

Low Impact Development

USING LID TO SOLVE YOUR ERP, TMDL,
NPDES, NNC (AND OTHER) PROBLEMS



Prescription to Clean Up Florida Waters:

Rx

Patient: Florida Waters

- Reduce runoff volumes
- Reduce pollution sources
- Reduce/disconnect impervious surfaces
- Improve stormwater treatment efficiency
- Harvest and re-use stormwater
- Protect buffers, forests and wetlands

WHAT IS LID?

- Comprehensive approach
- Hydrology is integrating framework
- Use simple, nonstructural methods
- Control stormwater at the source
- Micro-scale stormwater management
- Decentralized BMPs & disbursed flows
- Multifunctional landscape and infrastructure

Many LID practices are just creative applications of conventional BMPs:



- Dry Retention
- Filtration
- Wet Detention



WHY LID?

- Numeric nutrient criteria
- Impaired waters
- TMDL/BMAP adoption
- NPDES MS4 permits



- Water supply demands
- Source water protection
- No more land





The State of Florida has been slow to adopt LID permitting criteria...

...so local governments are taking the lead.



ERP rules don't specifically reference LID but it easily fits into the regulatory framework:

Presumptive Criteria (volume based) –

- retain first ½ inch of runoff
- retain first ¾ inch of runoff if direct OFW discharge

Non-presumptive Criteria (load based) –

- 80% pollutant removal
- 95% pollutant removal if direct OFW discharge

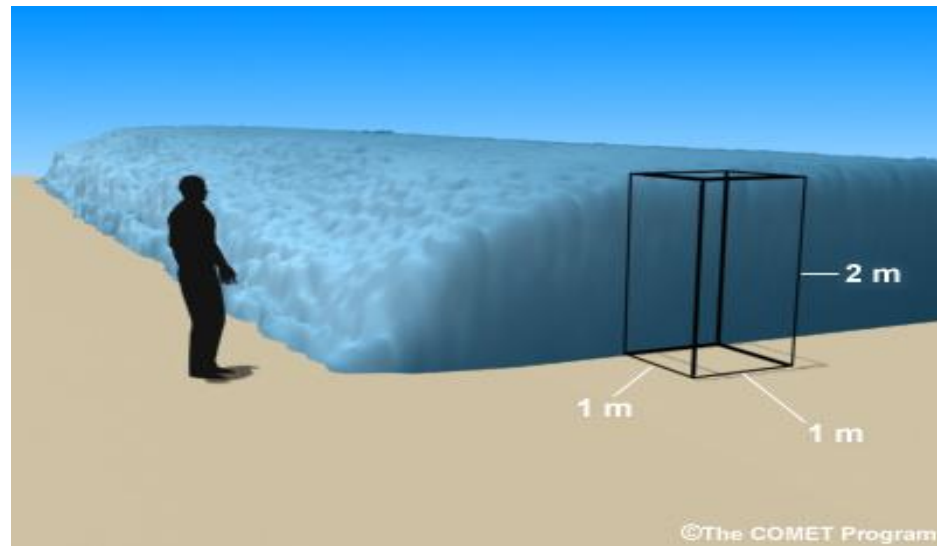
Net Improvement (load based) –

- post-development pollutant load < pre-development for pollutant of impairment

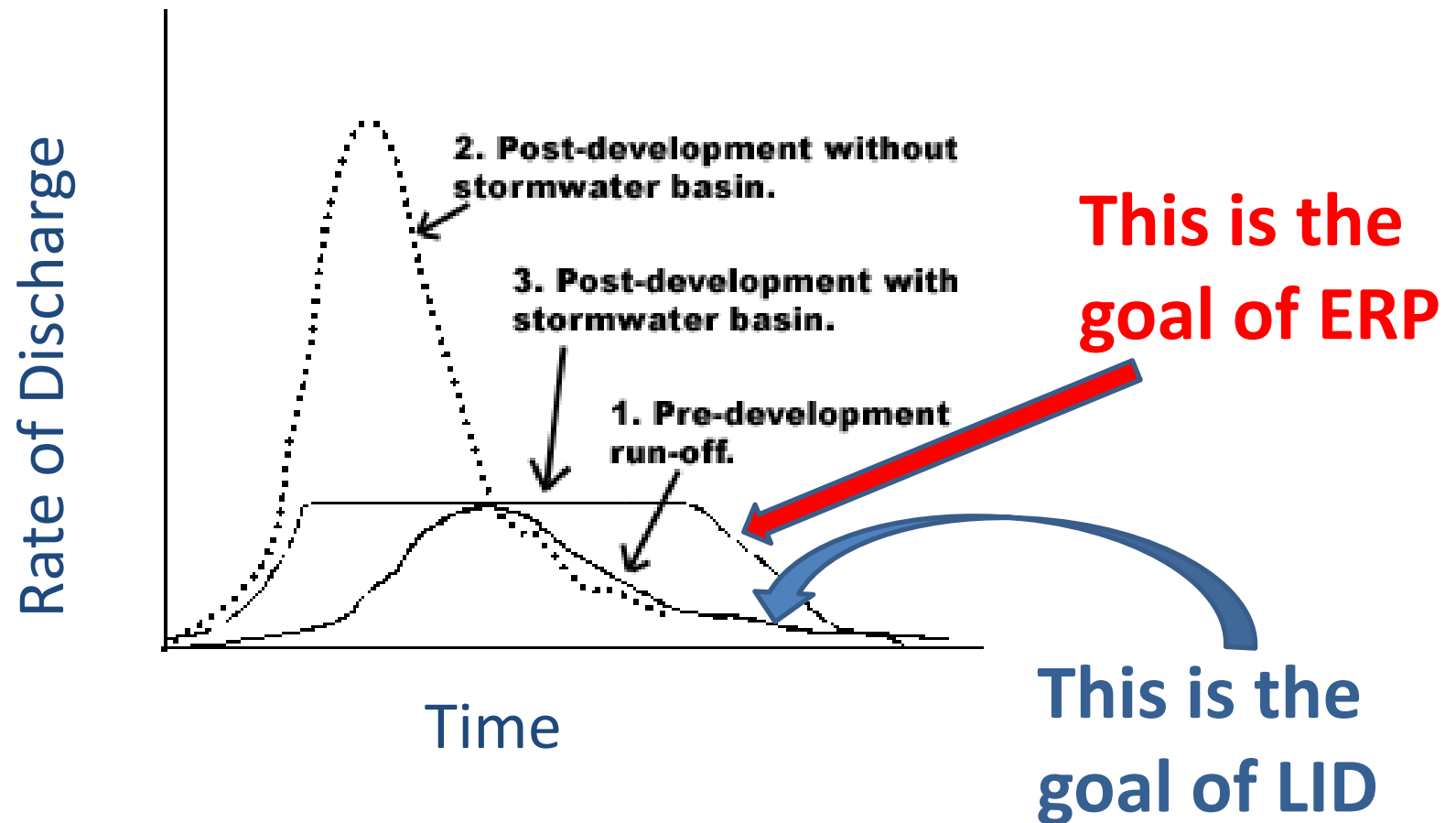
LID effectiveness may be measured by load reduction...



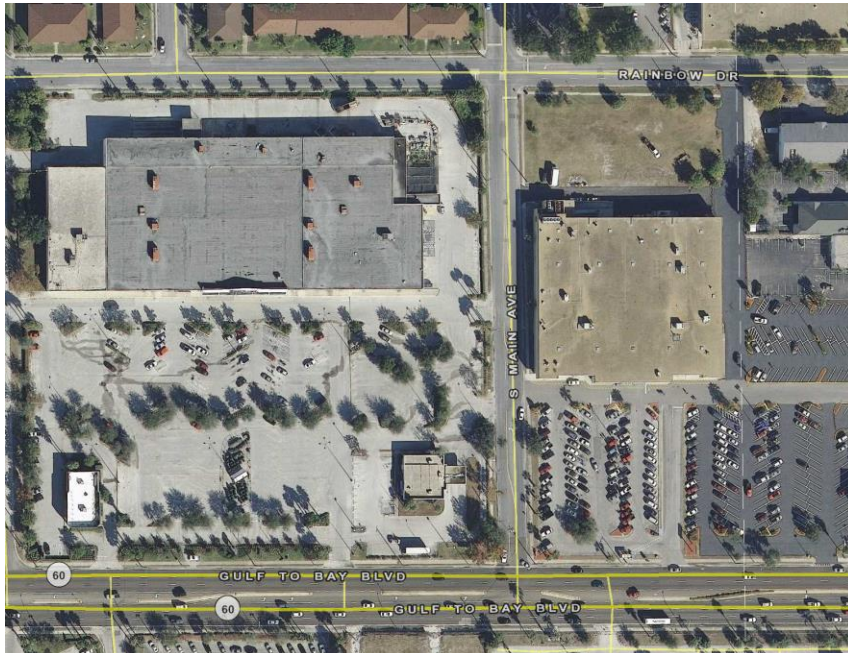
But it's all about volume!



Hydrologic Impact of Development



Why is LID a Good Choice for Redevelopment?



- Allows optimal utilization of space-limited development sites.
- Ideal for sites not requiring flood attenuation or additional fill.
- Provides additional tools to meet net improvement requirements.

LOW IMPACT DEVELOPMENT

Pollution Prevention

- **Minimize disturbance**
- **Protect vegetation, trees, wetlands**
- **Minimize soil compaction**
- **Reduce/disconnect impervious surfaces**
- **Minimize pollutant sources**
- **Minimize runoff volume/load**

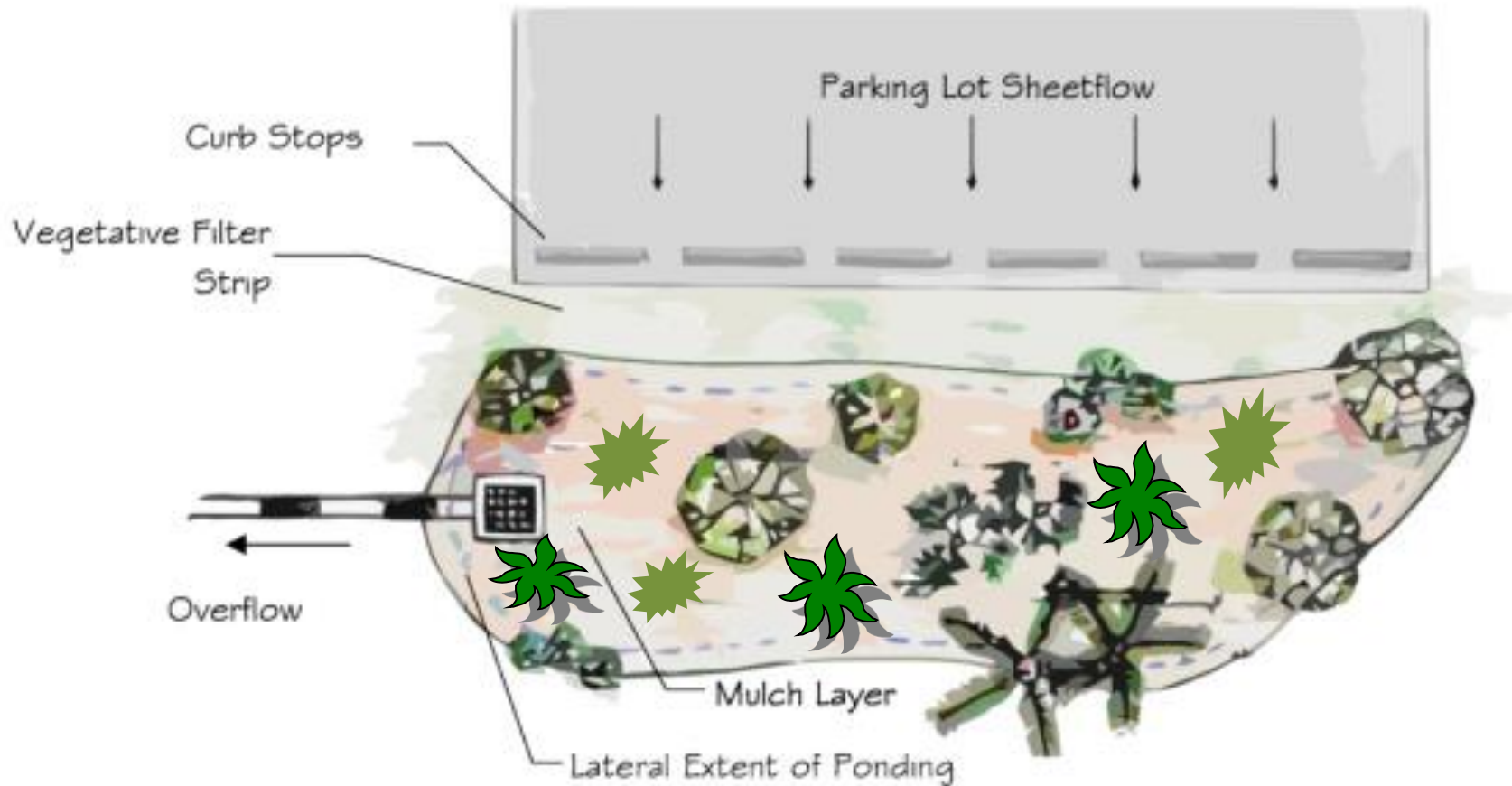
LOW IMPACT DEVELOPMENT

Pollutant Removal

- **Retention basins and swales**
- **Pervious pavement**
- **Filter strips**
- **Greenroofs**
- **Stormwater harvesting**
- **Biofiltration systems**



Plan View of a Parking Lot Bioretention Basin



Parking Lot Treatment Swale





From an ERP perspective,
retention by any other name...



is still retention.

A swale



is a swale



is a swale.

Pervious Pavement: It Aint What it Used to Be

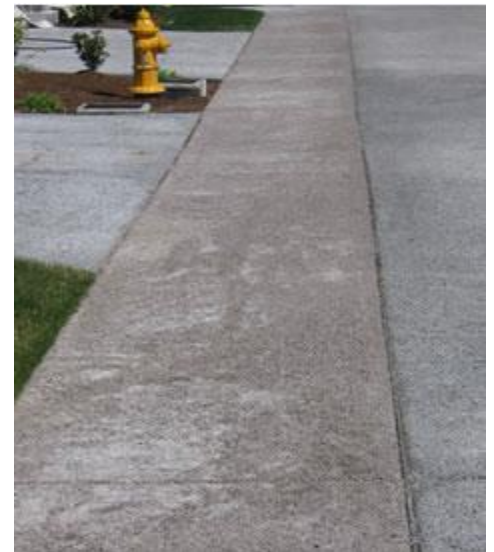



- Improved products
- Better construction supervision (using specialized construction crews trained and certified by the product manufacturer)
- Better designs and maintenance procedures



www.stormwater.ucf.edu

Pervious Pavement – Lots of options to choose from ...





From an ERP perspective,
pervious pavement is just a
retention pond with cars on top.

Hank Higginbotham

04/22/2008 11:22 am

Right LID Practice, Right Place

- Porous pavement works best over permeable soils with a deep water table.
- Traffic must be restricted to exclude heavy vehicles.
- Not advisable in areas with high levels of off-site sediment input.

Modular Concrete Pavers

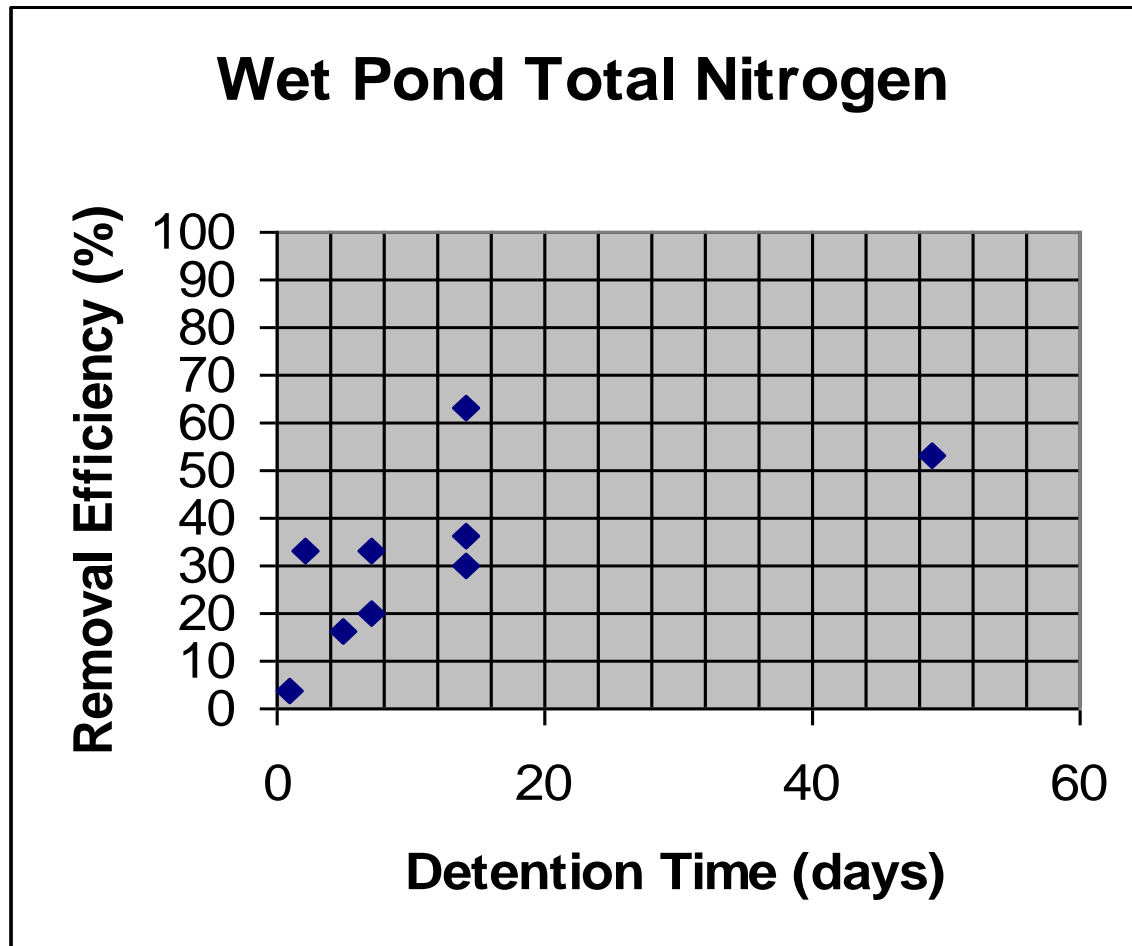


(be careful about Federal ADA requirements)

Wet Detention Nutrient Removal Efficiency

42% N removal, 77% P removal

That's as good as it gets!

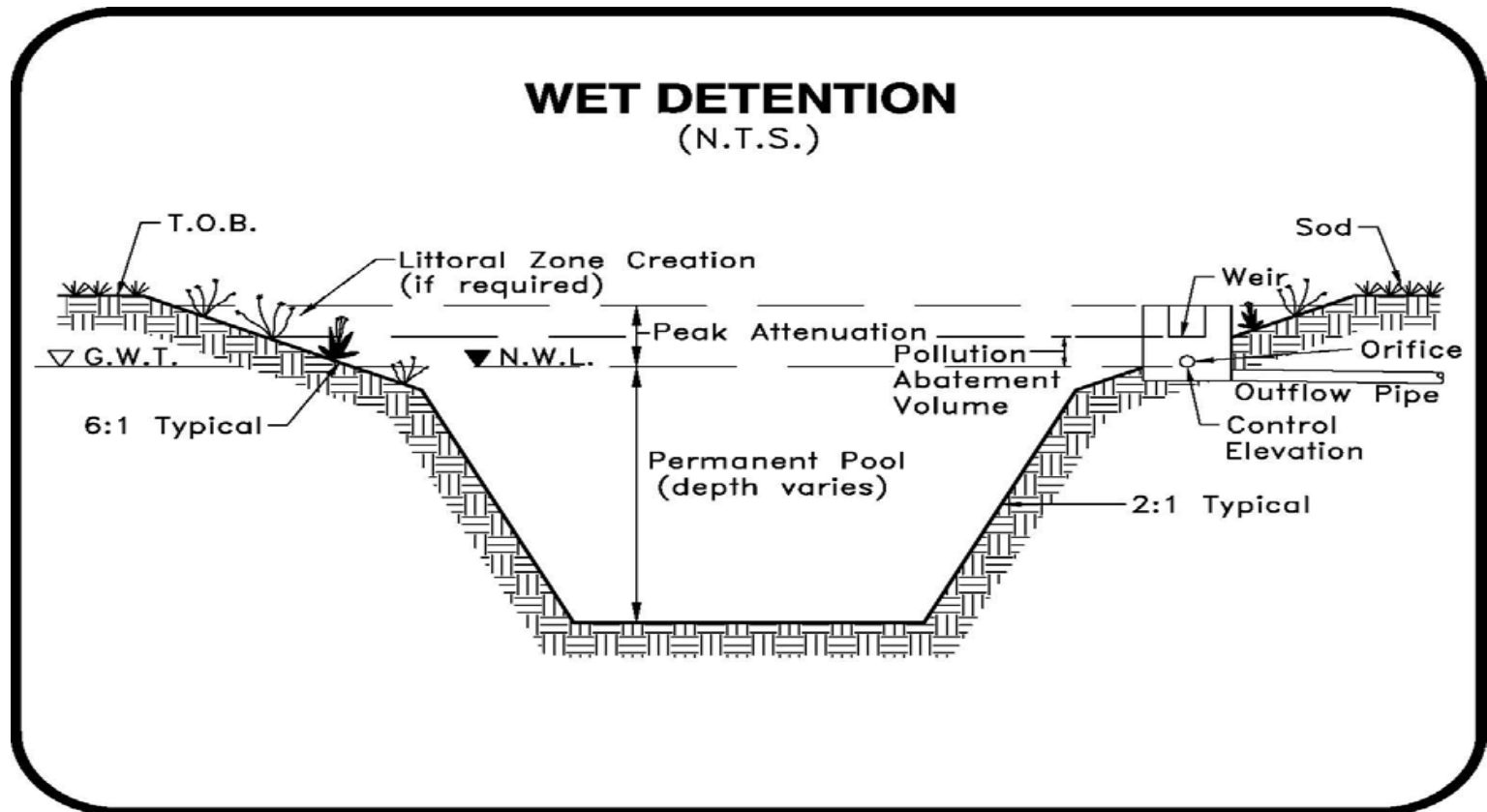


A photograph of a wet detention pond. In the foreground, a concrete spillway with two openings is visible, with water flowing over it. To the right of the spillway is a large, rectangular, dark-colored structure, possibly a pump or a storage tank. The pond is surrounded by green grass and trees. In the background, a white pickup truck and a boat on a trailer are parked on a paved area.

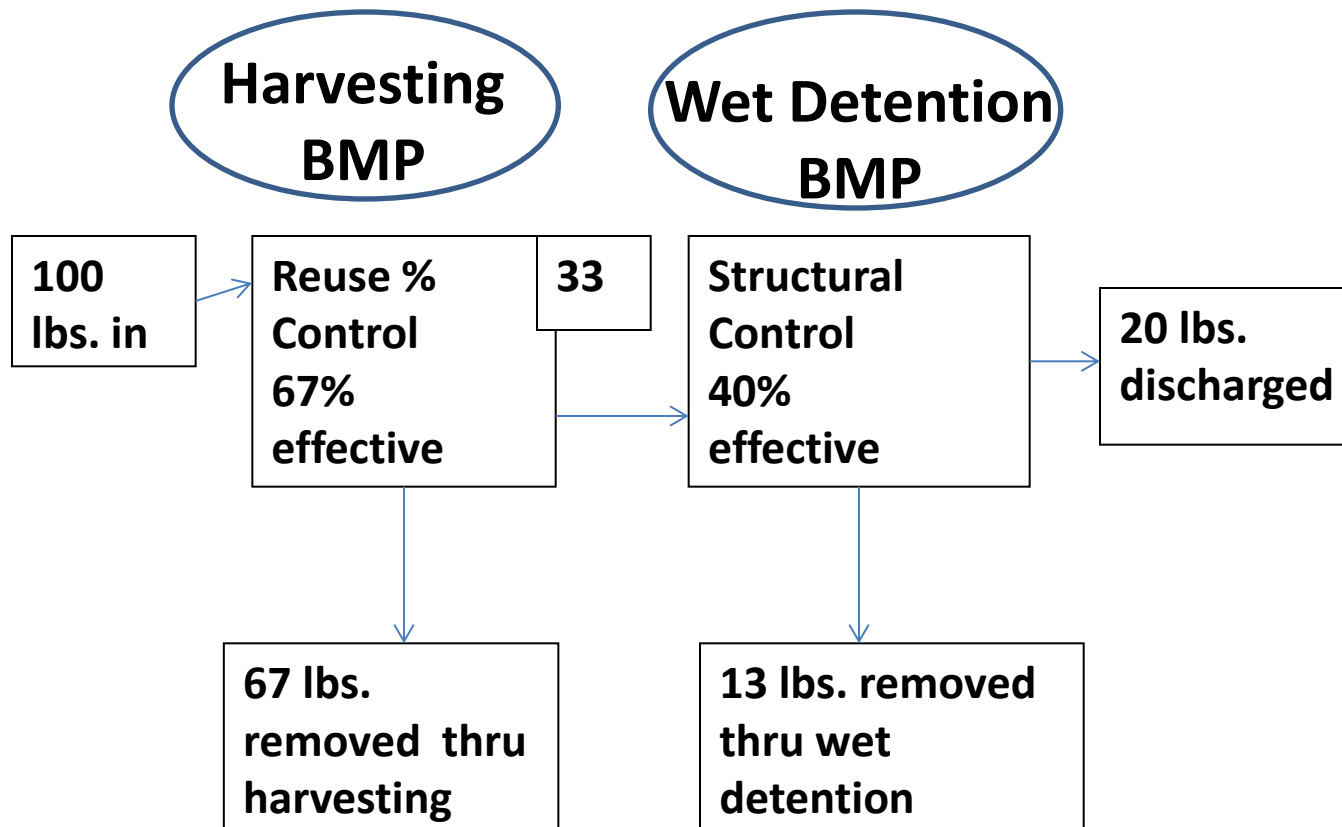
How can we improve the effectiveness of conventional wet detention systems?

1. Reduce pollutant discharges to the pond (source controls).
2. Reduce discharges from the pond (stormwater harvesting).

Stormwater Harvesting Ponds are Just Modified Wet Detention Ponds



Nutrient Removal is Enhanced by Combining Wet Detention with Reuse



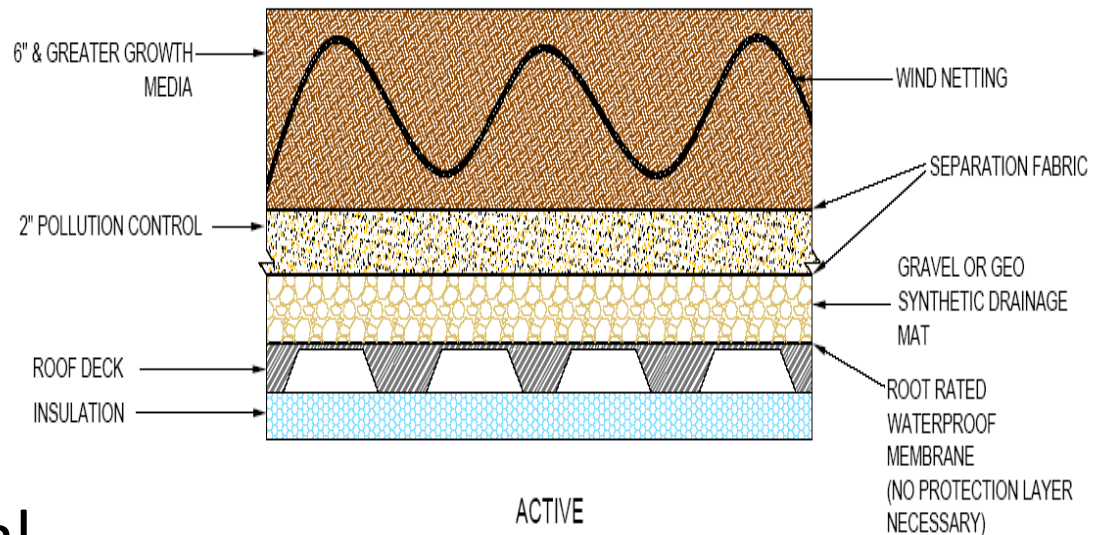
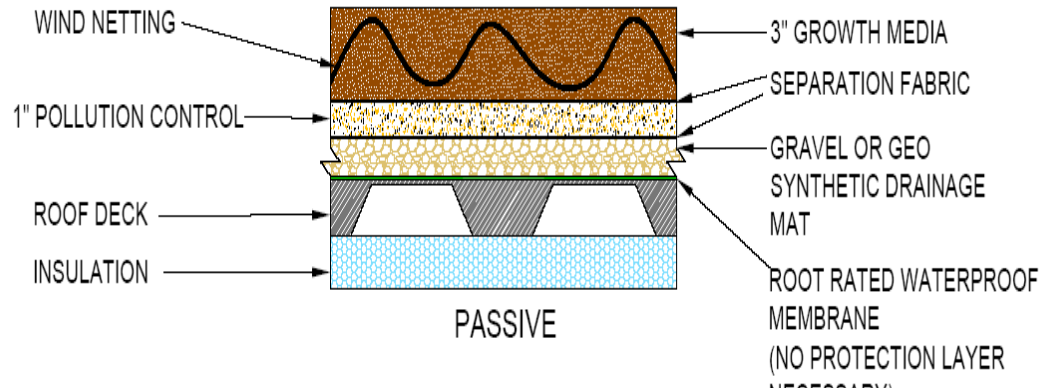
Greenroofs



GREENROOFS IN FLORIDA

- UCF Student Union, Physical Science and Stormwater Lab (3)
- FSGE (Envirohome) (2) in Indialantic
- Bonita Bay (first one and has been modified for irrigation)
- New American Home in Orlando
- Charlotte County Stadium
- UF Perry Construction Yard Building
- Tecta-America Building in Sanford
- Romano Eco Center in Lake Worth
- Honda Headquarters in Clermont
- Escambia County One Stop Permit Building
- Residence on Casey Key
- Orlando Fire Station #1
- Environmental Center, Key West
- Kimley-Horn in Vero Beach
- Gulf Coast College in Panama City

Greenroof Design Sections



Source: Sarasota
County LID Manual

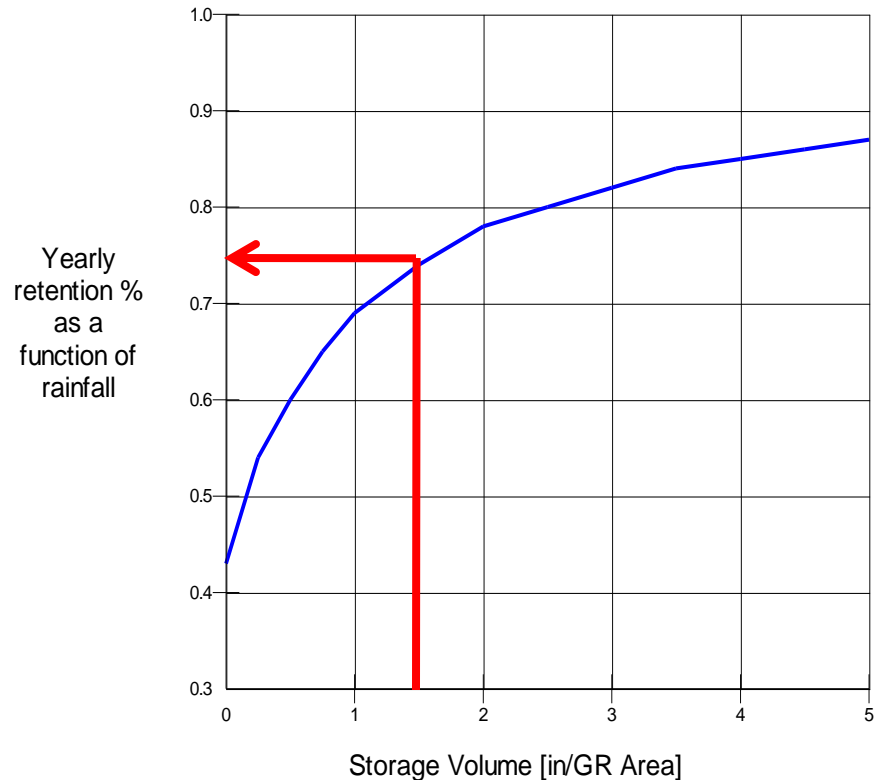
CSTORM Model for UCF Greenroof Cistern Design

Ref: Mike Hardin Thesis UCF M.S.

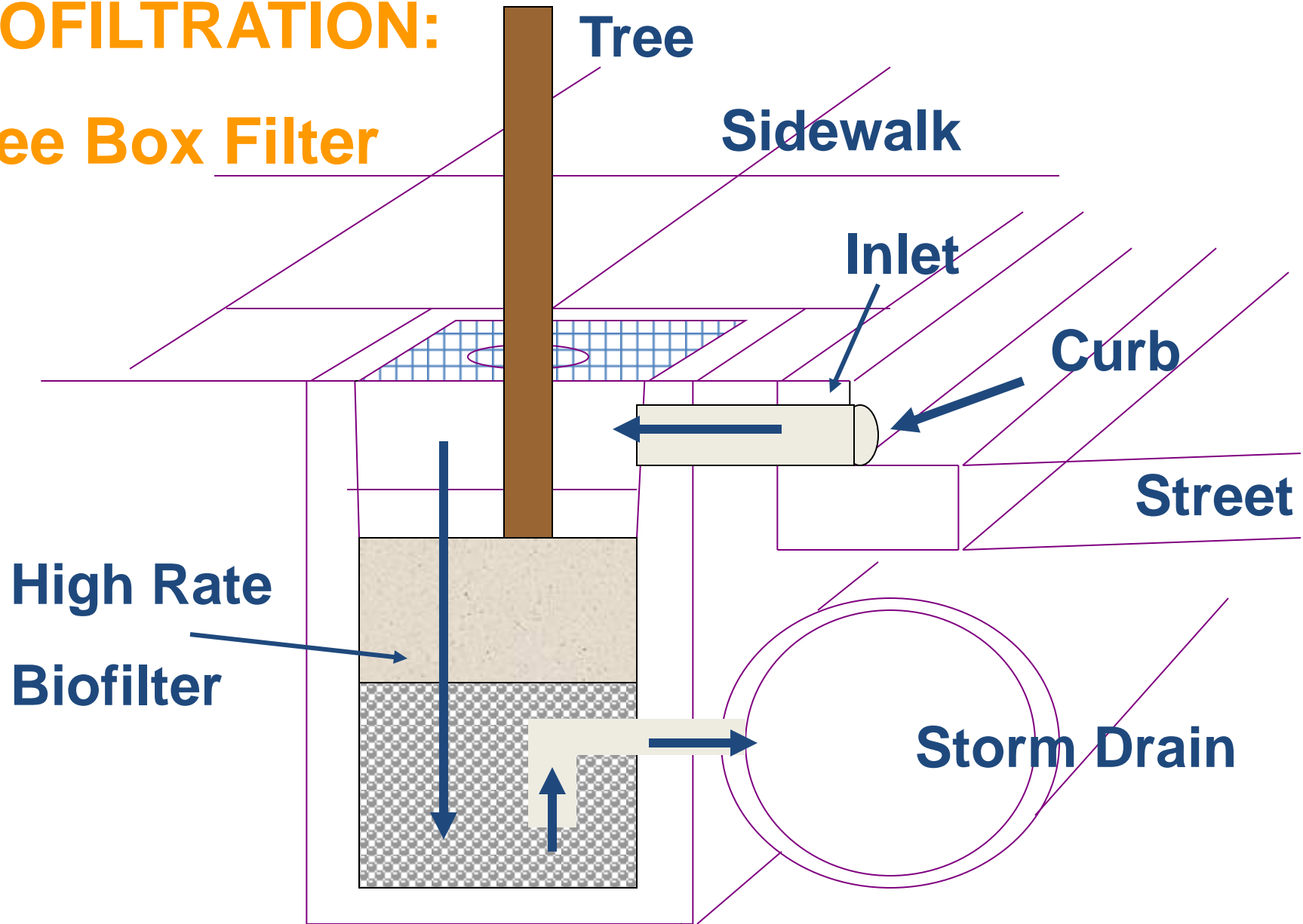
UCF greenroof achieves 75%
efficiency with cistern storing 1.6"
rain (1 gal. per sq. ft.)



Reuse Curve for Station 6628 Orlando FL 1 in
irrigation per week 30 years of dat



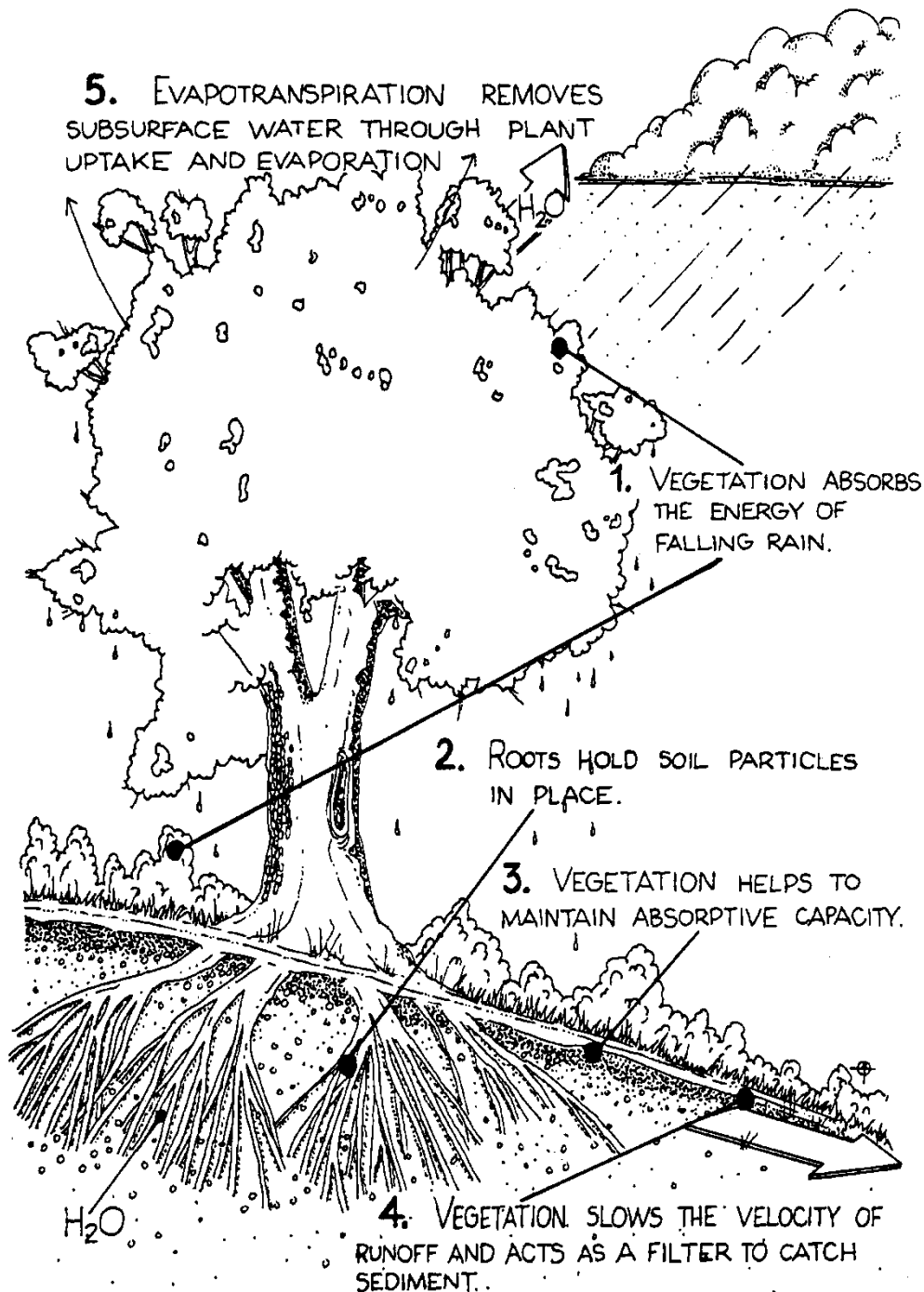
BIOFILTRATION: Tree Box Filter





**Street tree
stormwater filters**





**Trees are
stormwater
BMPs!**

**Planting trees
in urban areas
intercepts and
evaporates
rain and
reduces
stormwater
runoff.**

**Florida Friendly
Landscaping is an
effective means
of source control.**



**Florida
Friendly
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Thank You!