Designing Infrastructure Projects Using Low Impact Development

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Agenda

What are we doing? :
Example Projects

How do we implement? :
Planning Considerations

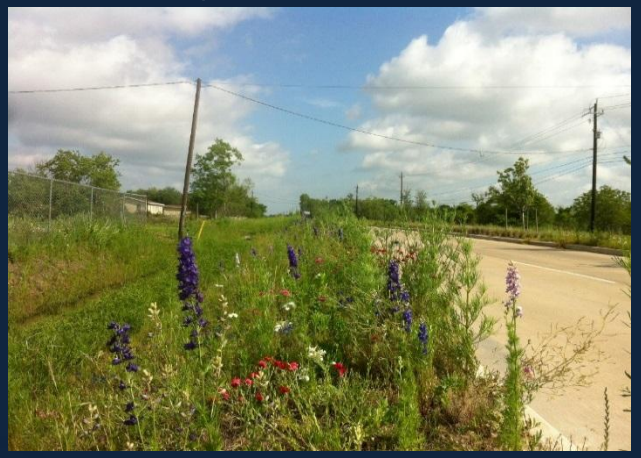
What is next?:
Recommendations

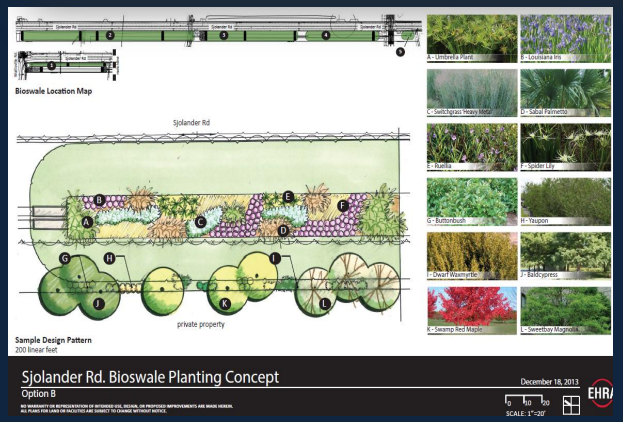
LID Criteria – Local Definition

Low Impact Development (LID) is a comprehensive land planning and engineering design approach with the goal of maintaining, as the minimum, the pre-development hydrologic regime in a watershed without solely using conventional development and detention basin techniques to satisfy drainage and flood mitigation requirements..

Typical conventional systems

What are we doing? LID Project Examples





What are we doing?

	Name	Location / Address	Project type	LID Feature(s)	Status	Engineer /Architect	Land Arch.
1	Birnamwood Dr.	25039 Birnamwood Blvd Spring, TX 77373	4 lane New Roadway	Bioswale, native grass seed, wildflowers, and potted plants	Complete	Klotz	Knudson
2	Evelyn Meador Library	2400 N Meyer Ave, Seabrook, TX	library	Bioswale, bioretention (rain gardens), wetland	Complete	K. English Architect	Asakura Robinson
3	Gene Green Park	6500 East Sam Houston Pkwy N, Houston	Park Development	Bioswale, Wetlands	Complete	Cobb Findley	Asakura Robinson
4	Gosling Rd	23637 Gosling Rd, Spring, TX 77389	Roadway Exapansion	bioretention	Design	SPI	Asakura Robinson
5	Holzworth North	2203 Spring Stuebner Rd, Spring, TX 77389	4 lane New Roadway	Bioswale, native grass seed, wildflowers, and potted plants	Complete	Klotz	Asakura Robinson
6	N. Main	7128 N. Main Street Baytown, TX 77521	Roadway Exapansion	Raingraden, vegetated swales, Costal Prairie Seed Mix, Flexterra hydromulch	Complete	Dannenbaum	Asakura Robinson
7	Sjolander Rd.	7500 Sjolander Rd. Baytown, TX 77521	Roadway expansion	Bioswale, native grass seed, wildflowers, and potted plants	Landscaping	EHRA	EHRA
8	Treaschwig A	4220 Treaschwig Rd, Spring, TX 77373	4 lane Road expansion	bioretention	Design	EHRA	TBD
9	Louetta	14519 Louetta Rd, Cypress, TX 77429	4 lane Road expansion	bioretention	Design	Zarenkelk	Talley Landscape
10	Riley Fuzzel	230 Riley Fuzzell Rd Spring, TX 77373	4 lane Road expansion	bioretention	Design	TSC	Knudson
11	Aldine Westfield	26900 Aldine Westfield Spring, TX 77373	4 lane Road expansion	TBD	Design	Isani	Kolby Davidson
12	Holdereith	n/a	4 lane New Roadway	TBD	Study	Binkley & Barfield	TBD
13	Annex 17	n/a	Site Complex	TBD	Study		TBD

- 13 projects
- 5 complete
- 1 Monitoring (Birnamwood)

Birnamwood Design Elements

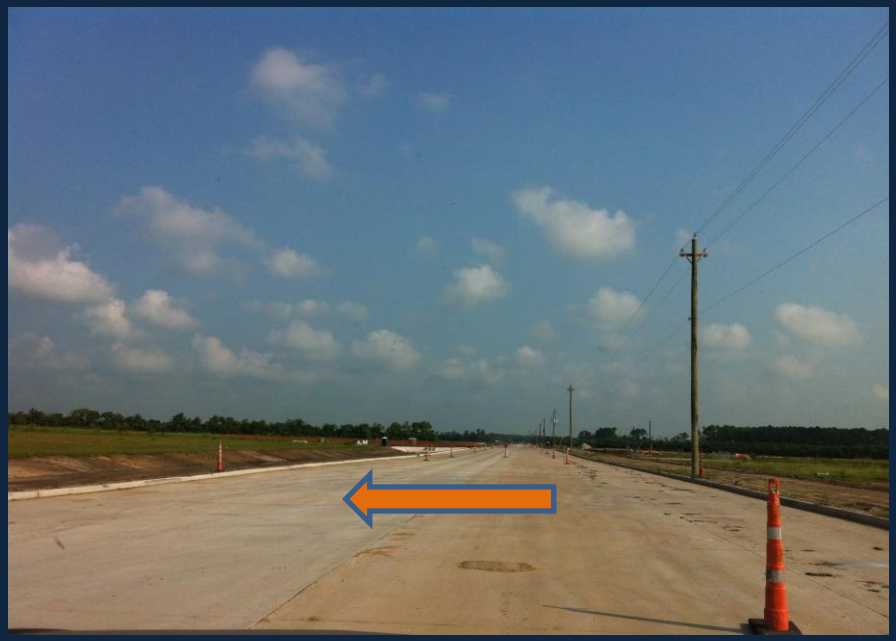
Center median bioswale, false curb inlets, berms, riprap

Birnamwood

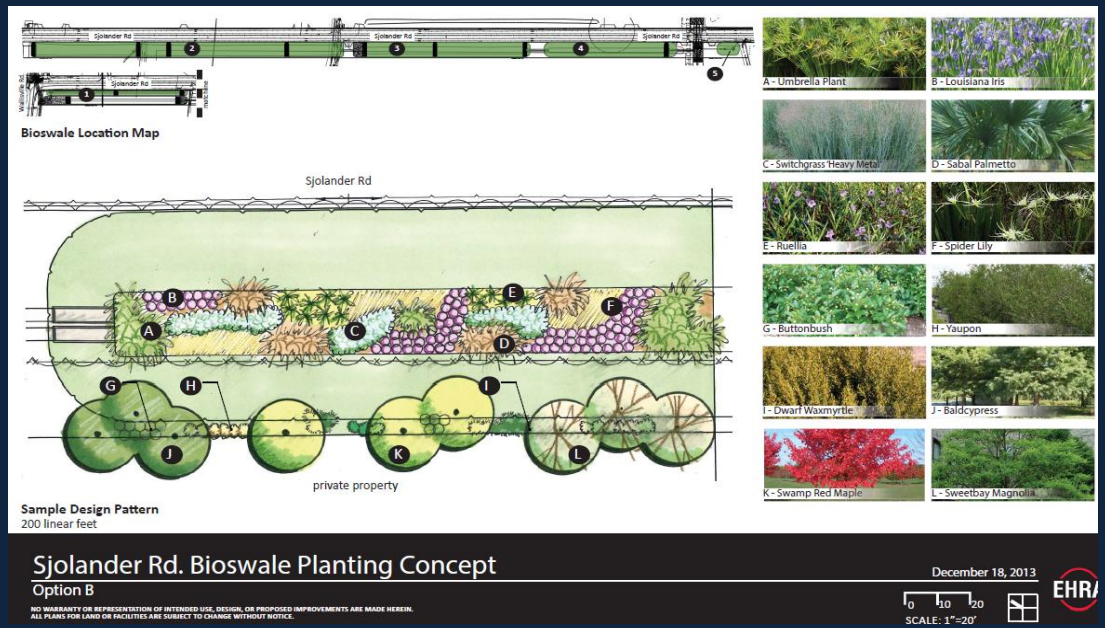
LID Design provided a cost effective, sustainable roadway leading to an anchor park along spring creek.

Monitoring Equipment

Sjolander



- Landscaping phase
- Tremendous (multi-million) cost savings due to 26 pipelines and a major water canal.
- LID provided a design solution.

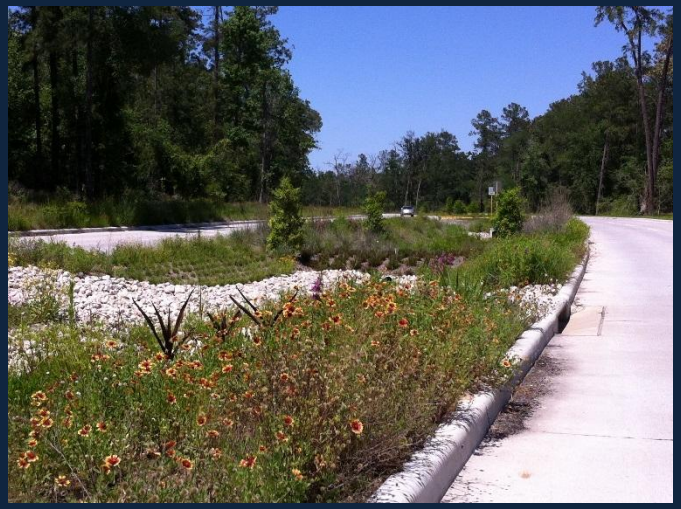


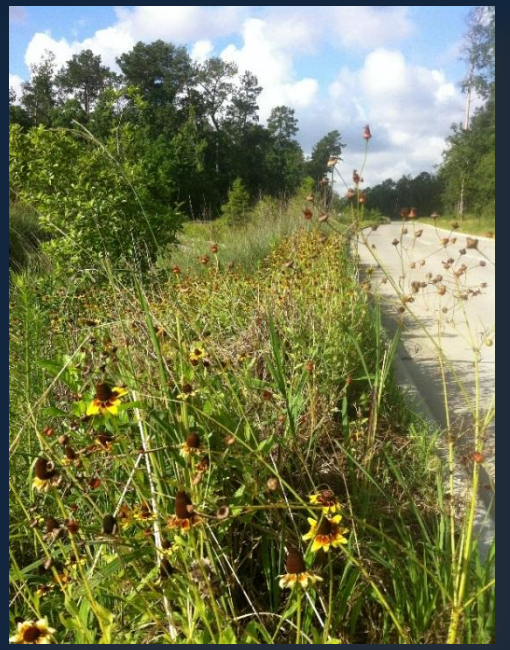
Holzworth North

- Landscaping recently completed.
- Same median swale design and biofiltration as Birnamwood.

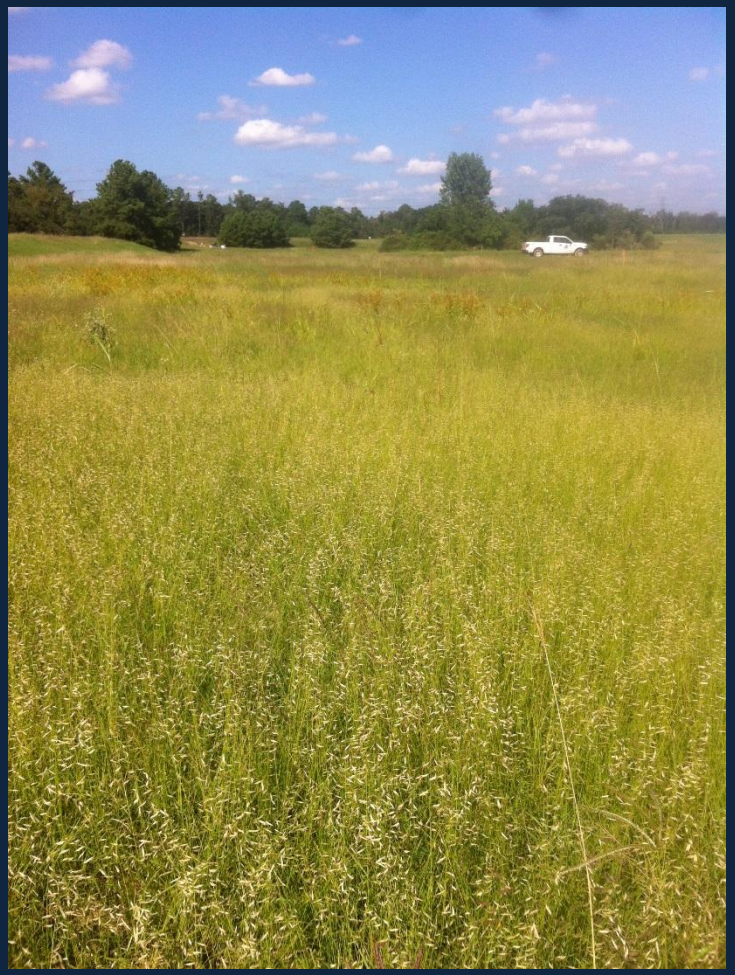
Design Elements – Native Plants

- LID may encourage use, but not specify/require.
- Statewide interest in native grass/plants for public projects.
- What grass will work?
- Everyone likes, & everyone doesn't like.
- Beauty is in the eye of…





Native Grass Mixes

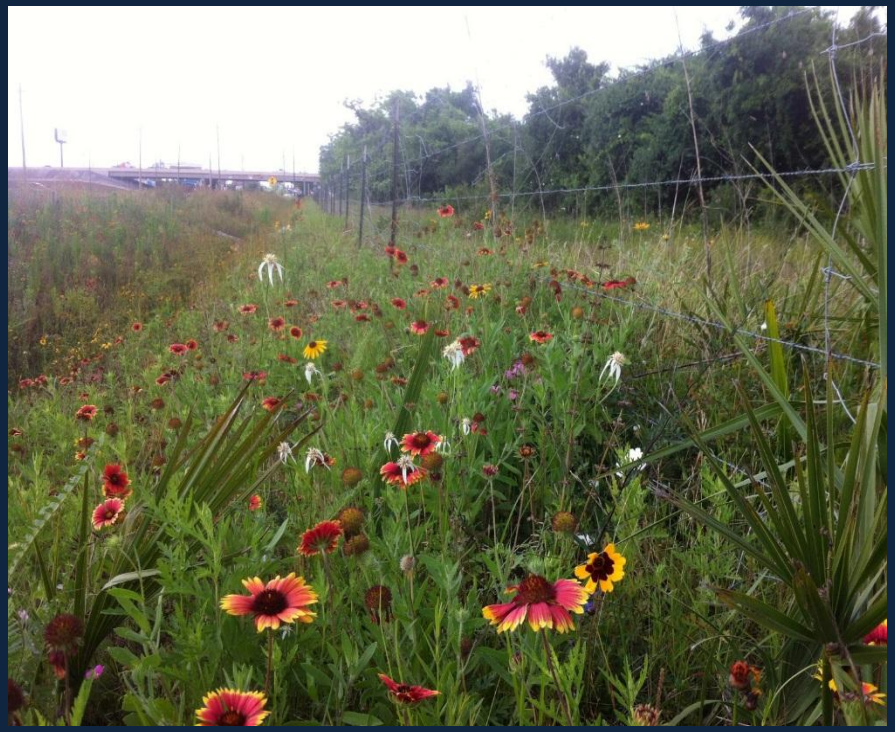


- Grass Test plots
- DK seed mix
- Hydromulch using HCFCD spec.
- Seeded in July
- No irrigation.

How do we implement?

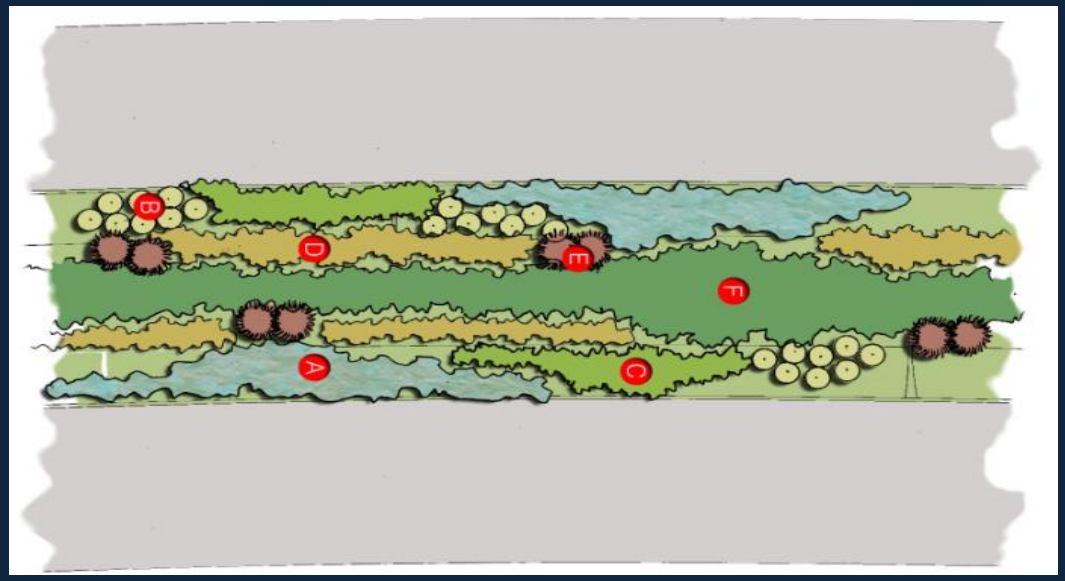
- First: Why?
- Environmental Benefits? Cost Effective? Pretty? Sustainable?
- A solution to complex problems….
- Right of way for detention & storm water quality.
- Reduced maintenance/mowing.
- Improved water quality.

- if some of these are challenges;
  managing runoff with LID
  may provide a solution.



How do we implement?

- So you decided to incorporate LID:
- Project type / Alignment / Pre-Design Phase
- LID Criteria : Pre-project meeting (speak with review agency)
- Drainage Report : Addressing SW Management is the focus.
  - Can this project manage stormwater within the project limits using LID?
  - In simple terms, find ways to distribute runoff storage.



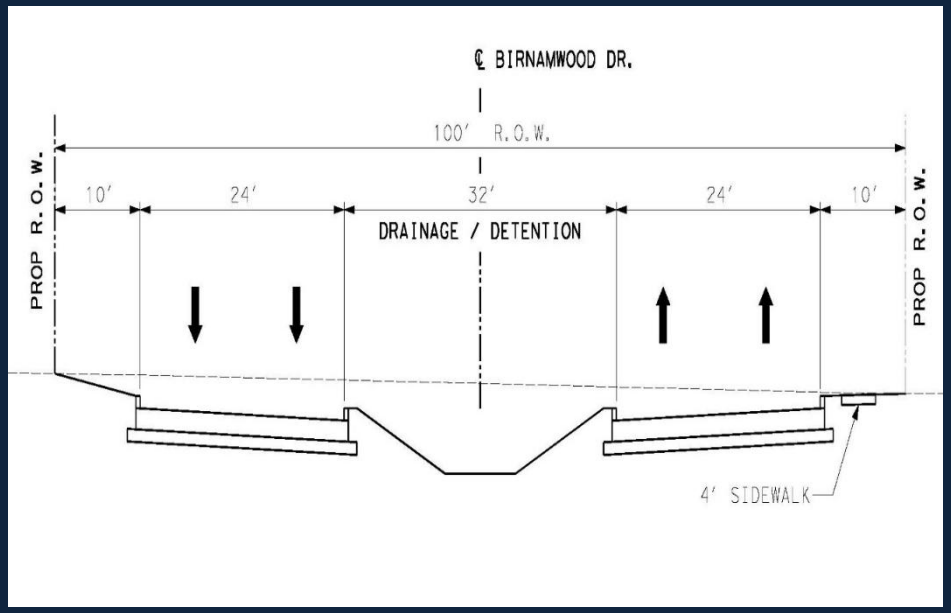
How do we implement?

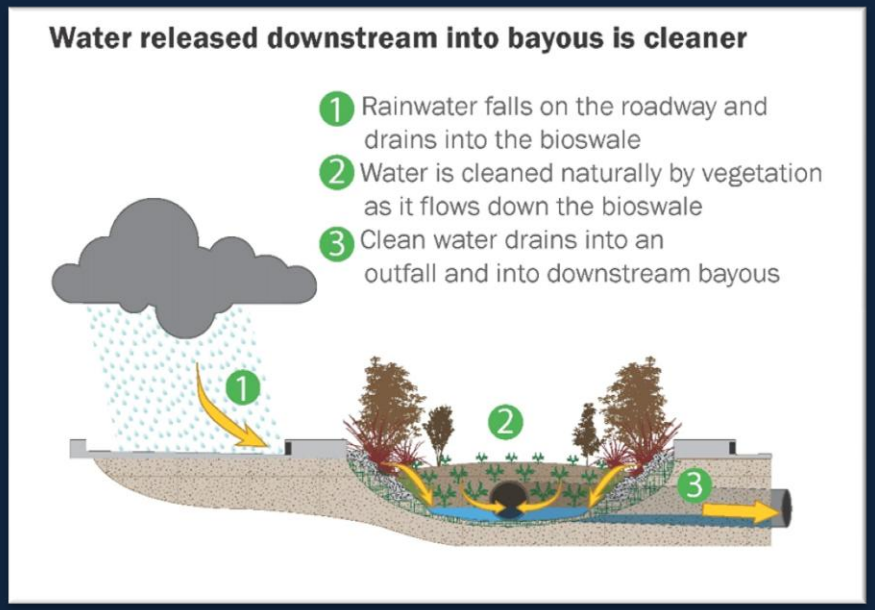
<u>Planning Considerations:</u>

- Consider the project goal.
- Evaluate project costs.
- Visualize the landscape plan.
- Discuss maintenance responsibilities.
- Determine vegetation establishment.
- Think outside the box.

- An interdisciplinary team is key:
  - Engineer/Architect / Landscape Architect / Environmental

Bioswale

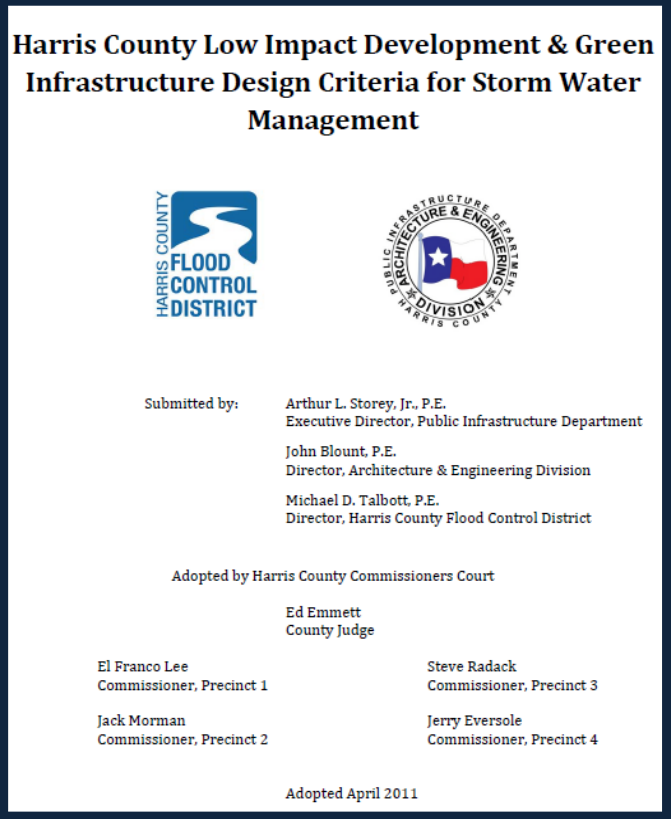




- Treat 1” water quality volume.
- Engineered soils at outfalls.
- False back curb Inlets.
- Reduce storm sewer pipe.

What do we need to do now?

- Track projects / share lessons learned.
- Evaluate local criteria as needed.
- Discuss WQ/runoff monitoring.
- Educate each other.
  - Meet those here today.
  - Attend LID conference in Jan.
- Build on current efforts:
  - Grants, projects, etc.



Harris County Low Impact Development & Green Infrastructure Design Criteria for Storm Water Management

HARRIS COUNTY FLOOD CONTROL DISTRICT

PUBLIC INFRASTRUCTURE DEPARTMENT HARRIS COUNTY ARCHITECTURE & ENGINEERING DIVISION

Submitted by:

Arthur L. Storey, Jr., P.E.
Executive Director, Public Infrastructure Department

John Blount, P.E.
Director, Architecture & Engineering Division

Michael D. Talbott, P.E.
Director, Harris County Flood Control District

Adopted by Harris County Commissioners Court

Ed Emmett
County Judge

El Franco Lee
Commissioner, Precinct 1

Steve Radack
Commissioner, Precinct 3

Jack Morman
Commissioner, Precinct 2

Jerry Eversole
Commissioner, Precinct 4

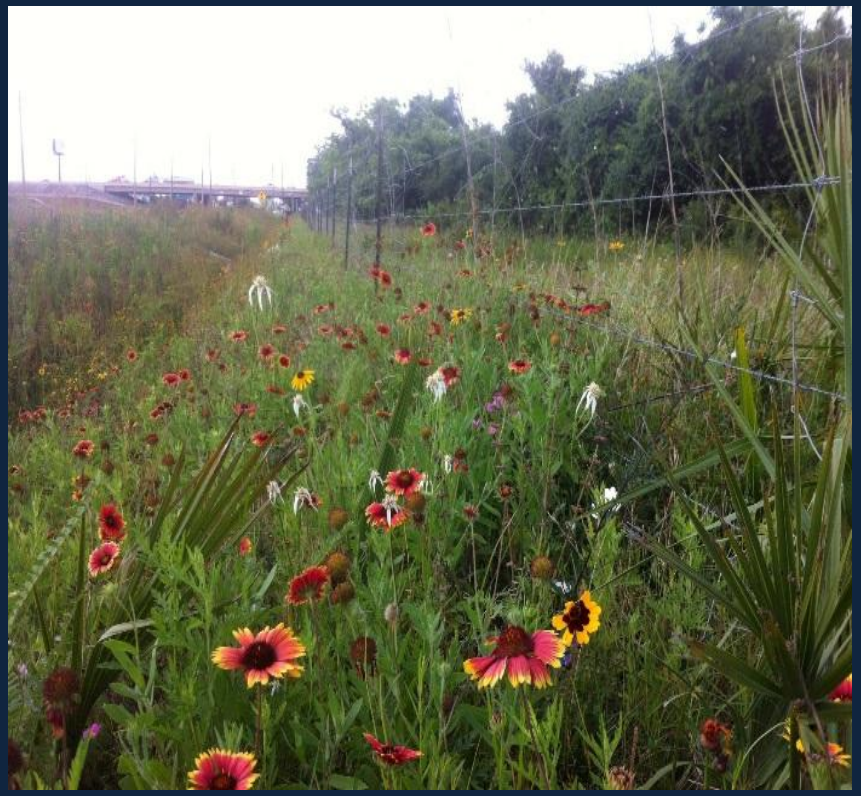
Adopted April 2011

What do we need to do now?

- LID in more parking lots.

Summary

- LID projects have been designed, constructed, and 1 is being monitored.
- LID has offered a cost-effective, unique solution, to complex issues.
- Several new projects moving into study and design phase that will evaluate LID as an option for the project.



Questions

- Nick.Russo@hcpid.org

Design Elements – Engineered Soil

- Focal Point Biofiltration System Treats the first 1” of runoff volume = between 2 to 3yr storm or (3-5 inches in 24hr.) at 2 outfalls.

- High Infiltration Rate – 100”/ hr

- Filtration areas offered a unique solution.

- Protection of media until vegetation is established was key.

Native / Adapted /Invasive Debate…

Not everyone is on board…

- Encourage native, caution criticism.
- Statewide interest in native grass/plants for public & oil/gas projects.
- What grass seed will work best?
- Everyone likes, & everyone doesn't like.

Design Elements – Native Plants

- We wanted to use natives/adapted plants but did not specify 100%.
- Several seed mixes from Native American Seed.
- Goal to reduce mowing.
- Positive Acceptance.

Mowing

Mowing

Swale mowed once since June 2012. (Feb 2014)

May-2014

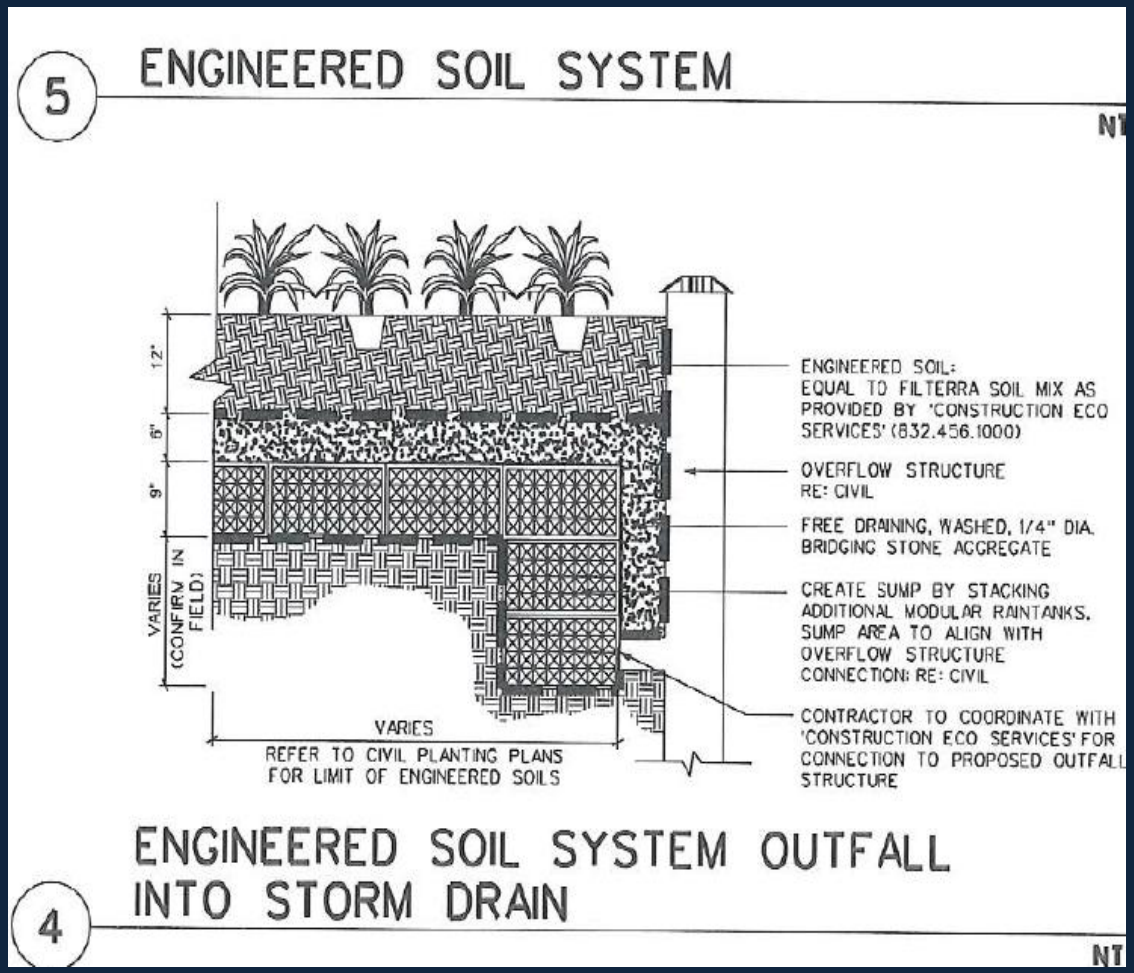
Cost Effectiveness

Total Project Cost = $ 2.6 million

Cost Savings compared to the traditional roadway:

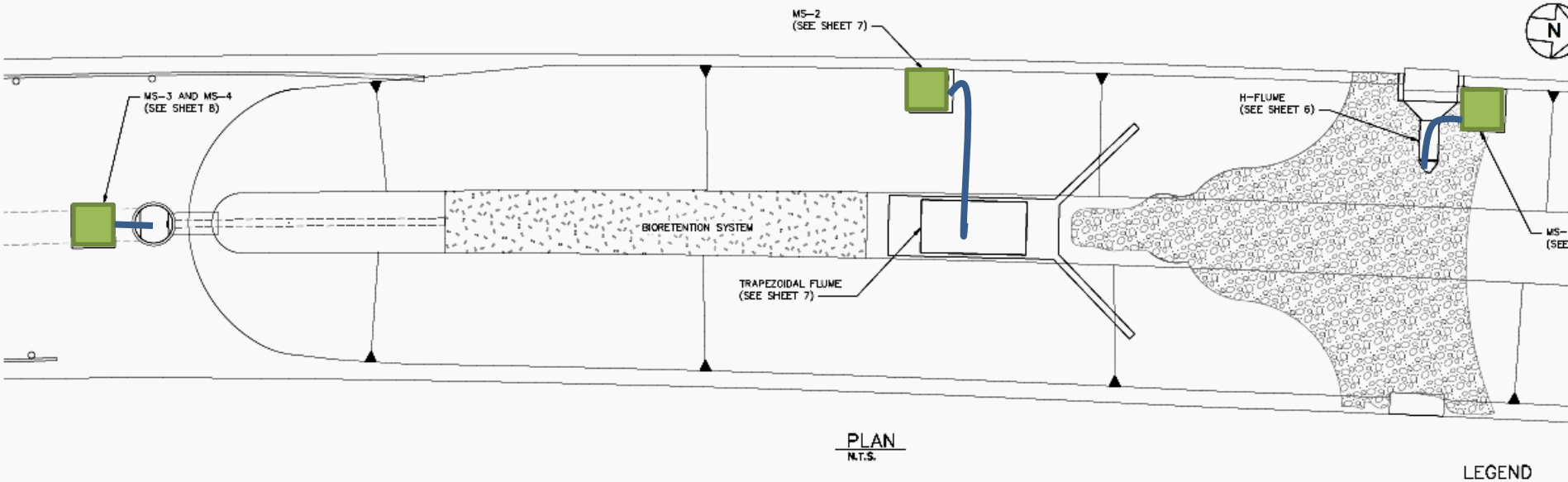
- Eliminated offsite detention.
- Reduced our floodplain mitigation pond.
- Reduced wetland impact.
- Reduced right of way purchase.
- Reduced storm sewer.
- Reduced mowing to 2 times per year vs. 10 or more times.
- Saved at least $100 -$200K compared to traditional project cost but the main point is all of these LID elements were not more expensive.

Monitoring Plan



What we want to evaluate:

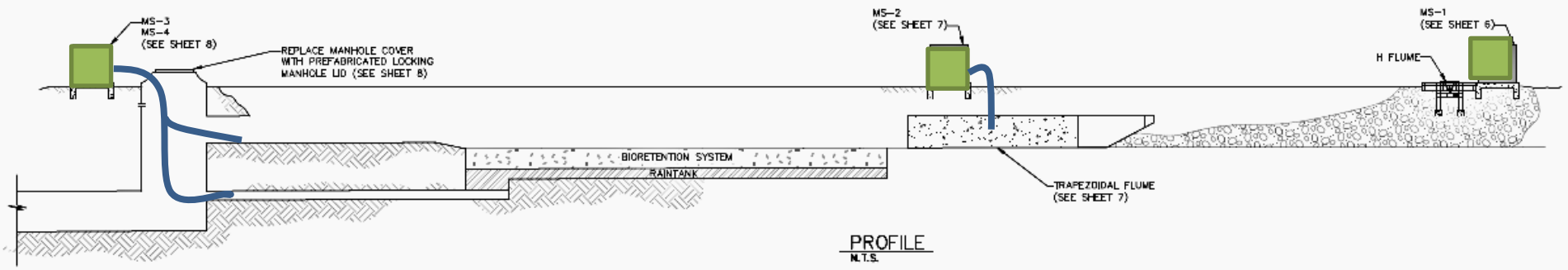
- <u>Water Quality</u> performance of the swale and the soil media
- <u>Runoff Reduction</u> from the swale and the soil media
- Monitoring of the southern outfall location (half of the project).



PLAN
N.T.S.

LEGEND

- TOP OF SLOPE
- BOTTOM OF SLOPE
- MONITORING EQUIPMENT
- MS — MONITORING STATION
- BIORETENTION SYSTEM
- RAINTANK (EXISTING)
- CRUSHED CONCRETE RIP
- EXISTING GRADE



PROFILE
N.T.S.

NO	REVISIONS	DATE	NAME
0	ISSUED FOR CONSTRUCTION	1-20-14	MFB

HARRIS COUNTY
PUBLIC INFRASTRUCTURE DEPARTMENT
ARCHITECTURE & ENGINEERING DIVISION

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Houston, Texas 77079
(713) 461-9600
TEXAS REG. REGISTRATION NO. F-487

MICHAEL F. BLOOM
92979
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
1/17/2014

PROJECT TITLE:	WATER QUALITY MONITORING
DRAWN BY: JJV/KH	BRINAMWOOD DRIVE
CK'D BY: MFB	SHEET DESCRIPTION: MONITORING STATIONS
SCALE: N.T.S.	PLAN & PROFILE
DATE: JAN. 2014	APPROVED BY: