LID in Houston

What's Important for Successful Implementation

Economics drive adoption and implementation

- ‘Cheaper and Better’ overcomes resistance to change
- LID originally developed to lower cost of regulatory compliance

Performance trumps prescription

- Managing the LID/GI paradigm requires different strategies than the 2000 year old paradigm
- Institutionalizing innovation a must in a rapidly evolving discipline

What’s Important

What's Important

Constructability, maintainability and reliability must be critical considerations

- Forgetting about one of these invites failure

Construction oversight and post-construction performance verification insure viability

- It may be landscape, but it is also the drainage system

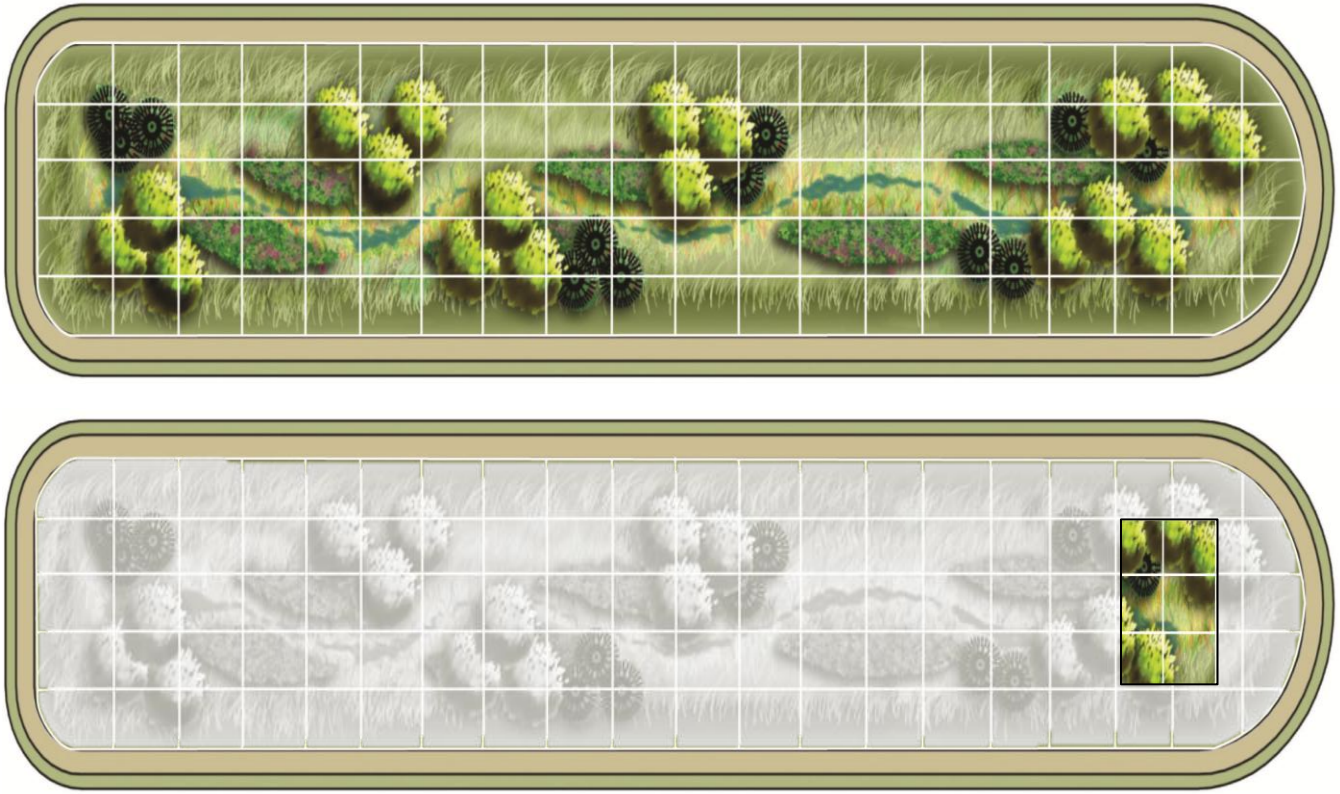
Vendor/supplier lifecycle commitment to installed systems is crucial

- Maintenance resources must be part of the package

IMPORTANT BMP TREND

- Envisioned by Harris County LID Design Guide
  - Address concerns about performance, reliability, maintenance of traditional bioretention systems
  - Minimum 30”/hour infiltration rate required
- Primary bioretention practice in Houston Area
  - Higher flow rates reduce footprint and enable multiple benefits

High Performance Bioretention Systems



High Performance Bioretention Systems

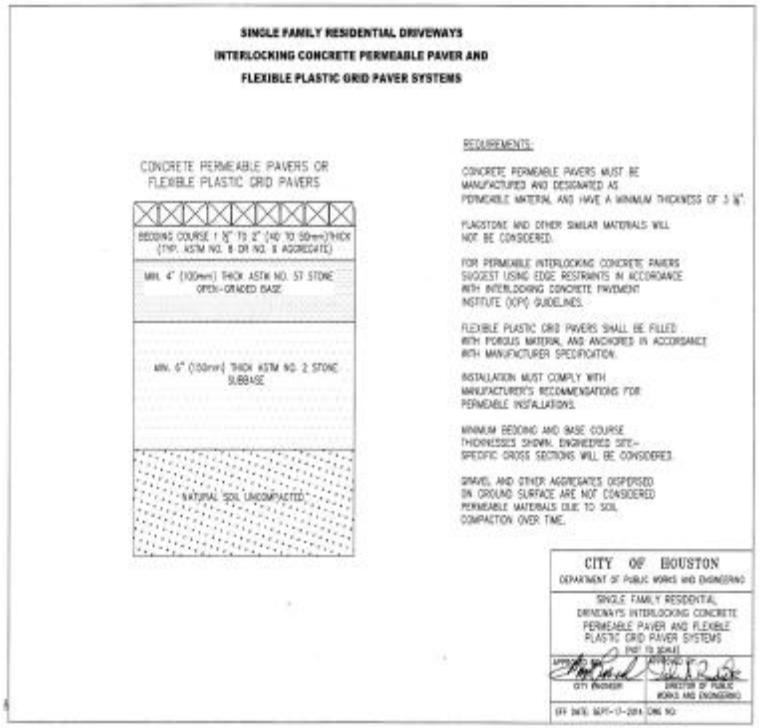
- Smaller scale high flow rate systems
  - Increase utilization and application opportunities
  - Require less land to implement
  - Allow for ‘factors of safety’
  - Improve construction sequencing options
  - Lower construction costs
  - Lower maintenance costs
  - Improve reliability

High Performance Bioretention Systems

IMPORTANT BMP TREND

- City of Houston stormwater management code encourages use of porous pavement systems
  - Porous pavement surface area is considered 'undeveloped' for purposes of detention volume calculations
  - Void space in subsurface rock layer counts toward site detention volume

Porous Pavement/ Detention Systems



SINGLE FAMILY RESIDENTIAL DRIVEWAYS
INTERLOCKING CONCRETE PERMEABLE PAVER AND
FLEXIBLE PLASTIC GRID PAVER SYSTEMS

CONCRETE PERMEABLE PAVERS OR
FLEXIBLE PLASTIC GRID PAVERS

BEDDING COURSE 1 ½" TO 2" (40 TO 50mm) THICK (TYP. ASTM NO. 8 OR NO. 9 AGGREGATE)

MIN. 4" (100mm) THICK ASTM NO. 57 STONE OPEN-GRADED BASE

MIN. 6" (150mm) THICK ASTM NO. 2 STONE SUBBASE

NATURAL SOIL UNCOMPACTED

REQUIREMENTS:

CONCRETE PERMEABLE PAVERS MUST BE MANUFACTURED AND DESIGNATED AS PERMEABLE MATERIAL AND HAVE A MINIMUM THICKNESS OF 3 ⅛".

FLAGSTONE AND OTHER SIMILAR MATERIALS WILL NOT BE CONSIDERED.

FOR PERMEABLE INTERLOCKING CONCRETE PAVERS SUGGEST USING EDGE RESTRAINTS IN ACCORDANCE WITH INTERLOCKING CONCRETE PAVEMENT INSTITUTE (ICPI) GUIDELINES.

FLEXIBLE PLASTIC GRID PAVERS SHALL BE FILLED WITH POROUS MATERIAL AND ANCHORED IN ACCORDANCE WITH MANUFACTURER SPECIFICATION.

INSTALLATION MUST COMPLY WITH MANUFACTURER'S RECOMMENDATIONS FOR PERMEABLE INSTALLATIONS.

MINIMUM BEDDING AND BASE COURSE THICKNESSES SHOWN. ENGINEERED SITE-SPECIFIC CROSS SECTIONS WILL BE CONSIDERED.

GRAVEL AND OTHER AGGREGATES DISPERSED ON GROUND SURFACE ARE NOT CONSIDERED PERMEABLE MATERIALS DUE TO SOIL COMPACTION OVER TIME.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

SINGLE FAMILY RESIDENTIAL DRIVEWAYS INTERLOCKING CONCRETE PERMEABLE PAVER AND FLEXIBLE PLASTIC GRID PAVER SYSTEMS
(NOT TO SCALE)

CITY ENGINEER

DIRECTOR OF PUBLIC WORKS AND ENGINEERING

EFF. DATE: SEPT-17-2014 DWG NO.

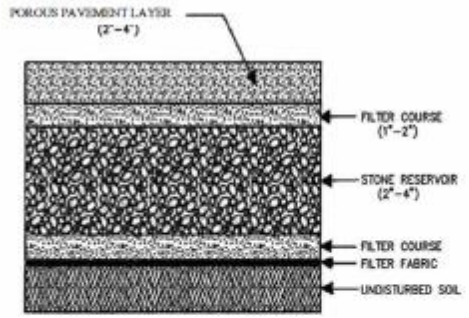


FIGURE 2b
POROUS PAVEMENT TYPICAL SECTION

Porous Pavement/ Detention Systems

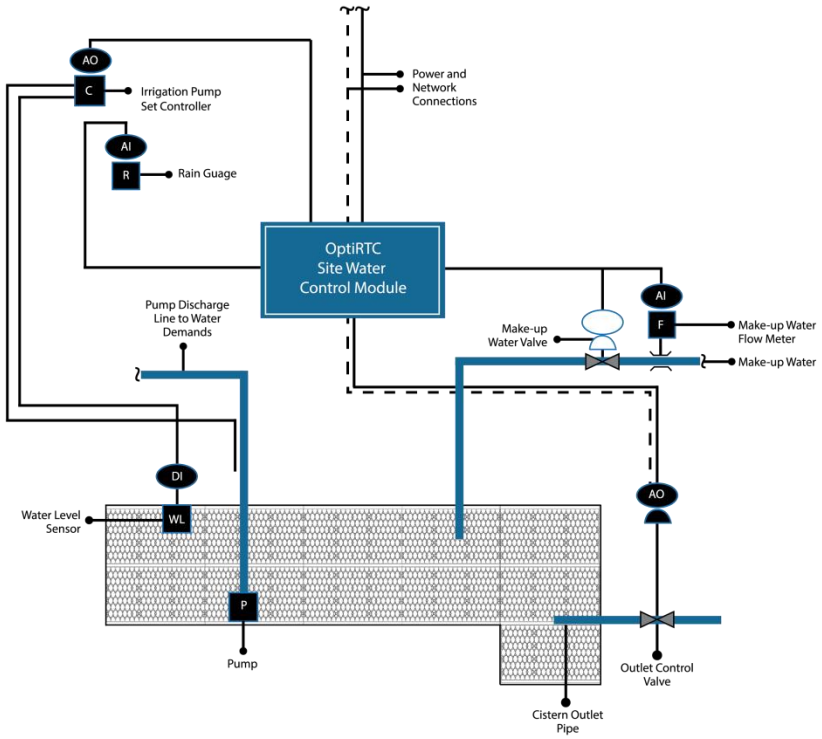
- Structural porous pavement/detention systems can eliminate detention ponds entirely on many sites
  - Traditional economic barriers to porous pavement eliminated
- Maintainability and maintenance cost remain key consideration
  - New technologies address these issues

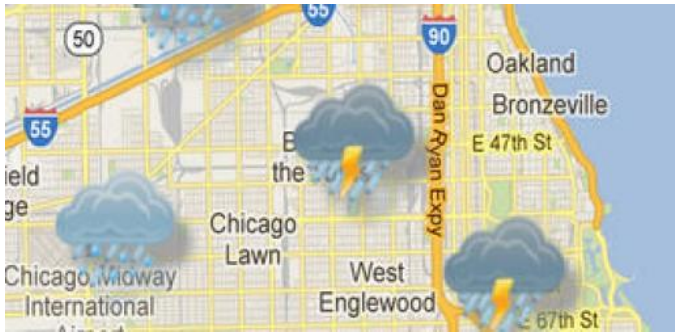
Porous Pavement/ Detention Systems

NEW BMP OPPORTUNITIES

- Store rainwater for irrigation requirements in commercial-scale detention facility while insuring full detention volume available when needed
- Common SCADA technology married with micro-scale weather forecasting data stream responds to both needs

Dual Detention/ Rainwater Harvesting





Dual Detention/ Rainwater Harvesting

- Harris County, City of Houston and Harris County Flood Control have agreed to permit these systems
- Simple, redundant, hands-off automated systems
- Can reduce ROI on rainwater harvesting at commercial-scale from 20 years to 4
- Can dramatically impact potable water demand

Dual Detention/ Rainwater Harvesting

"This really is an innovative approach, but I'm afraid we can't consider it. It's never been done before."

The process for easily and rapidly adopting innovation and new ideas must be integral to all processes

What's Important