

Where should we be going?

www.houstonLWSforum.org



Unique experience over the past 2-1/2 years

**Whose
raindrop is it?**
A shifting paradigm



Private ➔ Public Responsibility Shift



From 'it's mine' to 'you take care of it!'



Farmers Objective – Capture and retain as much moisture as possible
Homeowners Objective – Drain and remove rainfall as quickly as possible

Public ➔ Shared Responsibility Shift



It's 'Our' Raindrop

What's wrong with 'Public' Responsibility?

- **Full responsibility on our public agencies is unsustainable in the long term**
 - Unsupportable economic burden
 - ✦ Promotes 'disposal' methodology for valuable resource
 - Ongoing urbanization and development exacerbate problems
 - ✦ Increasingly challenging flooding problems
 - ✦ Increasingly challenging water quality problems
 - ✦ Dramatic reductions in habitat
 - ✦ Eroding environmental quality of life

THE BOTTOM LINE:

Controlling and treating storm water solely through a centralized system is impractical

- ❑ Houston population to double in next 40 years
- ❑ Can't build it big enough, wide enough, deep enough, fast enough....nor can we pay for it.
- ❑ Traditional infrastructure based on the proposition that storm water is a waste product with a cost of disposal
- ❑ Reality of the finite nature of water becoming more widely understood

Why 'Shared' Responsibility?



- **Economic Question to ponder is, which is less costly?**
 - Property Owner handling the raindrop where it falls
 - Property Owner passing the raindrop to Public Entity
- **Green Infrastructure (LID) techniques provide simple, low-cost controls that enable the shift of some responsibility back to the property owner.**
 - Property owners, like farmers can hold on to much of their water resources
 - Dovetails with growing awareness of the scarcity and cost of water (valuable resource vs. disposal mentality)
- **Small-scale, site-based, integrated practices produce significant cumulative results**

How the 'Shared' Raindrop Works

Large-scale regional
controls



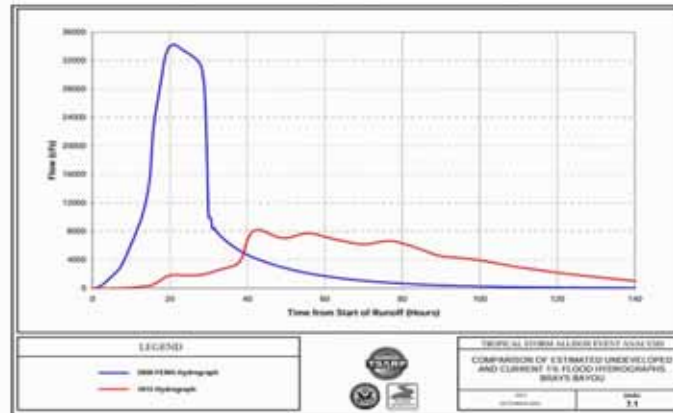
Small-scale, site-level
controls



- **Distributed, decentralized, multi-functional, multi-benefit controls**
 - Uniform distribution of small-scale controls
 - Land use is maximized
 - Storm water is managed in the 'landscape'
- **Integrate management practices**
 - Total costs are lowered
 - × Higher design costs
 - × Lower infrastructure costs
 - × Lower total cost of development

Capture, clean passively, store, reuse on the site where it hits the ground

What Does Green Infrastructure Do?



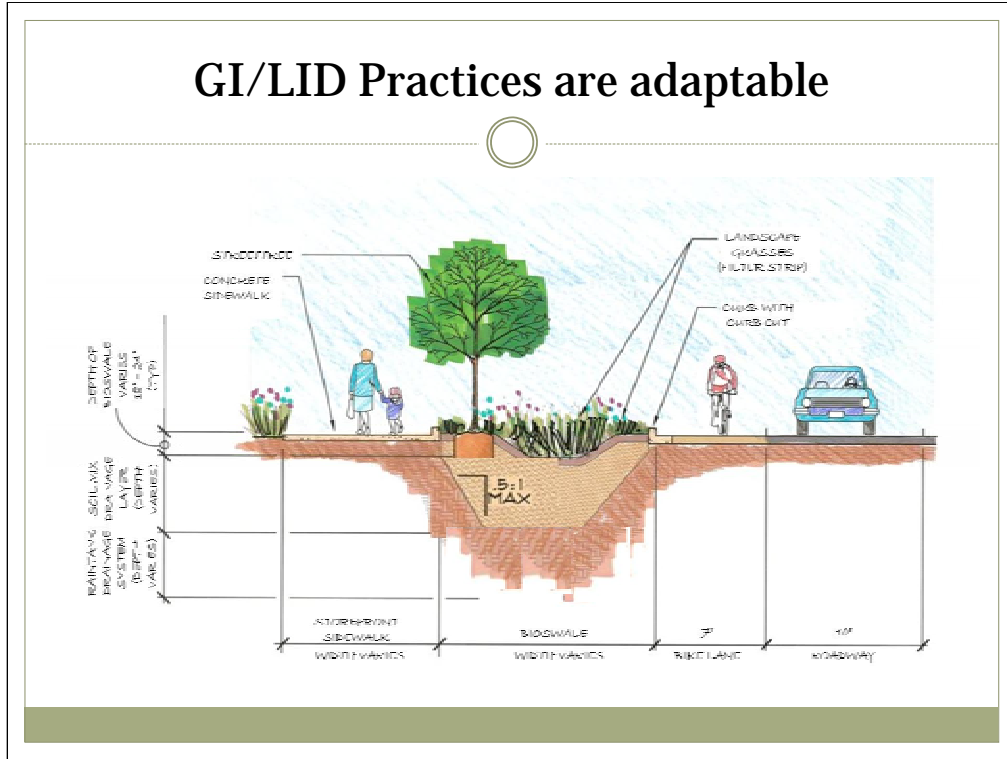
White Oak and Brays Hydrographs: 1915 & 2000

Blue line shows 2000 concentrated urban runoff; red line shows 1915 pre-urbanized runoff

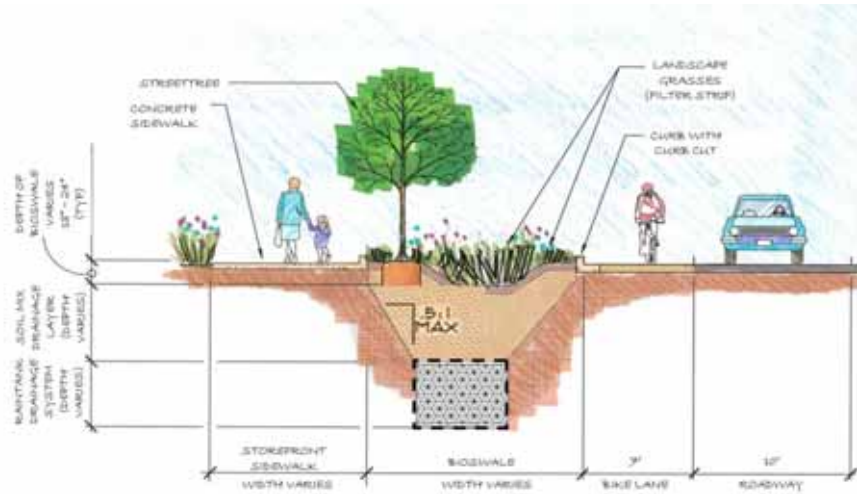
Small-scale, distributed, incremental controls which cumulatively have a significant impact.

CUMMULATIVE EFFECT (go to hydrograph) Lengthen Time of Concentration

GI/LID Practices are adaptable



GI/LID Practices are adaptable



GI/LID Practices are unlimited

- **Bioretention / Rain Gardens**
- **Strategic Grading**
- **Site Finger Printing**
- **Resource Conservation**
- **Flatter Wider Swales**
- **Flatter Slopes**
- **Long Flow Paths**
- **Tree / Shrub Depression**
- **Turf Depression**
- **Landscape Island Storage**
- **Rooftop Detention /Retention**
- **Roof Leader Disconnection**
- **Parking Lot / Street Storage**
- **Smaller Culverts, Pipes & Inlets**
- **Amended soils**
- **Alternative materials**
- **Tree Box Filters**
- **Alternative Impervious Surfaces**
- **Reduce Impervious Surface**
- **Surface Roughness Technology**
- **Rain Barrels / Cisterns / Water Use**
- **Catch Basins / Seepage Pits**
- **Sidewalk Storage**
- **Vegetative Swales, Buffers & Strips**
- **Infiltration Swales & Trenches**
- **Eliminate Curb and Gutter**
- **Shoulder Vegetation**
- **Maximize Sheet flow**
- **Maintain Drainage Patterns**
- **Green Roofs**
- **Reforestation**

"Creative Techniques to Treat, Use, Store, Retain, Detain and Recharge"

How do we make the shift happen?



- Local government leads by example
- We allow the market to drive demand
- We don't feel the need to reinvent the wheel
- We remove the obstacles
- Educate, educate, educate



**Local
government
leads by
example**

- **Adopt LID/Green Infrastructure standards for all new public construction**
- **Retrofit with LID/Green Infrastructure tools as renovations and upgrades required**
- **Learn from the LEED® experience**
- **Size and scope of the effort to drive public awareness of the issues and alternatives will determine speed of success**



**Local
government
leads by
example**

- **Emphasize & energize public-private collaborations that educate**
 - HLWSF experience
 - ✦ Design professionals, developers, local government collaborate
 - ✦ LID Design Competition going on NOW
 - Learn from Kansas City's "10,000 Raingardens" experience
 - ✦ Educating the public about the realities of the 'shared' raindrop
 - ✦ Laying the foundation for private landowner responsibility
- **Take maximum advantage of the 'marketing' opportunities offered by public projects**



**Allow
market to
drive
demand**

- **Adopt LID/Green Infrastructure ordinances in support of the market, not as a hammer to force it**
 - HC/COH made the right choice when early-stage LID regulations announced
- **Economics in favor of LID/Green Infrastructure**
 - The market can and will drive this change, as it has with Green Building
- **Education and raising awareness are key elements**
 - Local government voice should be concerted, clear, high profile
 - Perception of GI is critical element



**Don't
reinvent the
wheel**

- **Our Volume-Based Hydrology methodology is ideal platform**
- **Create guidance for designers that folds LID/Green Infrastructure tools into local volume-based hydrology model**
 - Build on experience and models developed elsewhere
 - Runoff Reduction Method experience is widespread
- **Numerous examples of design guidance, codes and ordinances**
- **No issues that haven't already been resolved elsewhere**



Remove the obstacles

- **Fully exploit existing regulations**
 - Part of resolution to underfunding
 - ✦ SWPPP enforcement
 - ✦ SWQ permitting and enforcement
 - Insist on viable implementation of Bacteria TMDL
 - ✦ Must address the real issues
- **Implement meaningful SWQ standards**
 - Lots of examples that work
- **Reduce obstacles in local development codes**
- **Develop incentives that motivate**
 - Appropriate that they reflect our priorities

Remove the obstacles

- **Resolve TCEQ's conflicting positions on Green Infrastructure**
 - One hand promotes, the other disallows GI infrastructure reimbursements to developers
- **Resolve wastewater reuse regulatory conflicts**
 - Simplify permitting
 - Resolve direct/indirect reuse conflicts
- **Resolve Class V Injection Well characterization of GI features**
 - Update guidance and construction requirements to accommodate GI

Developer reimbursements:

- designates some facilities as amenities and not as detention facilities
- Texas Water Development Board (TWDB) is working to incentivize rain water harvesting. Developers are not yet allowed, per county regulations, to have smaller water lines if rain water harvesting is implemented in the development, but less water would be used because 50% of water currently used goes toward irrigation.



5 years out

Fully engaged

- Broadening base of local experience on which to draw
- Developers, HOAs, garden clubs and other groups leading the charge
- Now able to see and measure incremental progress
- Experiencing 'aha' moments on a regular basis
 - Example sites being monitored

10 years out

Sustainable development methods are the norm

- Sustainable development methods are the norm
- Most common marketing pitch for new communities will address quality of life in terms of the landscape (suburban and urban)
 - Developers group preparing launch
- First 1-2 inches of rainfall
 - Being treated for pollutant load in the landscape
 - Not leaving the site
- Water reuse is common practice

20 years out

**Bayou City,
Sustainable
City**



**Green roofs and green walls will be
mainstream**

20 years out

**Bayou City,
Sustainable
City**



Parking lots will treat polluted runoff in the landscape islands

20 years out

**Bayou City,
Sustainable
City**



**Roadway runoff will be treated
naturally at the side of the road**

20 years out

**Bayou City,
Sustainable
City**



**Potable water will not be used for
irrigation**



20 years out

**Bayou City,
Sustainable
City**

**Toilet Flushing
Irrigation
Car Washing
Cooling Water
Fire Fighting**

**Recycled wastewater will be used in
many ways**

20 years out

**Bayou City,
Sustainable
City**



**'Bayou City' will reflect it's name in
a more pervasive way**

Be there for the Finals Event



**LOW IMPACT DEVELOPMENT
COMPETITION**

DESIGN

JANUARY 27TH

