

Roadblocks to LID



CITY OF
Tulsa
A New Kind of Energy™

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Low Impact Development

Green Infrastructure

- Watershed, land planning, & engineering design approach used to maintain pre-developed or natural site hydrology under post-development conditions
- Stormwater Quantity & Quality Enhancement Tool

No Adverse Impact VS Low Impact Development

NAI - Hydrologic Cycle Not Affected By Development

No increase in flow rate, velocity or water surface elevation.

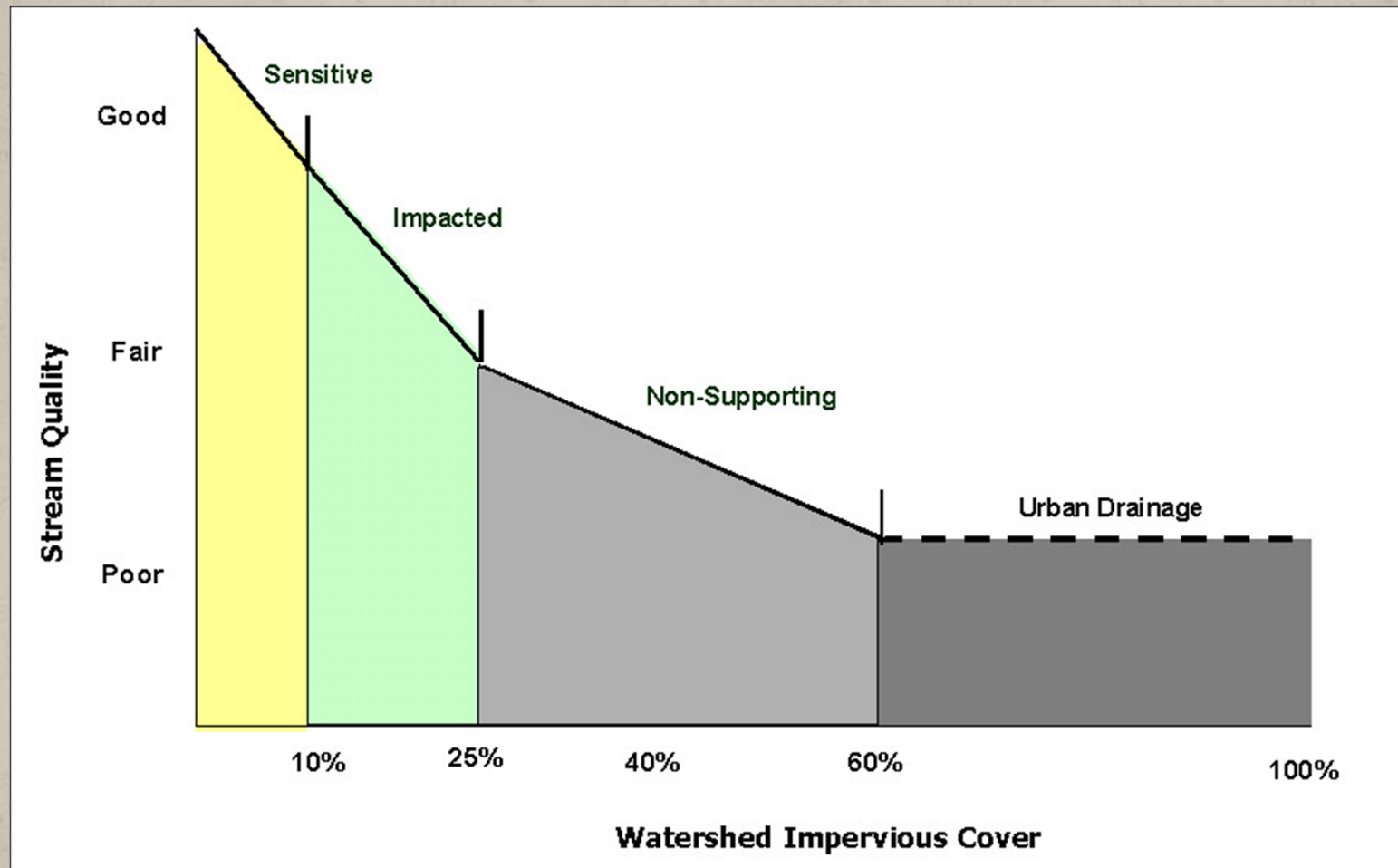
LID – Little to no increase in runoff volume

How do Impervious Surfaces affect Stormwater Quality?

- Deeply incised urban stream with small riparian area and high amount of impervious surface in watershed
- Stream in undeveloped watershed with adequate riparian area and little impervious surface



Impervious vs Stream Quality



LID and GI: EPA's Silver Bullets

Low Impact Development & Green Infrastructure

- Techniques that manage stormwater on-site and promote infiltration.
- Results in pollution reduction as well as volume reduction.
- Usually addressed in terms of “Best Management Practices” (BMPs).
- Can be regional, but usually are localized to the property (on-site management).



Photos courtesy of Nikos Singelis, EPA

Examples of LID/GI

- Rain water harvesting
- Grassed swales
- Bio-retention cells/rain gardens
- Permeable Pavement/pavers
- Extended-detention outlet structures
- Sand filters
- Infiltration basins and trenches
- Green roofs



Common Pollutants in Urban Stormwater

- Sediment
- Nutrients
- Oxygen-Demanding Substances
- Pathogens
- Trash
- Road Salts
- Oil and Grease
- Heavy Metals
- Heat
- Petroleum
- Pesticides
- Other organics



Tulsa's MS4 Permits – Phase 1

- Shall promote LID and other green design strategies as BMPs to minimize urban runoff into receiving streams.
- Must review development regulations to identify and remove impediment to LID.



Tulsa's MS4 Permits – Phase 1

- Conduct public education focused on the development and contractor communities.
- Incorporate LID into a City project by October 2013.



Small MS4 Permits – Phase 2

- Must develop, implement and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre...”



Small MS4 Permits – Phase 2

- Must develop and implement strategies which include a combination of structural and/or non-structural...BMPs ...”



Concerns

- Of the Phase 1 and Phase 2 permittees, Low Impact Development has been the most confusing and contentious .
- Fears of EPA forcing unwanted changes to local zoning and land use codes.
 - *Too narrow streets for fire trucks.*
 - *No sidewalks for residential safety.*
 - *No curbs and gutters.*
 - *Forcing a “green philosophy” on cities not desiring such.*
- Requirements vs. Recommendations...

Proposed OKR04 Text and LID / GI

Part IV.C.4.b. MCM 4th Construction – Recommendations

- (2) Develop outreach program for the local development community, including incentives for developers/builders, such as “green developer” recognition.

Part IV.C.5.a. MCM 5th Post-Construction – Requirements

- (4) You must review local ordinances and regulations, and identify the barriers to Low Impact Development (LID). Develop a schedule to remove those barriers that prohibit LID practices in the permit term.
- (6) You must include an education component for developers and the public about project designs that minimize water quality impacts, including LID strategies.

Proposed OKR04 Text and LID / GI

Part IV.C.4.b MCM 5th Post-Construction – Recommendations

(2) Consider requirements ...to direct growth to identified areas, protect sensitive areas ...increase open space ... provide buffers ... minimize impervious surfaces, ...encourage infill development ...

(3) Assess ... street design and parking lot guidelines ... that affect ...impervious cover. Determine if ...standards ... can be modified to support LID design options.

(4) Complete an inventory of impervious area ...determine the areas that may have the potential to be retrofitted with BMPs (such as LID) ... to reduce the frequency, volume and peak intensity of storm water runoff to and from your MS4.

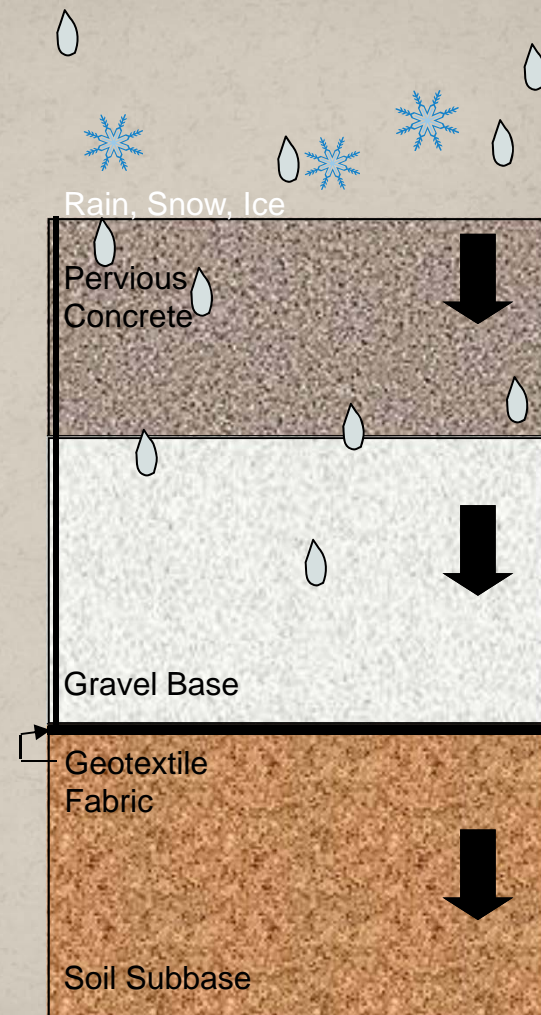
PERVIOUS CONCRETE



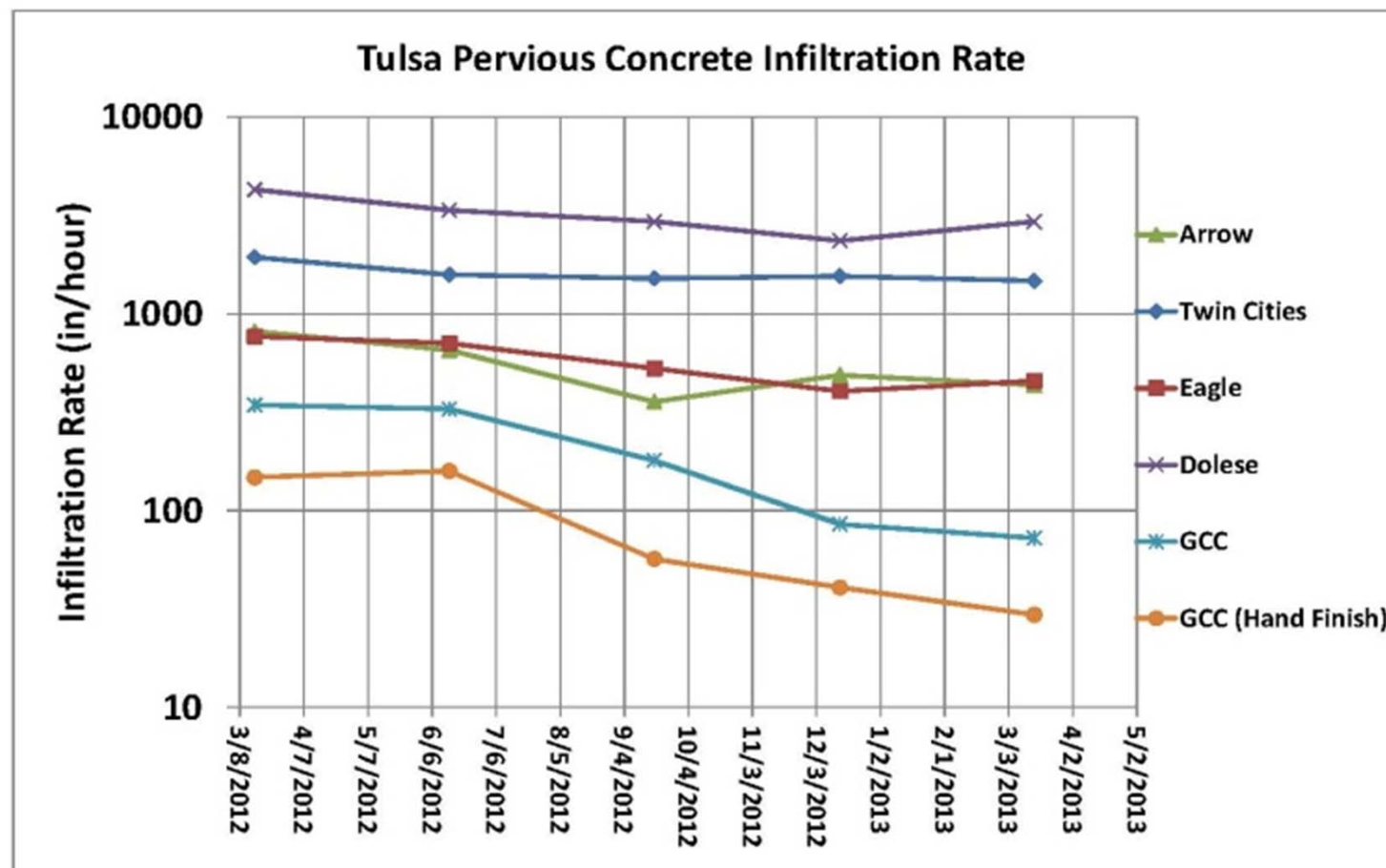
You Tube Video
Tulsa Pervious Concrete Demonstration

Pervious Concrete
water passes at
3 - 5 gallons
per min.
per sq. ft.
or
270 - 450 in.
per hr.

Most at Tulsa Site
Much Higher



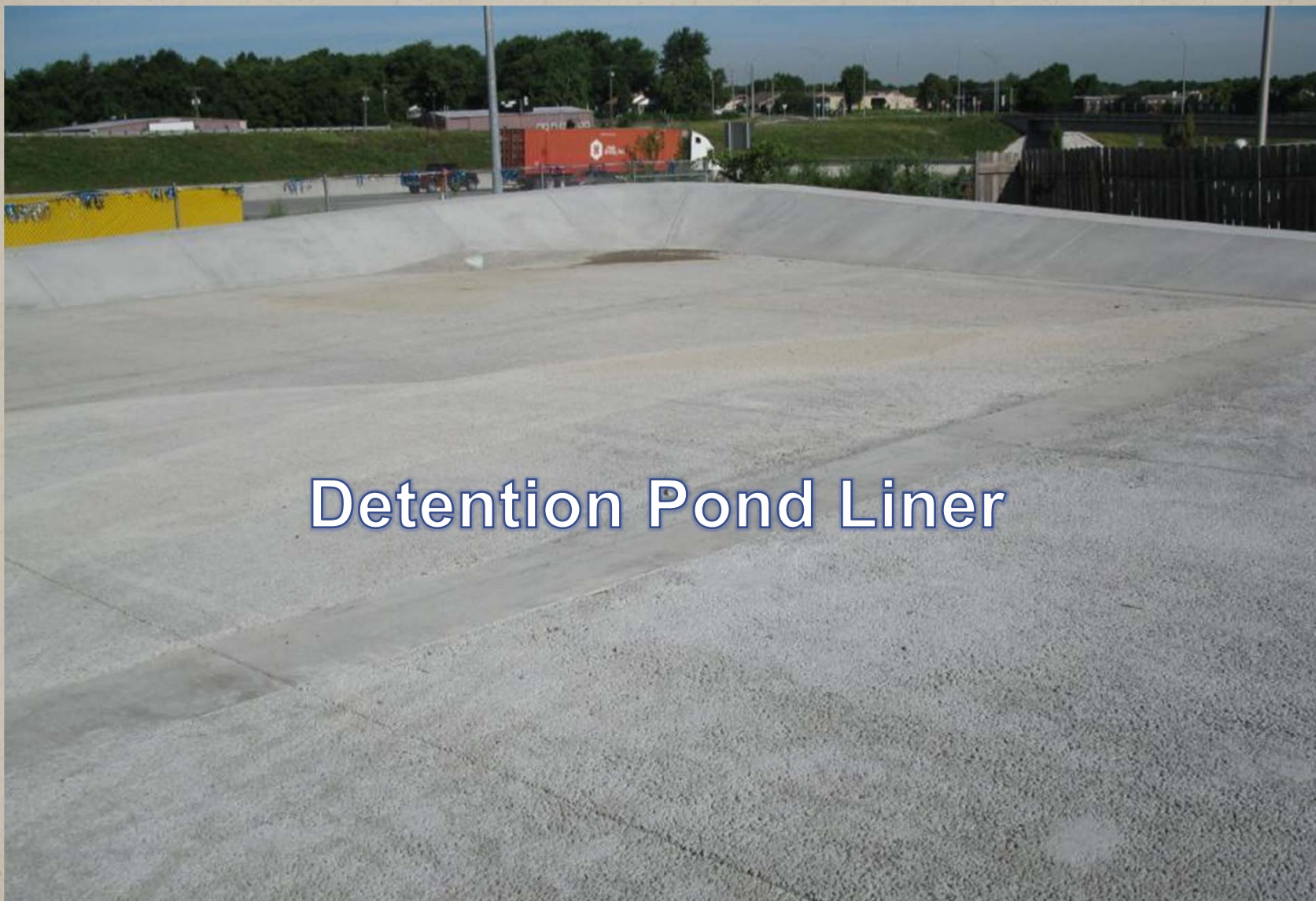
Pervious Concrete Performance



Pervious Concrete Applications

- Parking Areas
- Driveways
- Sidewalks
- Roadways
- Swales & Ditches
- Erosion Control
- Slope Protection
- Playground Underlayment
- Water Parks





Detention Pond Liner



Pervious Concrete Parking Lot
Finley Football Stadium
University of Tennessee Chattanooga

Benefits:

Reduced Runoff

Improved Water Quality

Ground Water Recharge

Roadblocks:

Clogging

Saturated Base

Durability

Administrative Cost



Rain Gardens And Why We Need Them



Lawn Pollution

Washes off of the land when it rains (or watered)



And flows to local streams through storm drains!!

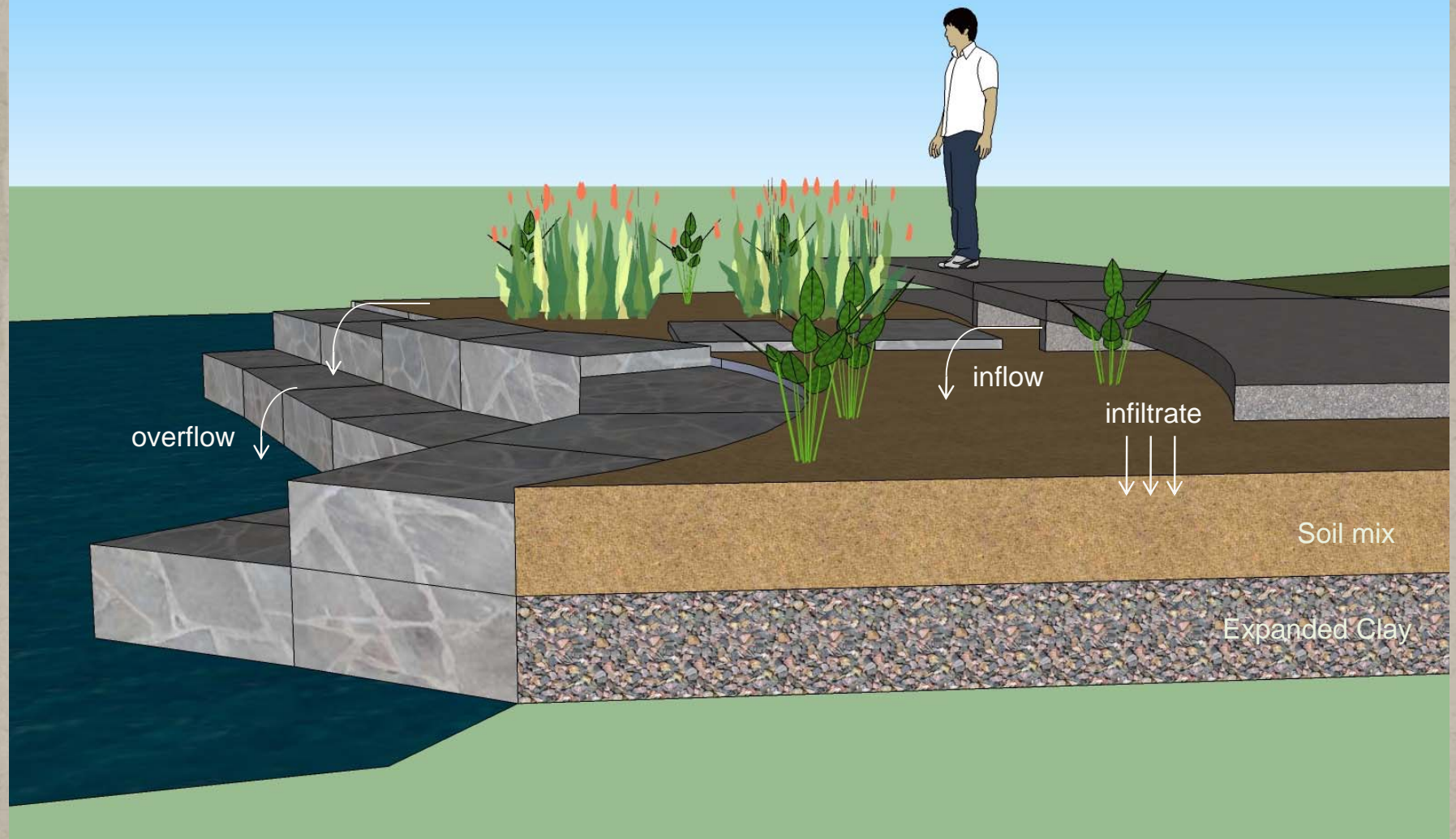
Spring 2013 – 6 years later



Conventional Wet Detention Pond



Conceptual Design of Cleansing Garden 1



Rain Garden 1 (Year 1)





Tulsa Area Rain Garden Project

INCOG and Conservation Commission Partnership
(funded with a grant from the EPA)

- 4 Rain gardens in greater Tulsa area
- Oklahoma native plants
- Construction/planting in Summer/Fall 2010 & 2011

→ Cooperated with 4 local municipalities and
1 school district



Remington Elementary School, Tulsa



Ray Harral Nature Center – Broken Arrow



Sapulpa Aquatics Center



Design partner:

Jim Crosby
Planning Design
Group



Bixby – Bentley Park Roundabout – 11/2012



SC/RC Environment Project of the Year
Oklahoma Chapter of American Public Works

Properly designed rain gardens prevent mosquito proliferation!!

Mosquito
death
trap!



Mosquitoes deposit eggs, then the garden dries up!

Water-Wise Workshop (Tulsa): 10/6/12

Hope Unitarian Church (near 91st & Sheridan)



A Pilot Project

Water-Wise Workshop (Tulsa): 10/6/12

Morning – presentations

- Kevin Gustavson, OCC
 - Bioretention/nutrient mgt.
- Carl Szafranski, Landscaping Firm
 - Conservation Landscaping
- Marilyn Stewart, Wild Things Nursery
 - Benefits of Native Plants
- Steve Grantham, Up With Trees
 - Drought Tolerant Trees



Water-Wise Workshop (Tulsa): 10/6/12

Afternoon – Rain Garden Construction and Planting



Water-Wise Workshop (Tulsa)



Native plant sale:

Wild Things Nursery and Grogg's Green Barn 40

Remington Elementary Maintenance





Tulsa MET School Fall 2012





Benefits:

Reduced Runoff

Improved Water Quality

Ground Water Recharge

Roadblocks:

Rat Gardens

Mosquitos

Maintenance

Unsightly

Mowing Ordinance Violation

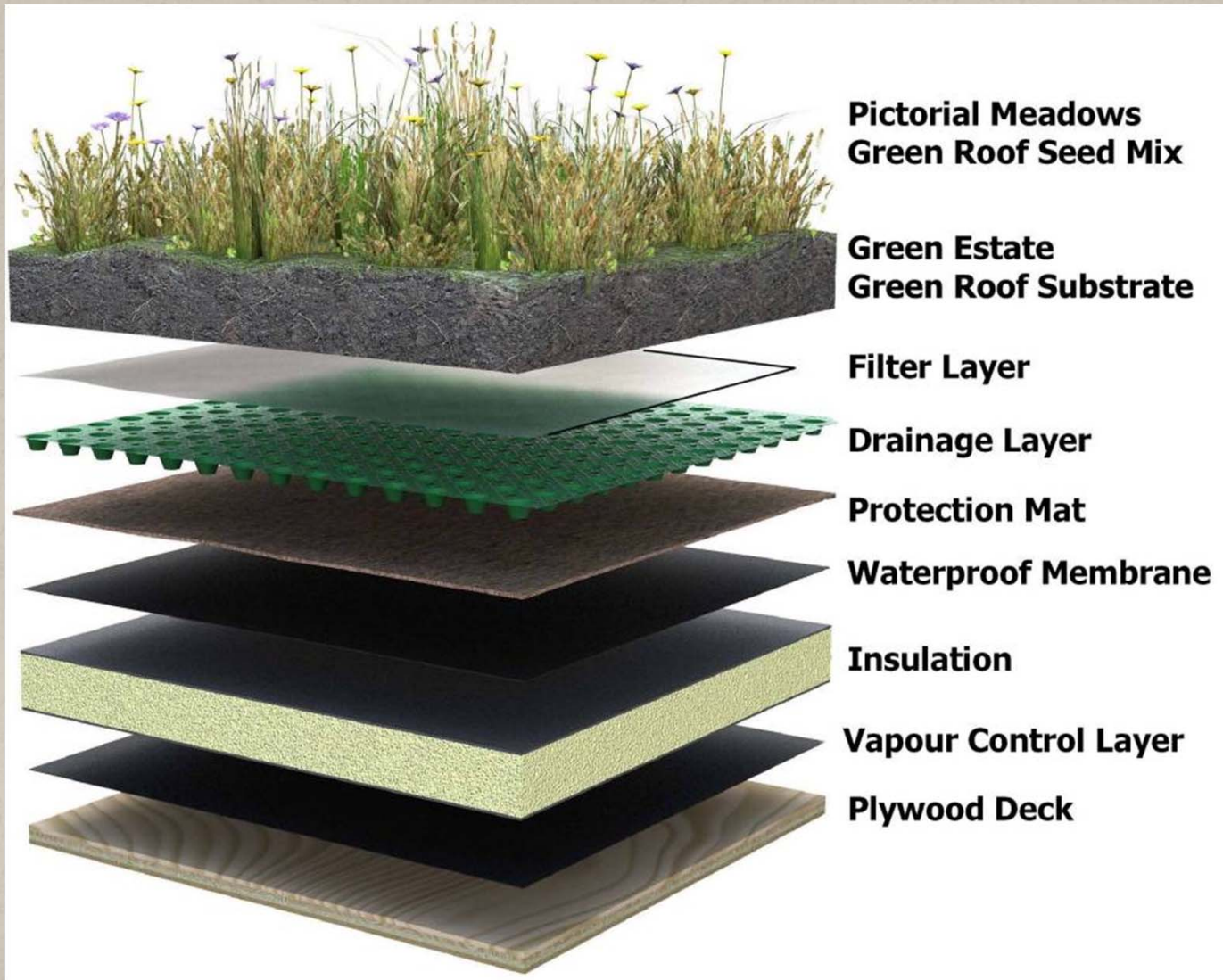


Green Roofs

Not New Technology



Green Roofs



Green Roofs



Benefits:

Reduced Runoff

Improved Water Quality

Reduced Heat Island Effect

Insulation Value

Urban Habitat

Extended Roof Life

Roadblocks:

Increased Dead Load

Improper Plant Selection

Maintenance



LID Challenges in Tulsa

- General Ignorance regarding LID/GI
- Perception – “it isn’t for Oklahoma”
 - We have frog strangler storms here
 - We aren’t tree huggers here
- City of Tulsa is Cautious
 - Engineering Department is skeptical and hesitant
 - Development Services is cautious and not set up for it
 - Politicians don’t see it as a priority
 - All of the above don’t want to hinder development



Challenges Continue

- Little regional data & technical specifications
- No incentives for developers
- Zoning doesn't promote an environment good for LID
 - Sprawling Streets
 - No mixed use development
 - Struggling downtown
- Weak Regulations/Not Addressing Impaired Streams

Solutions Emerge

- Years of internal/external education and networking
 - Webinars, emails, publications, demonstrations
- Show up at Predevelopment & Board Meetings
 - Helps educate City Staff, Board Members, & Developers
- Stress SW Mgmt Benefits & Permit Requirements
 - Regulations strengthened & stream health priority
- Comprehensive Plan Update led to Zoning Update
 - Involved in both phases & staying visible
- LID considered for fee credit
 - Fee in-lieu-of detention (38 cents to 74 cents/ft²)
 - Monthly Stormwater Fees

“Progress as Promised”

- Pervious Concrete Demonstration Project
 - Training/certification
 - Performance Specification Written for Public Projects
 - Public, Industry, Conference, & Media Attention
 - Continued Infiltration Testing
- Consideration for Adding Pervious Asphalt/Pavers
- Up with Trees is Interested in Adding Rain Gardens
- Piggy Back to Downtown Beautification
- Continuing to Work with Planning Department
- Downtown/mixed use is beginning
- Cooperative Efforts – TCCD, OCC, COT, Library...

Persistence & Baby Steps

- “Never, never, never give up.”
Winston Churchill

