Putting the LID on Stormwater in Tucson and Pima County

March 27, 2012
AridLID 2012, Tucson, AZ

Irene Ogata, RLA, CPM
Urban Landscape Manager
Office of Conservation & Sustainable Development

Evan Canfield, Ph.D, P.E.
Chief Hydrologist
Pima County Regional Flood Control

Joint Effort: LID Working Group Members

Public: Pima Co.

- Regional Flood Control District
- Development Services Dept.
- Dept. of. Transportation

Public: City of Tucson

- Office of Conservation & Sustainable Development
- Dept. of Transportation: Stormwater Division

Education: Univ. of Arizona

- Environmental Research Lab
- Drachman Institute
- Facilities
- Water Research Resource Center
- Biosphere 2

Public: Pima Assoc. of Gov.

Non-Profit/Other

- Watershed Management Group
- Living Streets Alliance
- Imagine Greater Tucson

Professional/Trade

- Norris Design
- Wheat Scharf & Assoc.

Joint Effort – LID Working Group

Products of the LID Working Group

Revised ***Pima County Detention / Retention Manual***	***Neighborhood Scale Water Harvesting Manual***	***Case Studies Catalogue***

Regulatory Efforts to Encourage Integrated Use of Stormwater

Regulatory:

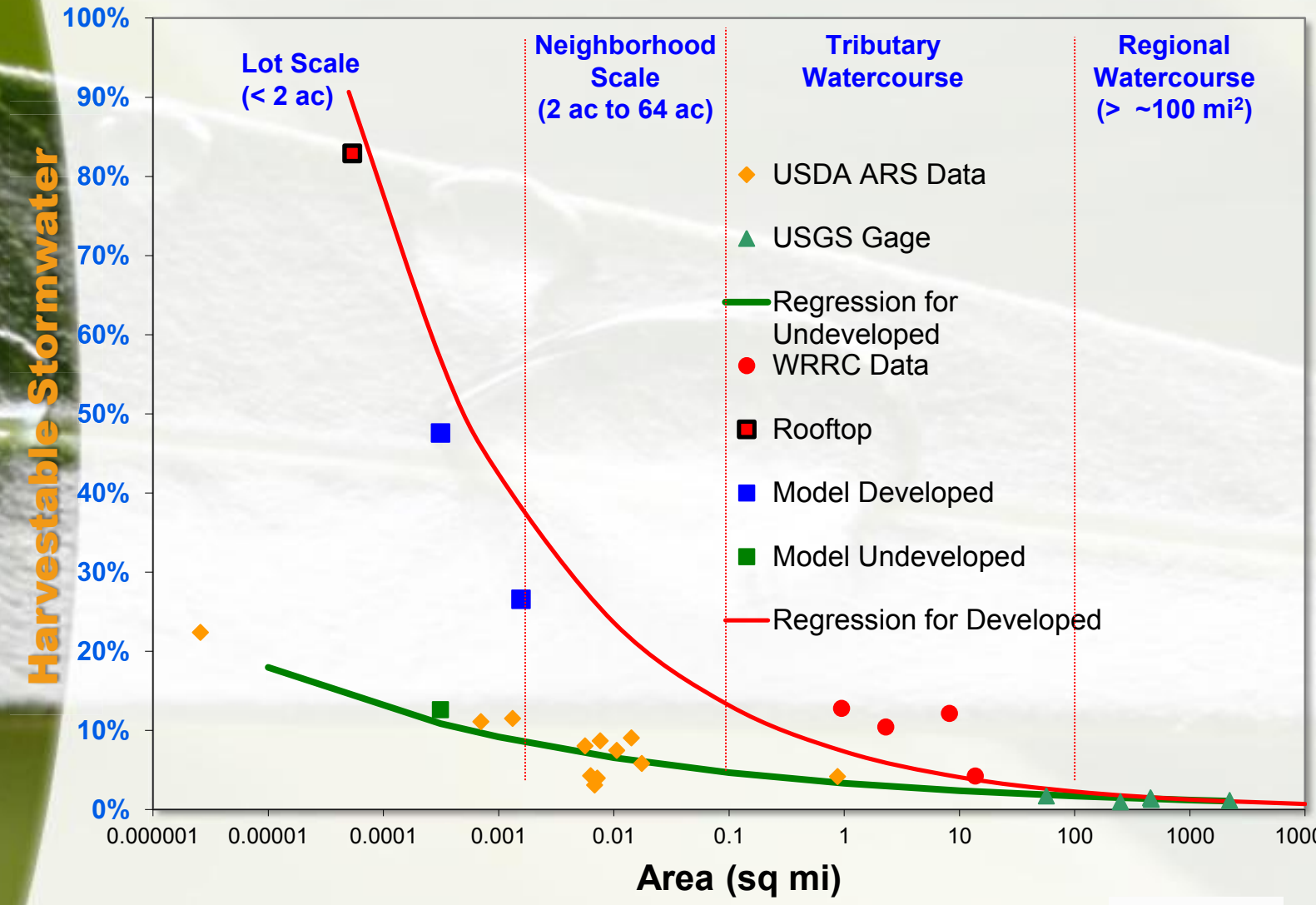
- **City of Tucson**
  - Commercial Water Harvesting Ordinance + Development Standards (2010)
  - Stormwater Discharge Permit (AZPDES)
  - General Plan *Green Infrastructure* component.
- **Pima County:**
  - Revised Detention/Retention Manual (expect – 2012)
  - Stormwater Discharge Permit (AZPDES)
- **Town of Oro Valley:**
  - Stormwater Ordinance and Stormwater Utility

AZPDES:MS4

- **Measurable Goal:** The county shall include in the fourth (4th) year annual report the findings of how the implementation of LID practices would contribute to the reduction of pollutants in stormwater discharges to the MS4 and identify a plan and schedule for incorporation into design standards.

‘Harvestable’ Water (Rainwater/Stormwater)

i.e. water yield



Low Impact Development and Green Infrastructure

Low Impact Development (LID)

'A comprehensive stormwater management and site-design technique. . . the goal of any construction project is to design a hydrologically functional site that mimics predevelopment conditions…'

Green Infrastructure

'As a general principal, Green Infrastructure techniques use soils and vegetation to infiltrate, evapotranspirate, and/or recycle stormwater runoff…'

EPA Green Infrastructure Homepage - Glossary

Low Impact Development (LID)

Mimic pre-development hydrology

LID Planning

- Disconnect and minimize impervious surfaces.
- Maintain pre-development waterways.

LID Flow Paths

- Lengthen and roughen overland flow paths.

LID Infiltration/ Features

- Pervious pavement.
- Swales, filter strips.
- Bioretention.
- Rainwater catchment systems.
- Detention basins.

Source: Low Impact Development Center

ctiveness

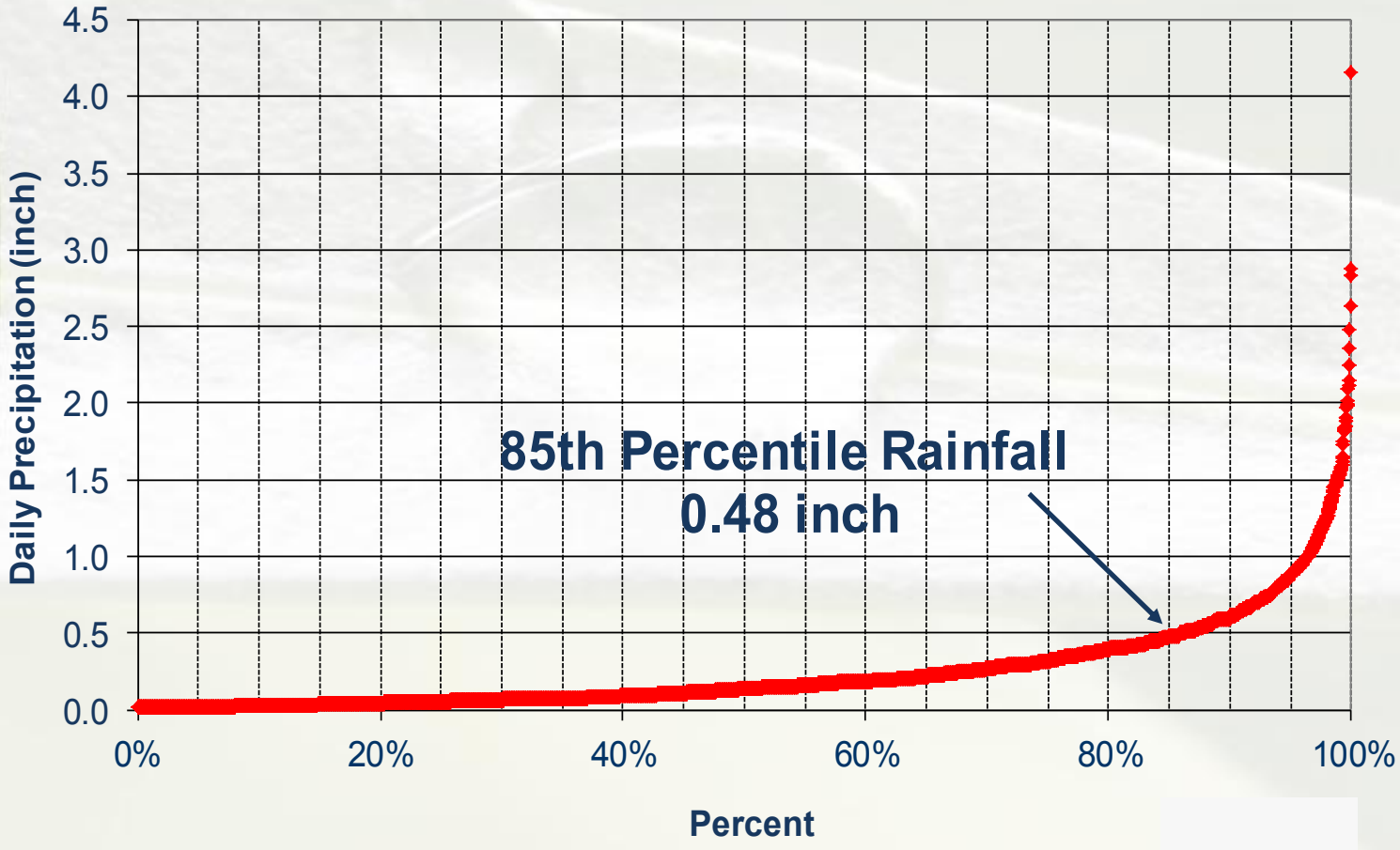
saves
opers,
ties

- .....in the vast majority
savings ranged from 15
methods were used (EF

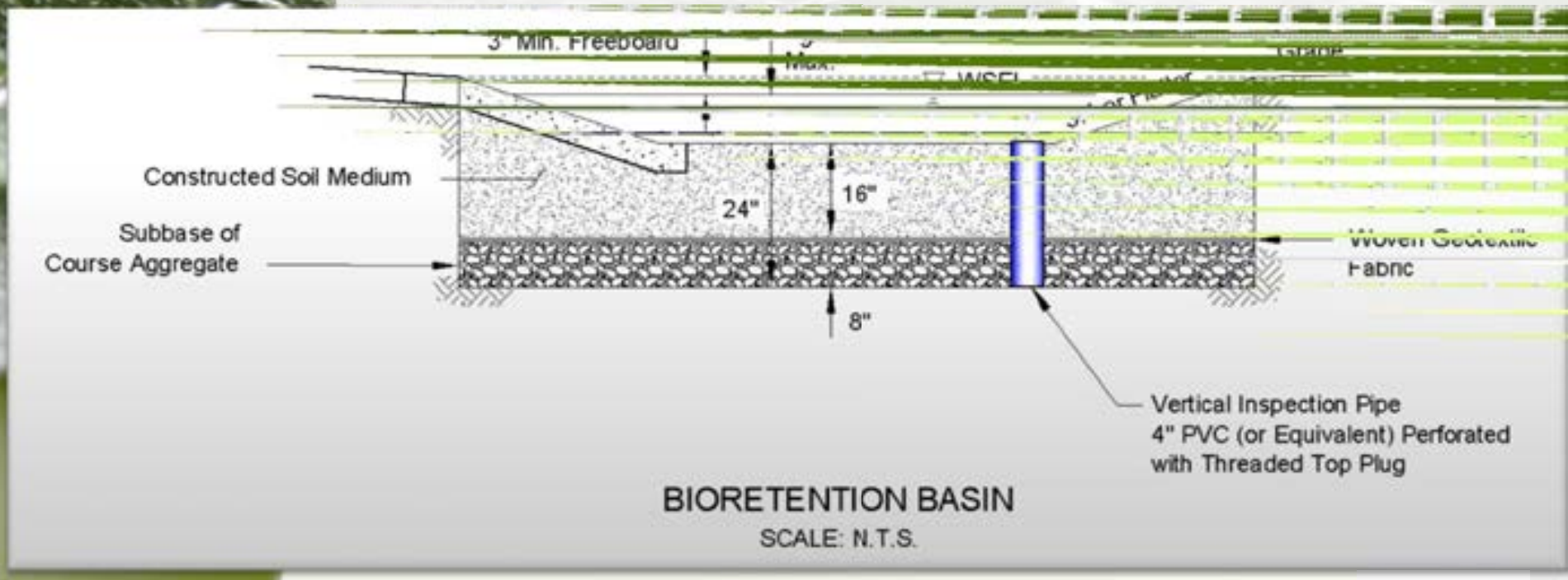
- Developers expect ec
increasing the number
costs on stormwater in
2009).

Pima County:
DETENTION–RETENTION MANUAL (Draft)

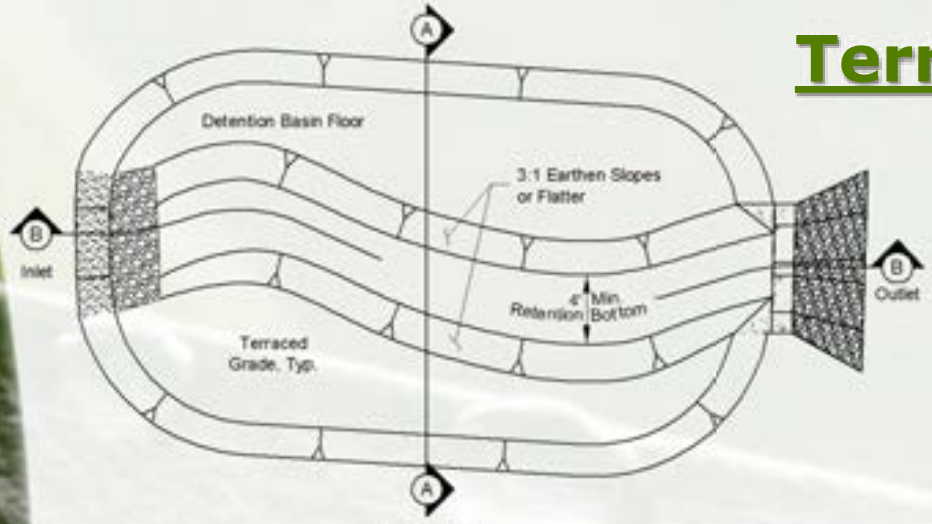
Replace Retention Requirement with a
'First Flush' Retention Requirement



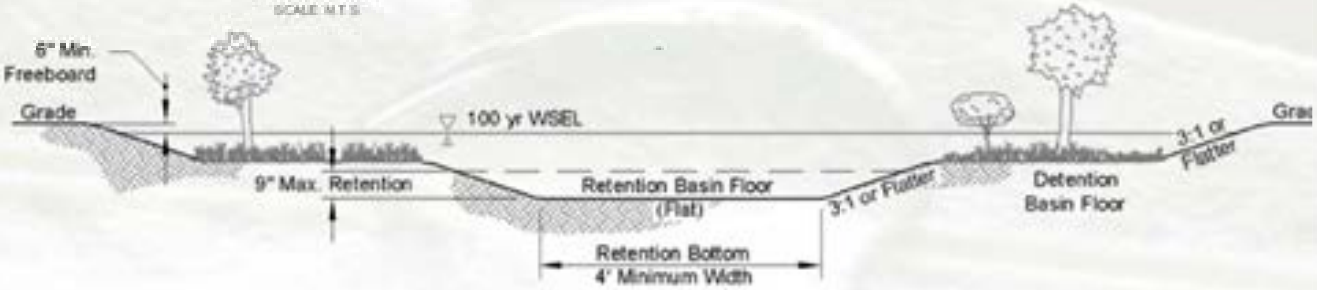
Bioretention Basin



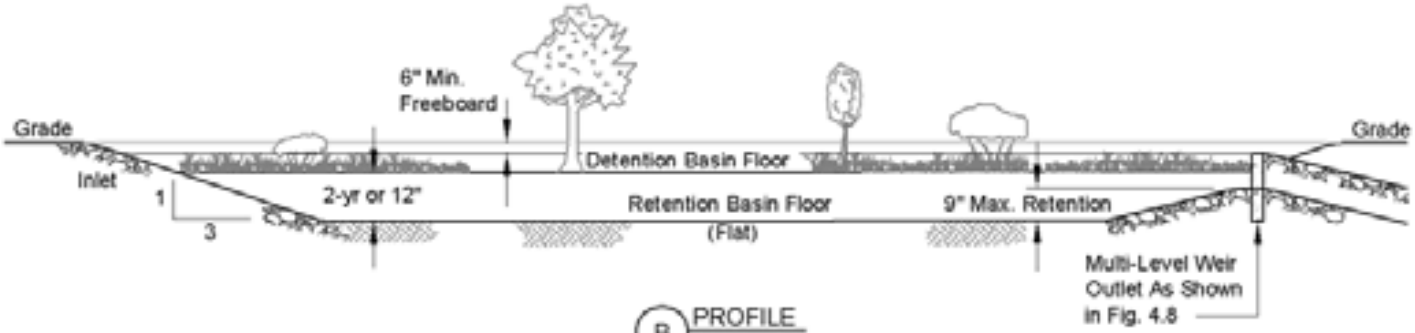
Terraced Detention Basin with Retention



PLAN VIEW
SCALE: N.T.S.



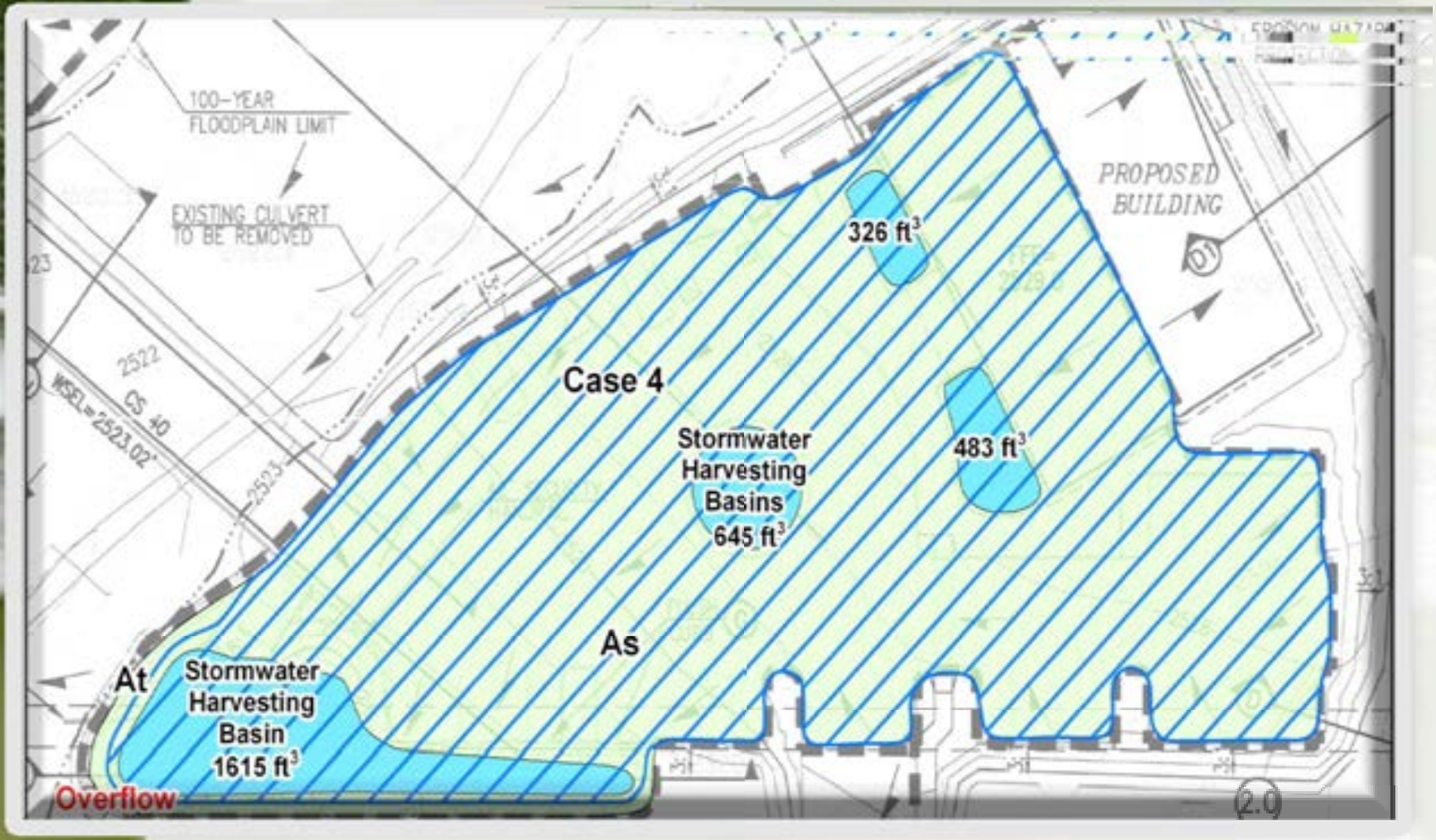
A SECTION
SCALE: N.T.S.



B PROFILE
SCALE: N.T.S.

Pima County:

DECENTRALIZED 'FIRST FLUSH' RETENTION

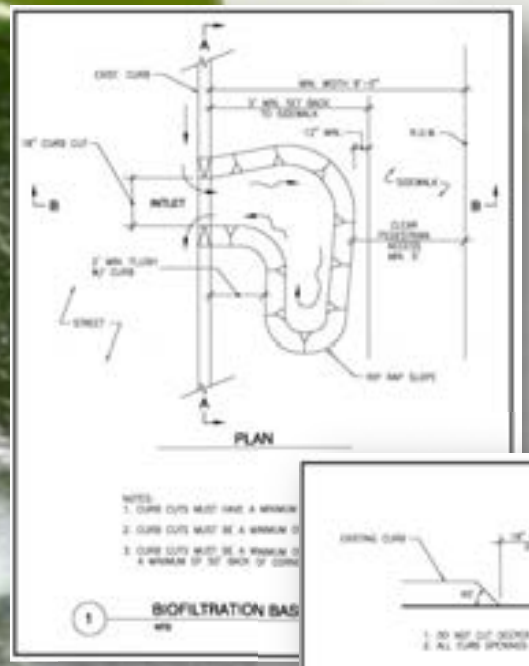


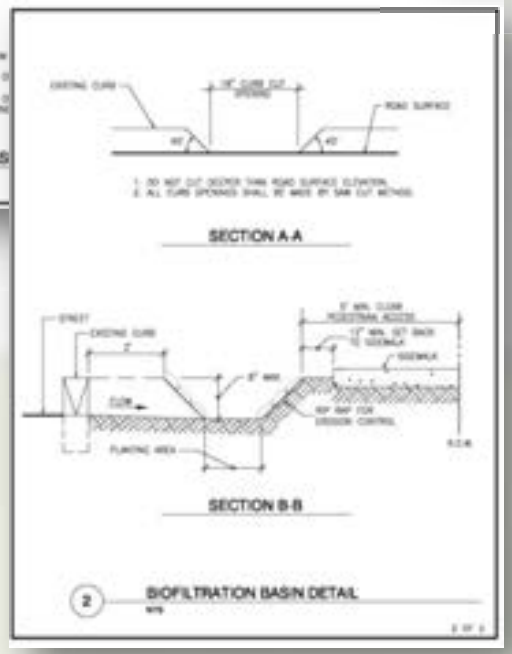
Neighborhood-Scale Water Harvesting Manual

Local Priority	Type: Pretreatment	Bioretention	Filtration	Infiltration	Runoff Volume Minimization	End of Pipe	Agency / Jurisdiction / Document / Date of Publication	Research Team Member Assignments	City of Santa Barbara / SW BMP Guidance Manual / 2008
high							Best (LID) Site Design Practices (Non Structural BMPs)		X
high					O		Natural/Sensitive Area Conservation/Restoration	Stantec (JT)	O
high					O		Impervious Area Disconnection		O
high					O		Minimize Impervious/Disturbed Areas		O
high					O		Cluster Development (Minimize Construction Footprint)		
high					O		Minimize Soil Compaction		
high				O			Protect/Use Natural Flow Paths and Buffers		O
high				O			Promotion of Open Space Design/Natural Infiltration		
high	O						Implement Source Controls		
medium	X		X				Media Filters / Filtration Devices	Eric	X
high	X		X				Sand Filter and Gravel Filters		X
medium	X						Hydrodynamic / Solids Removal Devices		X
medium	X						Oil and Water Separators		
high		X					Bioretention / Rain Gardens	Dave	X
high		X					Tree Pits / Tree Box Filters / Planters	Irene	X
high			X				Xeriscaped Buffers / Filter Strips / Swales	Evan	X
high				X			Dry Wells	Evan	X
high				X			Infiltration Basin / Systems	Stantec (JT)	X
high				X			Infiltration Trench or Gallery		X
high				X			Soil Amendments / Structural Soils	Irene	X
high					X		Porous/Pervious Pavements	Irene	X
high					X		Rainwater Harvesting for Use (Rain Barrel / Cistern)	Irene	X
high					X		Self-Treating Areas (Zero Discharge Microbasins)	Dave	X
high					X		Downspout Disconnection / Redirection	Stantec (JT)	X
high						X	Detention Basin / Gallery / Dry Ponds	Stantec (JW)	X
high						X	Retention Basin	Stantec (JW)	
medium							Diversion Structures / Flow Splitters / Green Outlets	Stantec (JT)	X
high							Source Controls (Non Structural BMPs)		X
?					O		Runoff Volume Minimization	Stantec (JT)	O
?	O						Manage Potential Stormwater Hotspots		
?	O						Roof Runoff Protection		
?	O						Runoff Quality Protection		O

City of Tucson

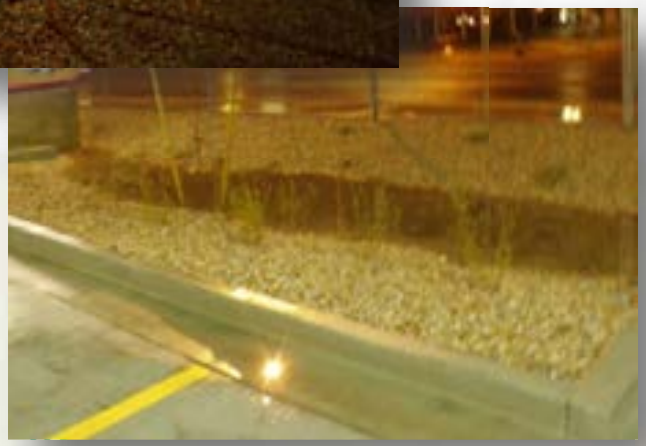
Approved: Curb cut standards





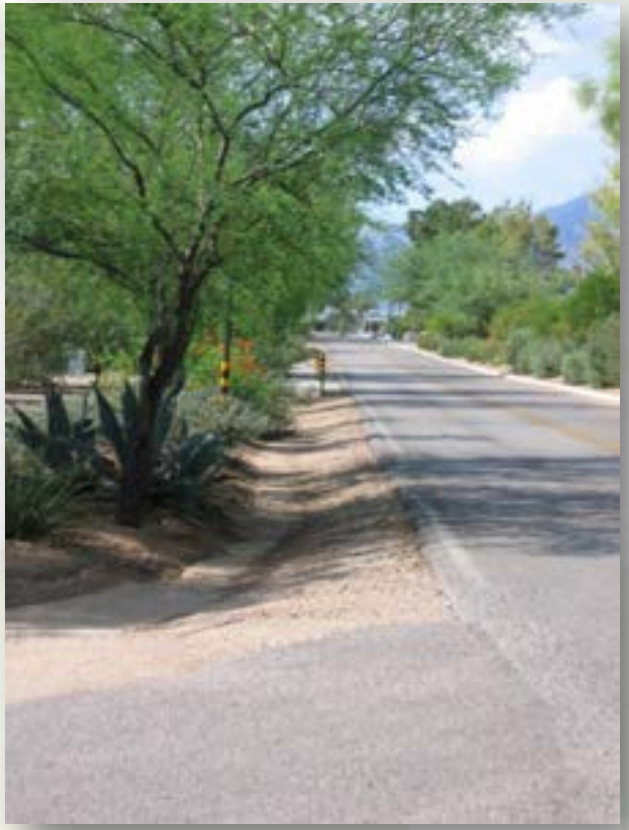
City of Tucson

Ordinanced: Commercial Rainwater Harvesting



Case Studies Catalogue

Small Scale: Neighborhood - scale



Case Studies Catalogue

20-30 Park (Highland Vista Park):

Collector street – residential land use

Native vegetation irrigated with harvested stormwater, reduced ponding and associated mosquito problems

Case Studies Catalogue

Rincon Heights: Residential collector

Photo: *Watershed Management Group (WMG)*

Case Studies

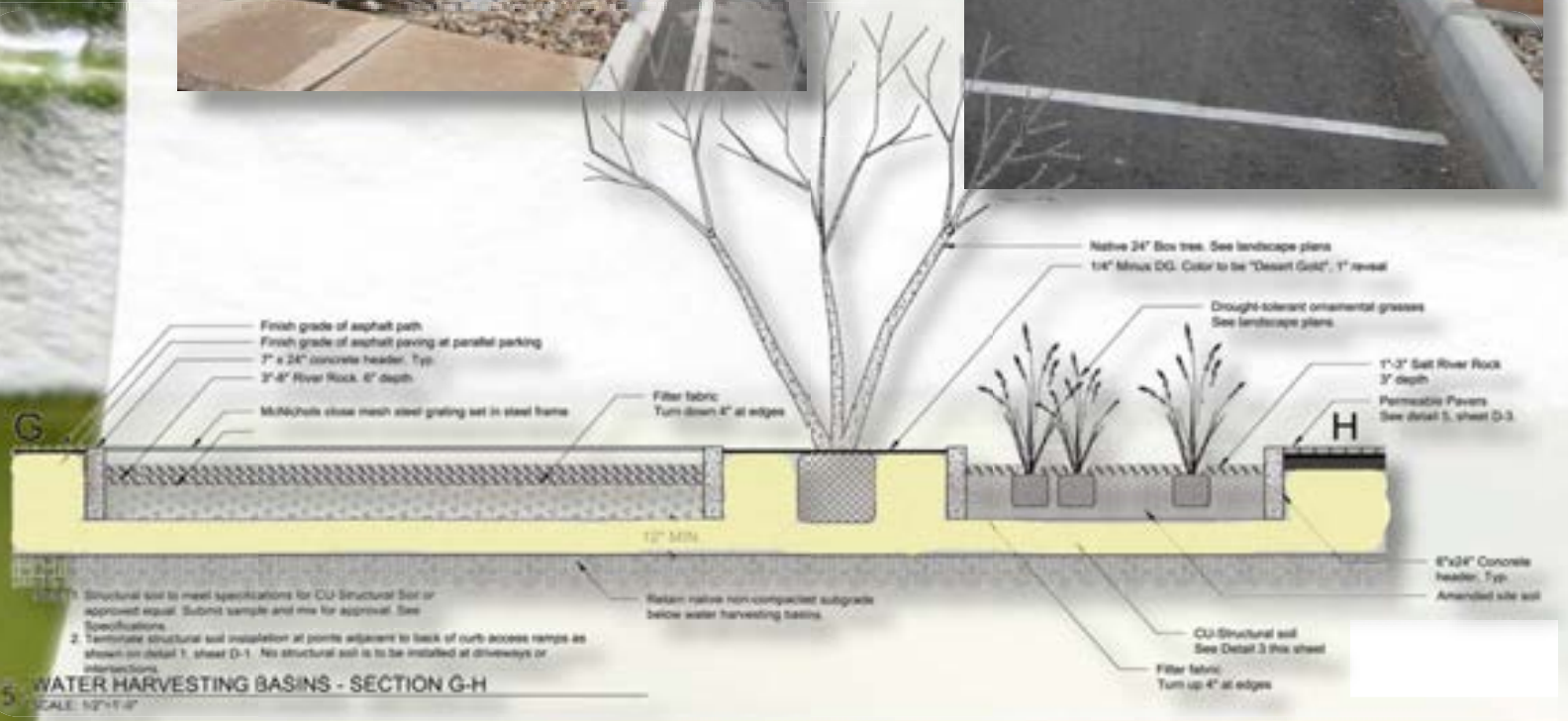
Ward 3: Municipal Facility – onsite capture

Case Studies

Scott Avenue: Collector street - commercial land uses

Case Studies

Camino Campestre: Collector Street – residential/park land use



Summary

Motivation for GI/LID:

- Reduce need for additional groundwater pumping by providing non-potable water source for street landscaping
- Alternative management strategy for residential street stormwater runoff
- Use LID practices to mitigate flooding
- Promote small urban waters restorationMitigate Urban Heat Island

Existing Req'ments:

- The City of Tucson and Pima County have 4 years to determine if how to implement LID.
- Water Harvesting Ordinance requires commercial sites to supply 50% of irrigation need (Tucson).
- Required to consider water harvesting for comprehensive plan ammendments (Pima County).

Next Steps:

- Finalize new Detention/Retention Manual (Pima County).
- Develop City-County Neighborhood Scale Water Harvesting Manual
- Compile Case Studies Catalog

So?

Current Project Timeline:

- Mid-2012: Draft Neighborhood Scale Water Harvesting Manual (public review by end of 2012)
- Mid- 2012: Pima County Dentention/Retention Manual for public review
- Late 2012: Draft Case Study Catalogue

Acknowledgements

- **Dave Stewart** (RFCD) developed the water harvesting credit methodology.
- **Ann Moynihan** and **Patricia Gilbert** (RFCD) led the effort to update the Detention/Retention Manual.
- **City of Tucson Water Harvesting Technical Advisory Committee** assisting to create methodology for Development Standards submittals

Resources

City-County Water Study White Paper on Stormwater

http://www.tucsonpimawaterstudy.com/Reports/Phase2/Stormwater.Mgt.Tech.Paper.pdf

City of Tucson Water Harvesting Ordinance

http://www.tucsonaz.gov/ocsd/sustainability/water/rainwaterharvesting.php

LID Working Group Website

http://rfcd.pima.gov/pdd/lid/workinggroup.htm

AridLID

http://www.aridlid.org/

Questions

Evan Canfield: evan.canfield@rfcd.pima.gov
Irene Ogata: irene.ogata@tucsonaz.gov