

NJDEP Stakeholder Meeting

Stormwater Infiltration



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Soil Testing

Soil Testing – reliance on a limited number of soil test pits and/or improper implementation of testing protocols may not provide accurate soil permeability information

Considerations:

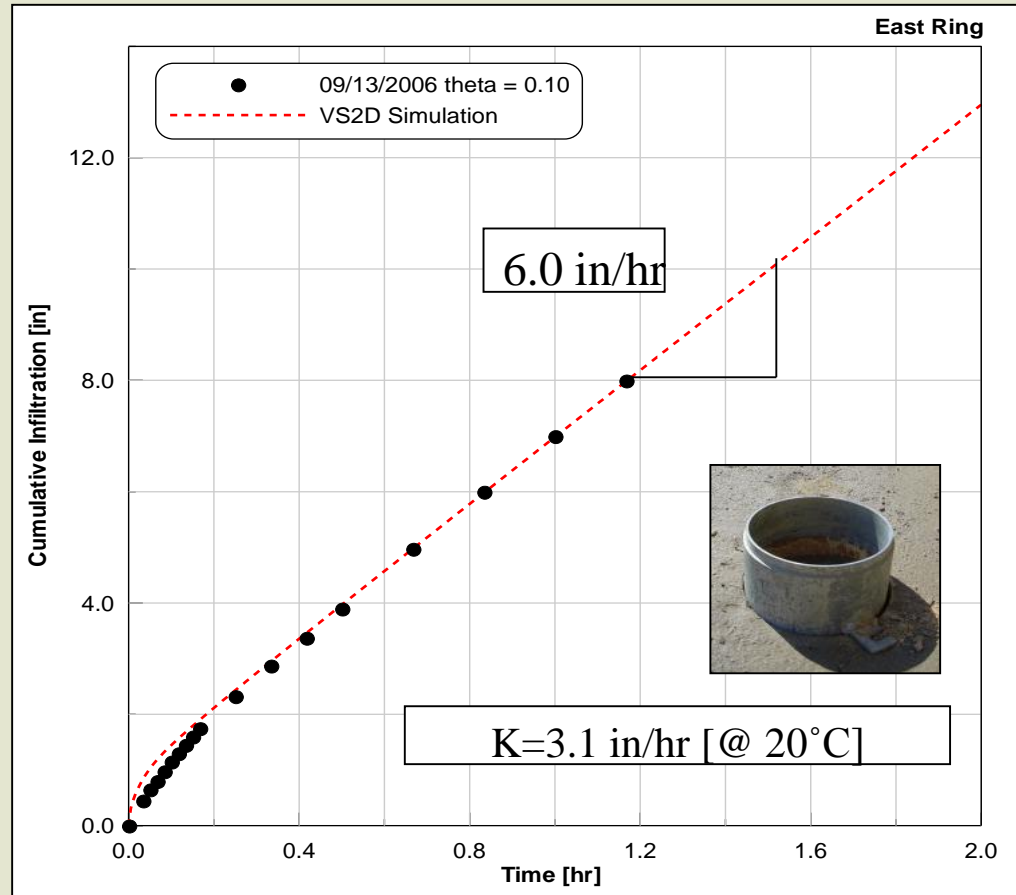
1. An adequate number of tests should be conducted to cover the expected variability of hydraulic conductivity within the footprint of the proposed basin.
2. Testing should be conducted in the horizon with the lowest expected hydraulic conductivity below the proposed bottom of the infiltration basin.
3. Testing methods which specifically calculate a hydraulic conductivity should be used.

Soil Testing

Examples for discussion:

Considerations:

1. Hydraulic Conductivity
2. In-Field / Undisturbed Samples
3. Physically Based Interpretation of Data
4. Use a Standardized / Consistent Method



Soil Testing

Examples for discussion:

Method*	Depth (ft)	Result (in/hr)	Notes
HPT	(6.5 to 23.5)	0 to 170	~50 in/hr near other test depths
Pump Test	~20-25	1.5	Horizontal hydraulic conductivity, b=10ft
Slug Test	~20-25	7.3, 8.2	Two tests, same well
Cased Borehole	4	1.2	2" Diameter, <1 gallon used, presoak and four trials
Single-Ring Infiltrometer	1	1.1	Four trials very consistent response

Construction Methods

Construction Methods - soil compaction during construction may decrease soil permeability and infiltration rates

Considerations:

1. Proper construction practices are key.
2. No rubber tire equipment on finished surface.
3. “Under excavate” basins during construction period.
4. Diligent E&S measures.
5. Give the soil a kick start with organic matter and low bulk density.



Maintenance

Maintenance – improper maintenance that decreases soil permeability, such as insufficient removal of accumulated sediment and overgrown vegetation may decrease actual infiltration rates.

Considerations:

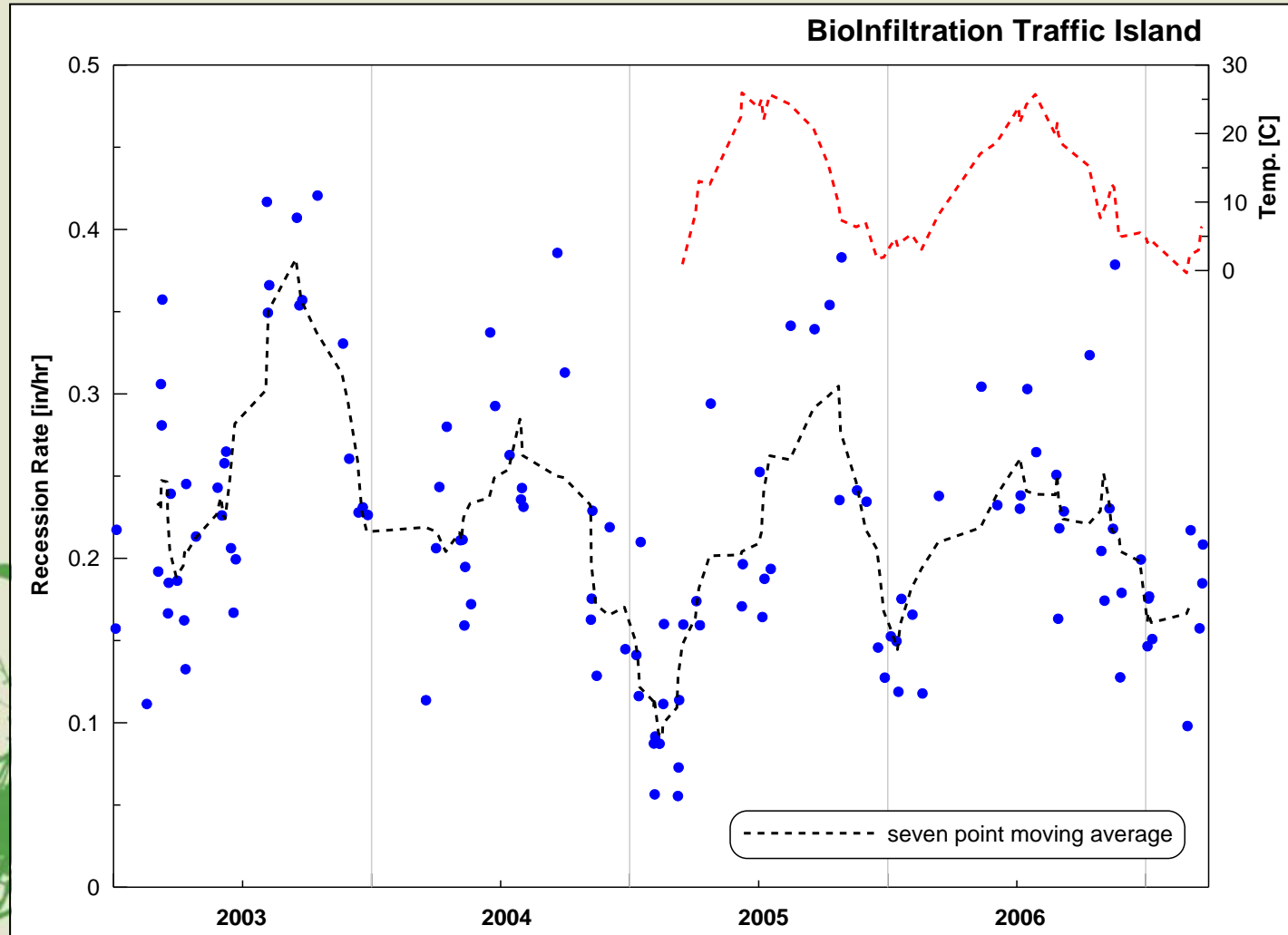
1. I have not found a system which has failed due to improper long-term maintenance; most failures in my experience are design-based.
2. Overloaded underground systems (unmaintainable) with inadequate pretreatment are susceptible to failure.
3. Vegetation is expected to **maintain** the operation of an infiltration system due to well-documented physical and biological processes.

Maintenance



- Constructed in 2001.
- Over 15 years of continuous operation.
- Intensely monitored.
- Maintaining functionality with no maintenance to date.

Maintenance



Emerson, C.H., Traver, R.G., "Multi-Year and Seasonal Variation of Infiltration from Stormwater Best Management Practices" ASCE Journal of Irrigation and Drainage Engineering, Vol. 134, No. 5, pgs. 598-605 September/October 2008.

Maintenance



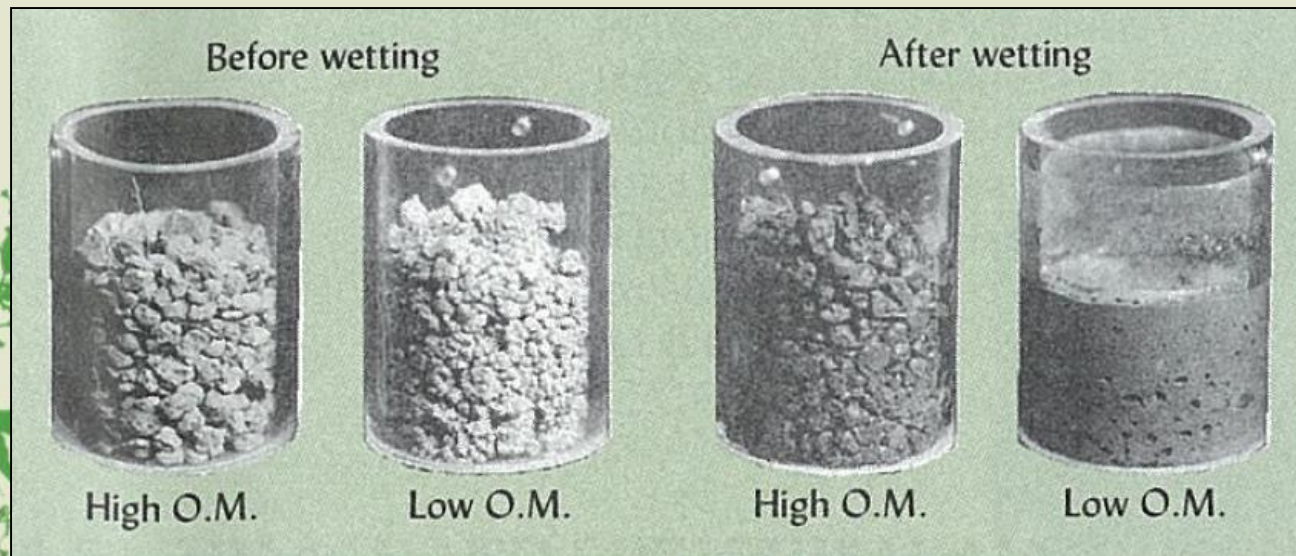
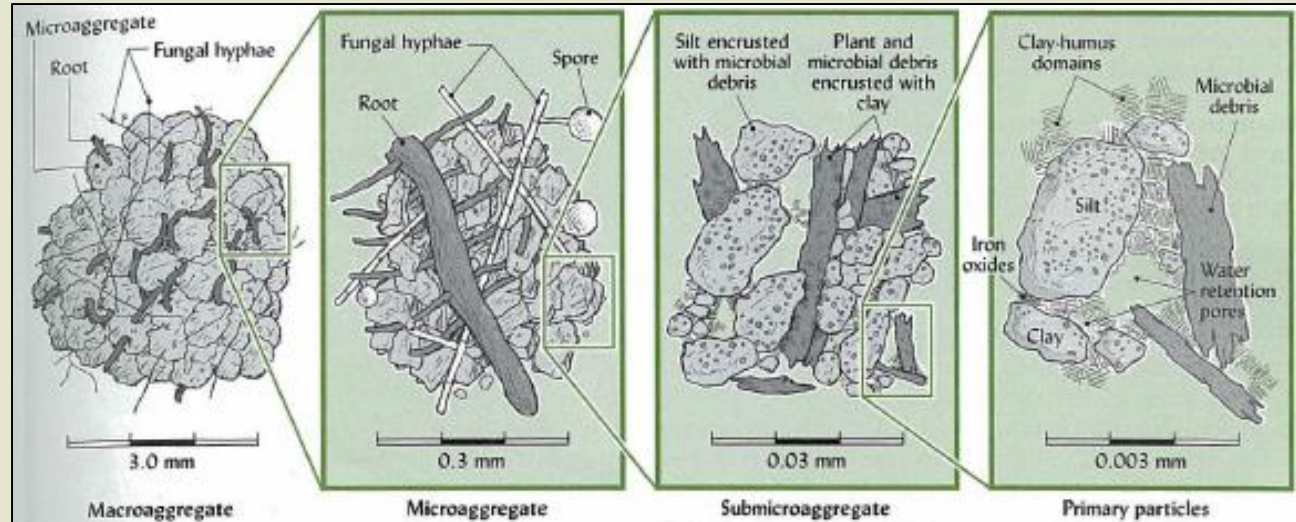
- 1.3 Ac Drainage Area
- 46% Impervious
- 10:1 DCIA to BMP
- 450 in/yr

Maintenance



One growing season...

Maintenance

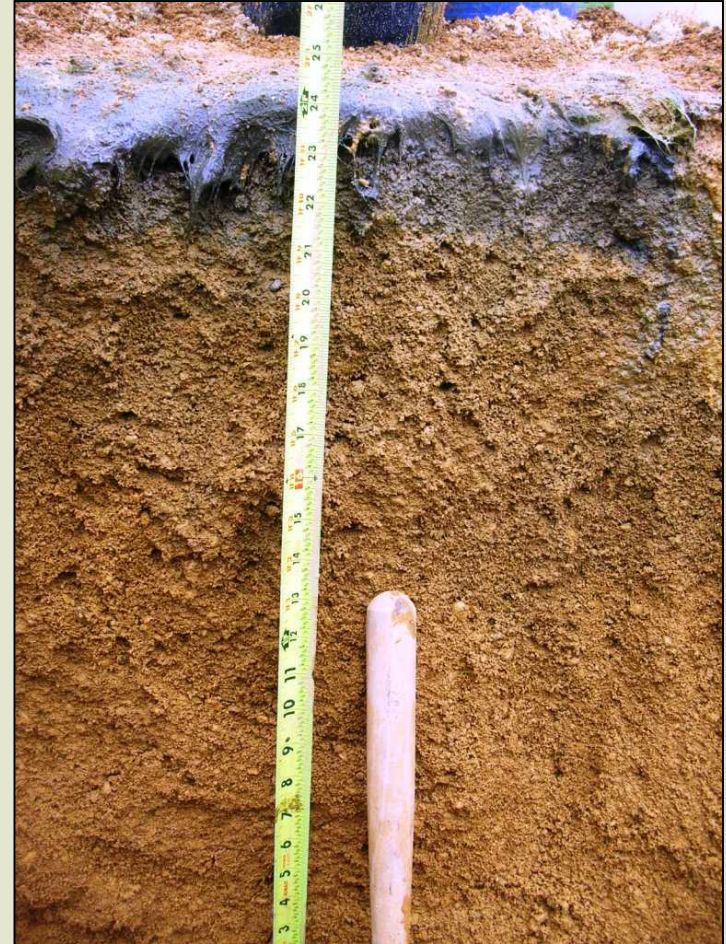
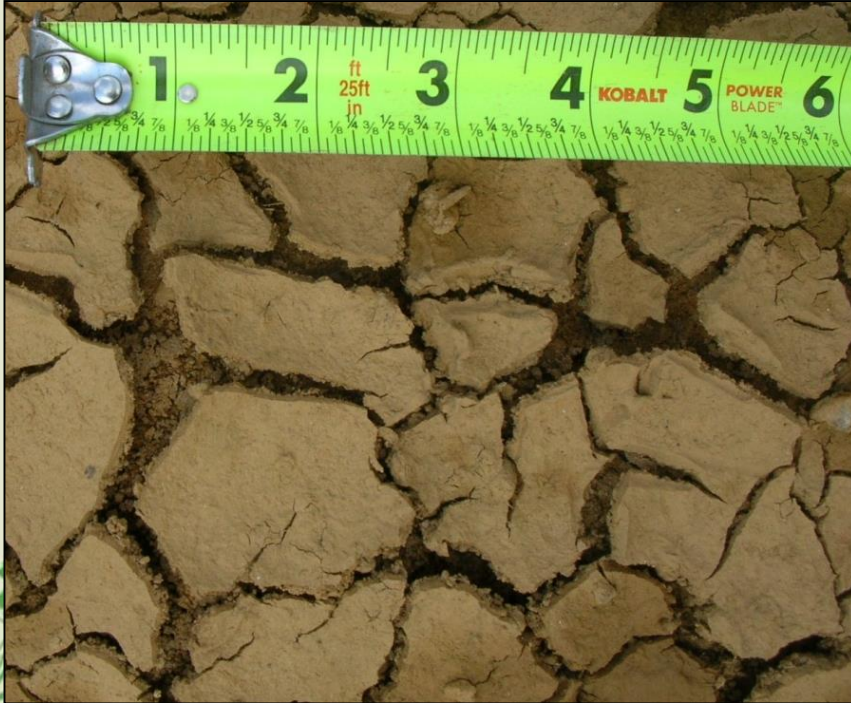


Maintenance



“K5” soil specification is not adequate; especially when basin lacks vegetation.

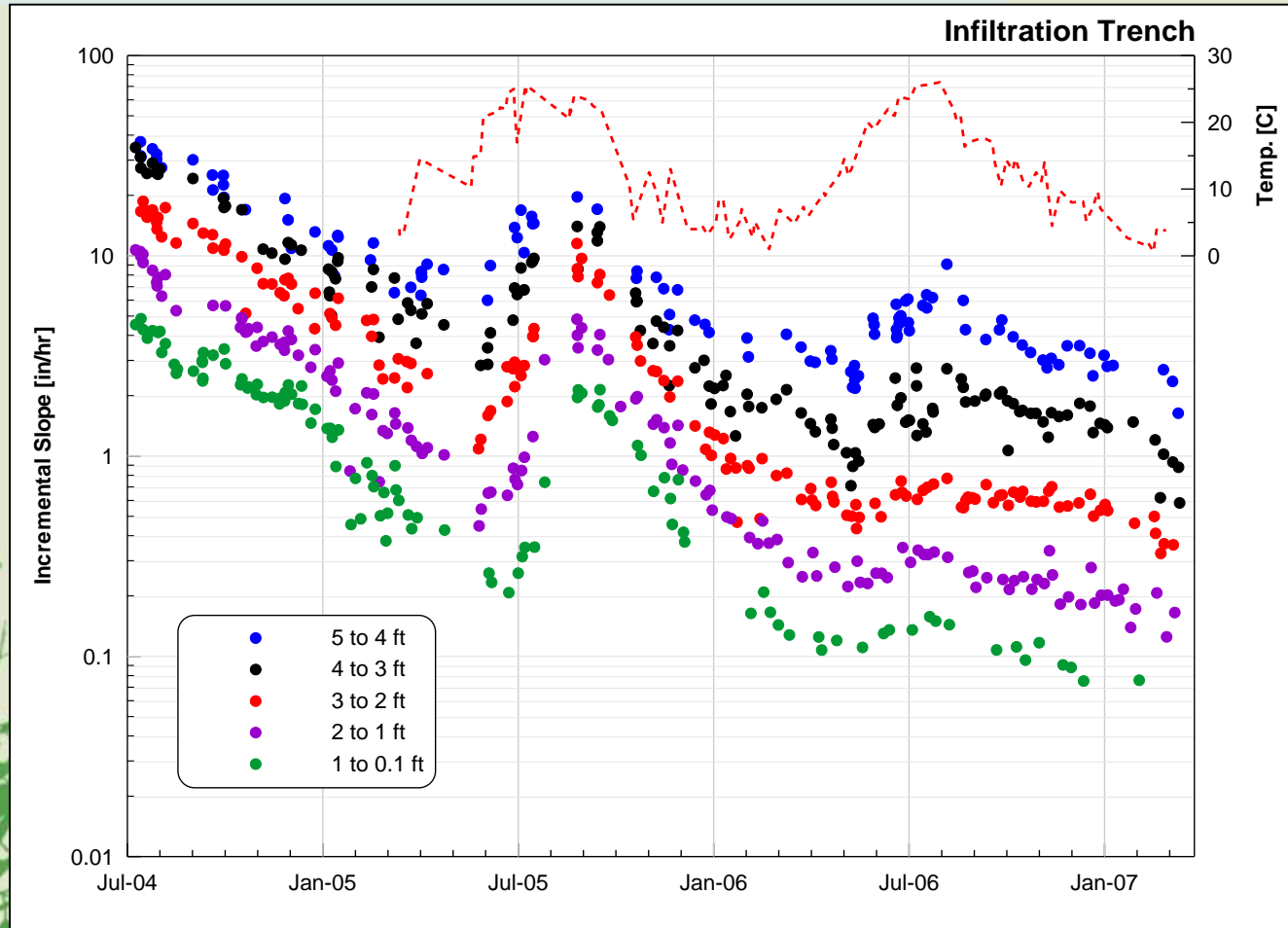
Maintenance



“K5” soil specification is not adequate; especially when basin lacks vegetation.

Maintenance

Data from an overloaded subsurface infiltration bed (130:1).



Emerson, C.H., Wadzuk, B.M., Traver, R.G., Hydraulic Evolution and Total Suspended Solids Capture of an Infiltration Trench" Hydrological Processes (Wiley InterScience), Vol. 23, January 26, 2010, DOI: 10.1002/hyp.7539.