


Advancing the Standard of Practice of Stormwater Management

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UNH Stormwater Center

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Acknowledgements

Funding Source:



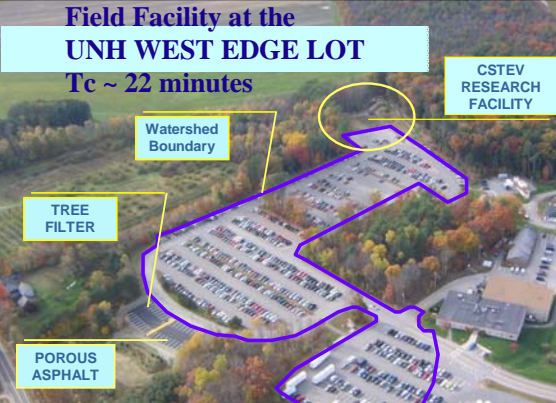
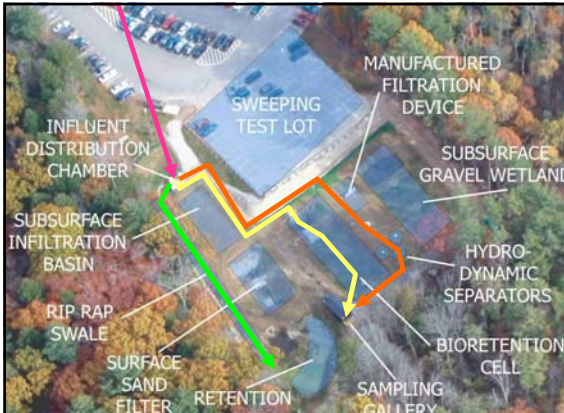
Collaborating Manufacturers:
Vortech, ADS, CDS, Environment 21, AquaShield, HydroInternational, StormTech

Stormwater Center Crew

- Faculty: Tom Ballestero, Robert Roseen, Steve Jones
- Facility Manager: Jamie Houle
- Graduate Students: Pedro Avellaneda, Josh Briggs, Robert Wildey, Angie Miles, Mindy Bubier, George Fowler, Kris Houle, Julie Maimes
- Undergraduate Students: Darlene Brown, Tim Puls, Greg Sine, Joel Ballestero, Allison Wasiewski, Ethan Gyles, Kristina Esterheld, Lindsey Napurano, Matt Shump, Erich Fiedler.
- Technical Advisory Board

Field Facility at the UNH WEST EDGE LOT

Tc ~ 22 minutes

Labels include: INFLUENT DISTRIBUTION CHAMBER, SWEEPING TEST LOT, MANUFACTURED FILTRATION DEVICE, SUBSURFACE GRAVEL WETLAND, SUBSURFACE INFILTRATION BASIN, HYDRO-DYNAMIC SEPARATORS, RIP RAP SWALE, BIORETENTION CELL, SURFACE SAND FILTER, RETENTION POND, SAMPLING GALLERY.

TREATMENT STRATEGIES: Conventional Devices



Retention Pond Rip Rap Swale

TREATMENT STRATEGIES: Manufactured Devices

Hydrodynamic Separator

Filter Unit

Subsurface Infiltration Unit

Filter Unit

TREATMENT STRATEGIES: Low Impact Development Technologies

Porous Asphalt

Gravel Wetland

Sand Filter

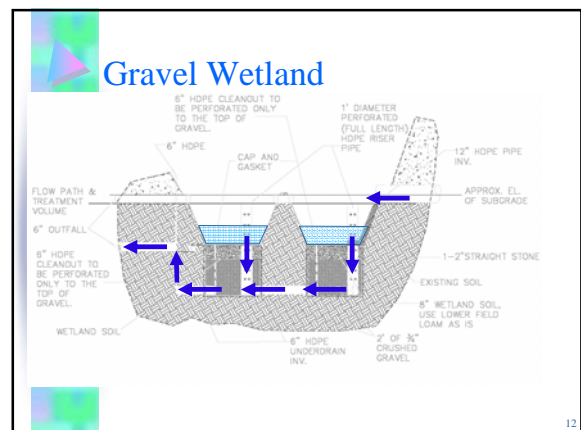
Bioretention Unit

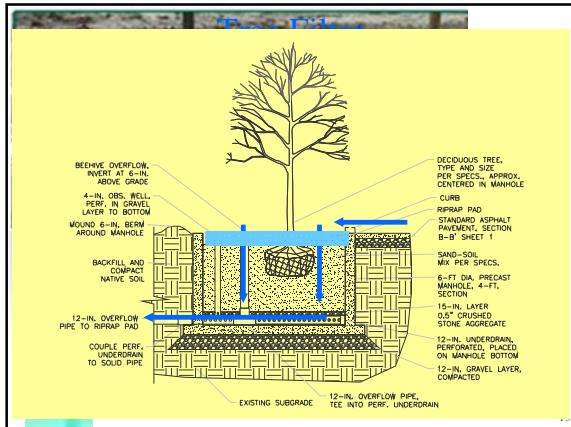
Tree Filter

Surface Sand Filter

Bioretention

Gravel Wetland



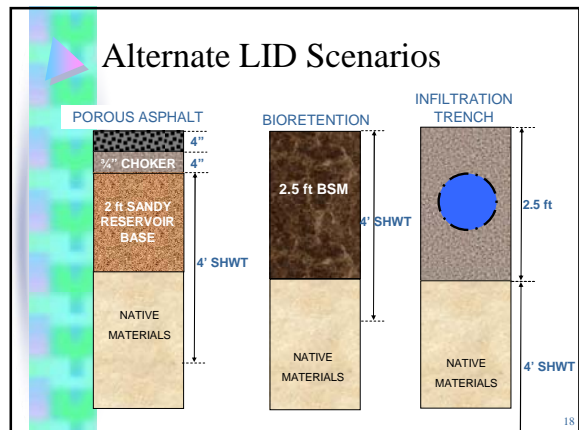
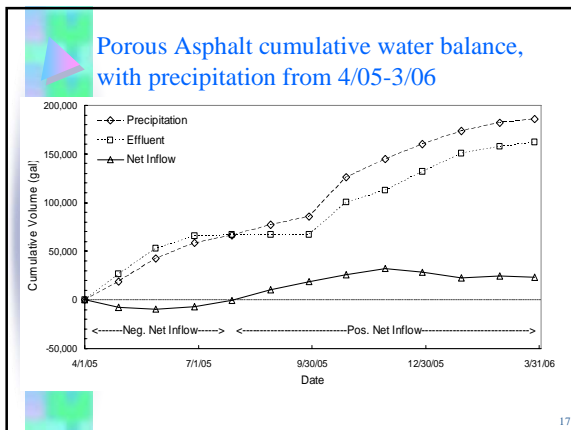
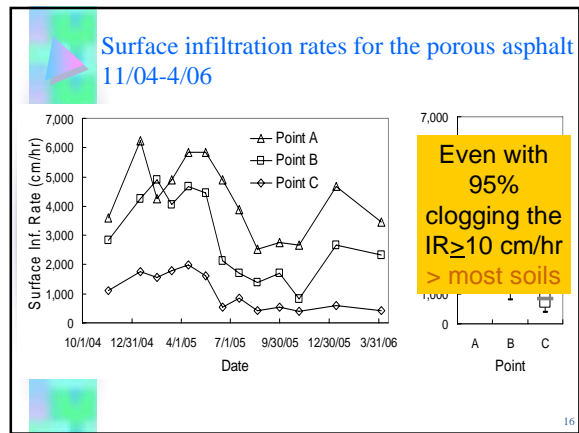
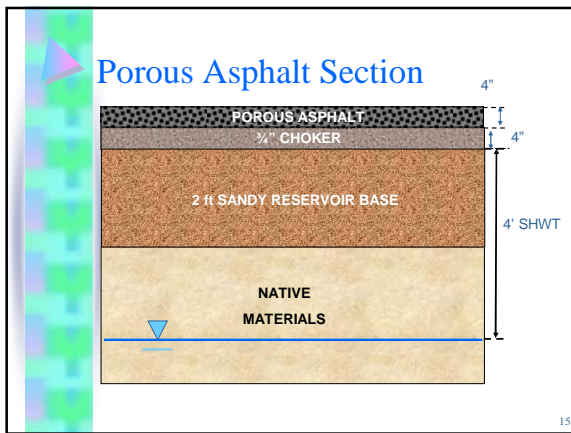


Porous Asphalt Pavement

- = binder + aggregate
- Modification of Open Grade Friction Course (OGFC)
- Aggregate gradation is coarse w/ few fines
- Asphalt binder often modified (polymers, fibers) but not necessary
- Air voids 18-22%

Standard Porous Asphalt Mixes	
US Standard Sieve Size	Percent Passing
1/2 in.	100
3/8 in.	95
#4	35
#8	15
#16	10
#30	2

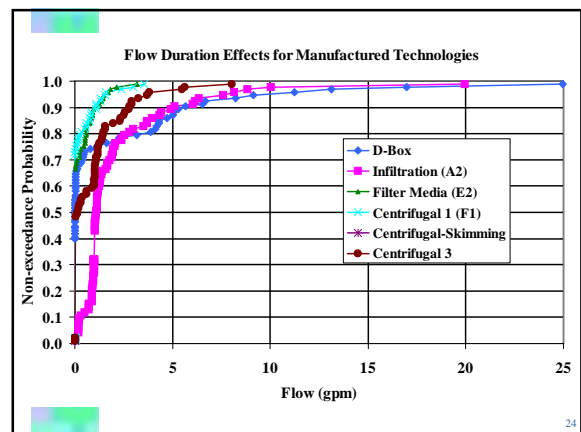
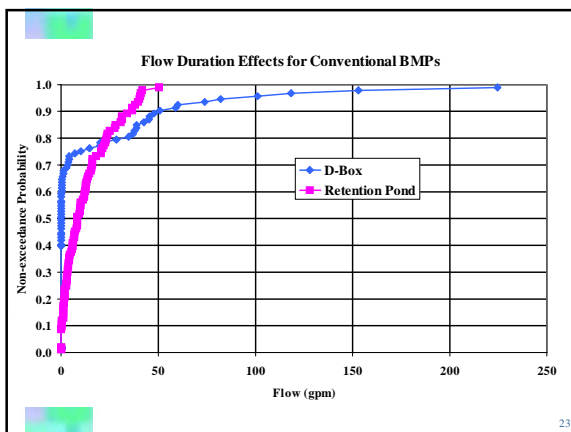
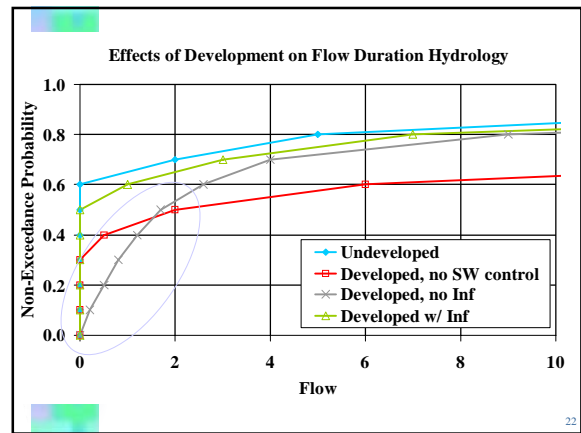
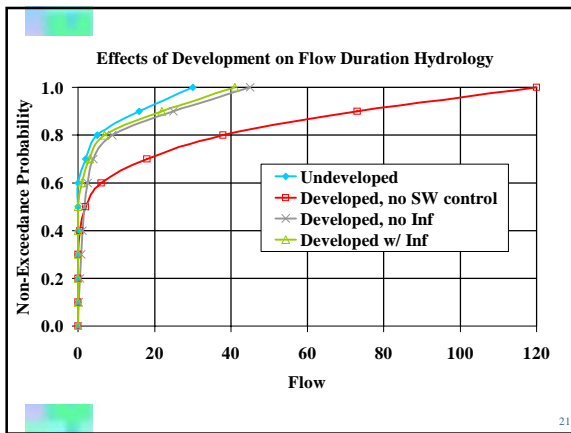
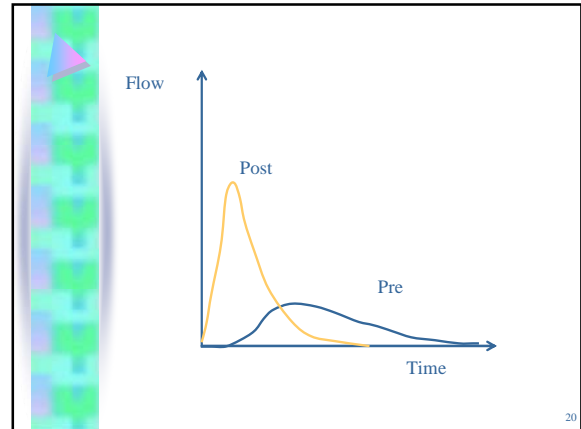
Percent bituminous 5.75-6.0% by weight

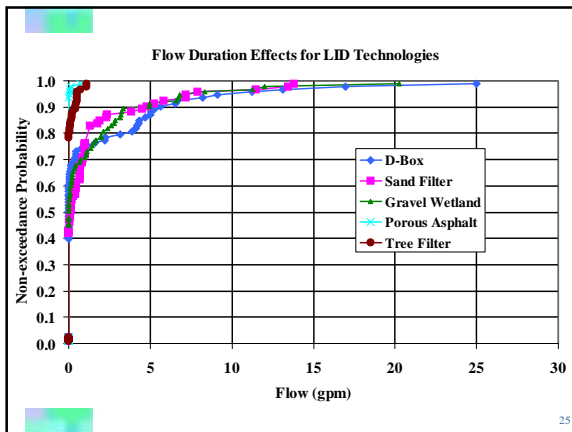


Hydrology

Traditionally stormwater management focused on peak flow reduction but just as often we now demand volume reduction, which is only realistically achieved via infiltration/recharge

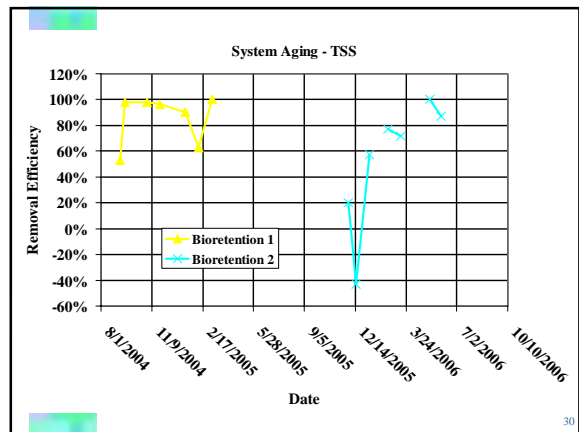
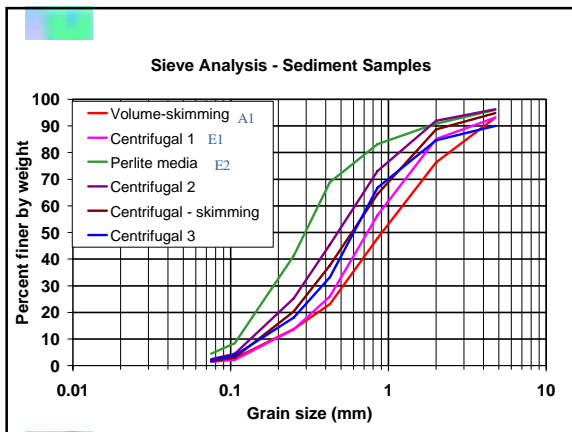
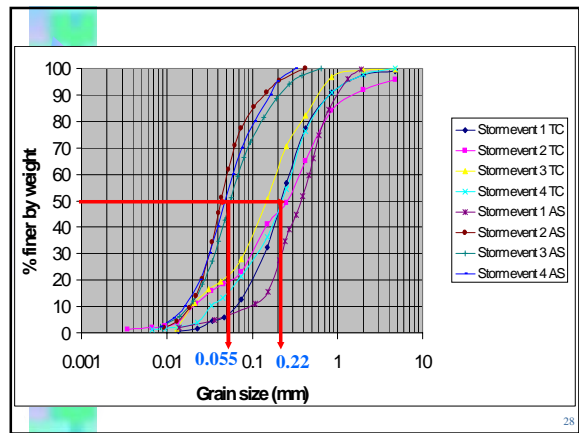
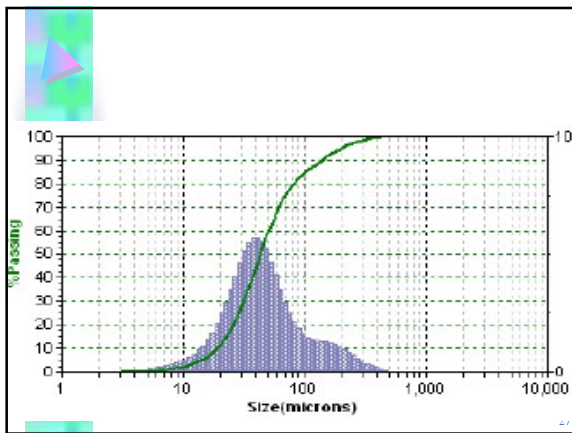
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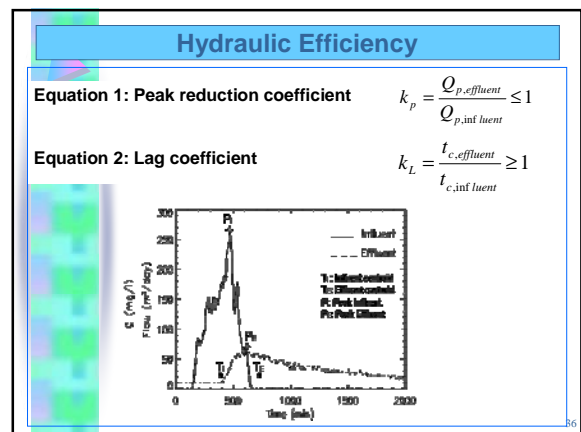
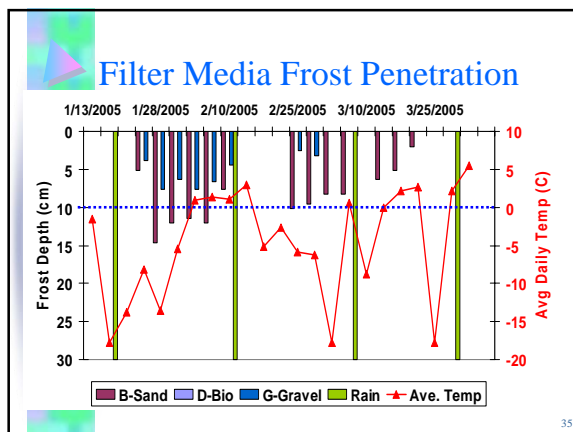
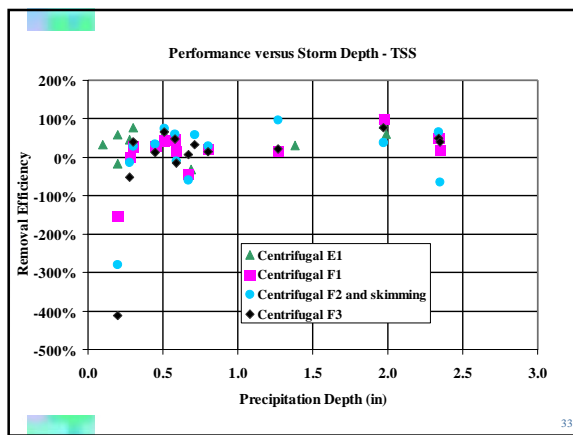
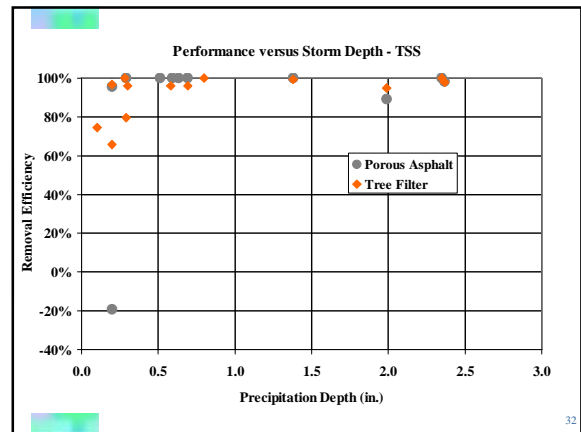
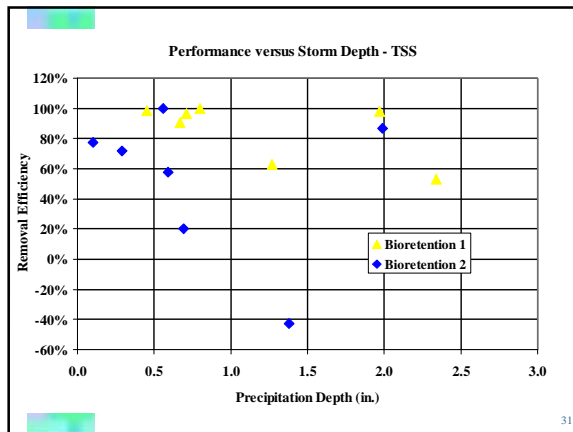




Sediment

The most common yardstick for the water quality performance of stormwater management technologies is the removal of sediment.



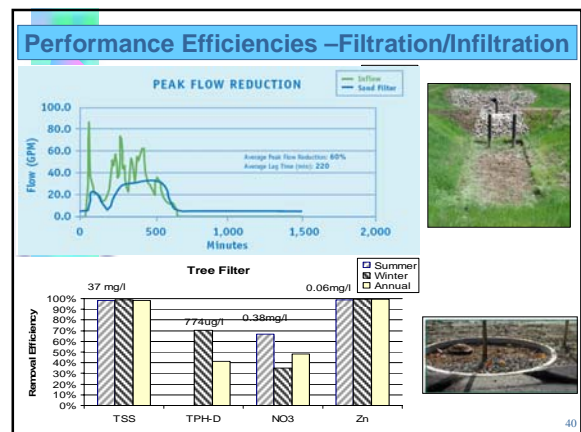
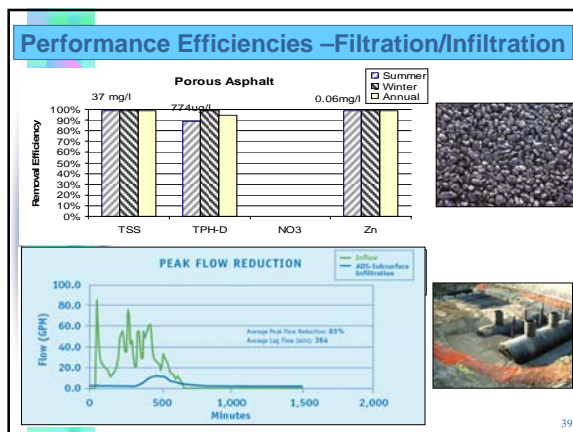
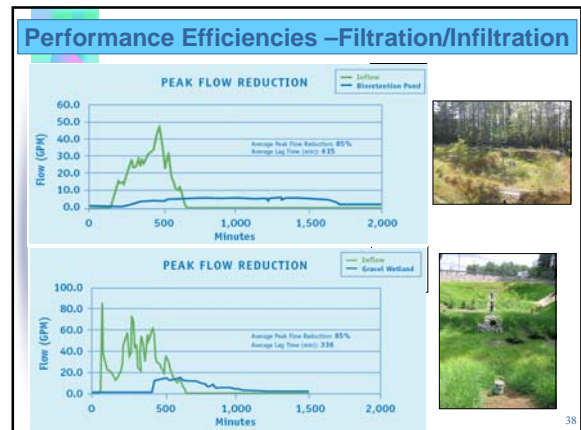


Hydraulic Efficiency

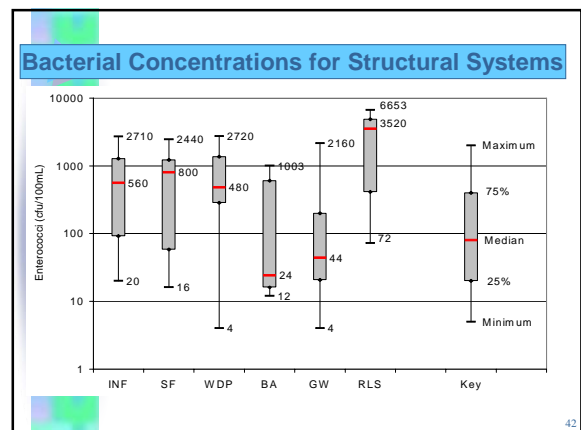
Annual and Seasonal lag (k_i) and delay (k_p) coefficients

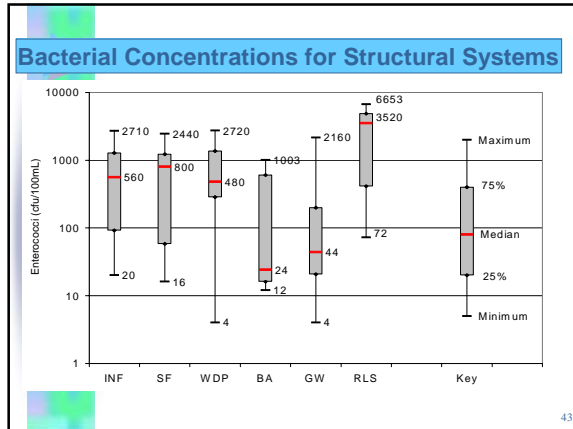
Device		Annual	winter(6)	summer(6)
Subsurface Infiltration	Ki	1.60	1.68	1.46
	Kp	0.17	0.17	0.16
Surface Sand Filter	Ki	1.47	1.56	1.27
	Kp	0.40	0.45	0.29
Retention Pond	Ki	2.02	2.11	1.77
	Kp	0.15	0.16	0.11
Bioretention	Ki	2.16	2.27	1.81
	Kp	0.15	0.18	0.06
Gravel Wetland	Ki	1.58	1.56	1.67
	Kp	0.15	0.16	0.14
Stone-Lined Swale	Ki	1.02	1.00	1.25
	Kp	1.03	1.13	0.79

MIN EFFECT (circled values)
GREATEST EFFECT (circled values)



Microorganisms





Questions?

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