Basin* 3-12 feet (Wa) 1 foot (WEF/ASCE)	3 feet
	Trench 2-10 feet (Schueler) 3-6 feet (WEF/ASCE)	10 feet
Lining	*Basin* Vegitation (Wa,FHWA,Mn)	Vegitation
	Trench Filter Fabric (FHWA)	Filter Fabric

Maintenance

- Maintain vegetation - 6 - 8”
- Till invert when maximum design drain time is exceeded
- Sediment removal
  - when facility is dry
  - light duty equipment
  - remove all cuttings
  - service filter fabric (trenches)

Monitoring

- Install monitoring wells
  - upgradient
  - downgradient
  - number based on:
    - strata
    - depth to GWT
    - Groundwater beneficial use
  - Monitor over the life of the project, and for time after project is decommissioned

Conclusions

- Do not use infiltration devices if criteria is not met. Plenty of other BMPs in the ‘tool kit’
- Maintenance program is essential for proper operation
- Monitoring program is essential over the life of the BMP