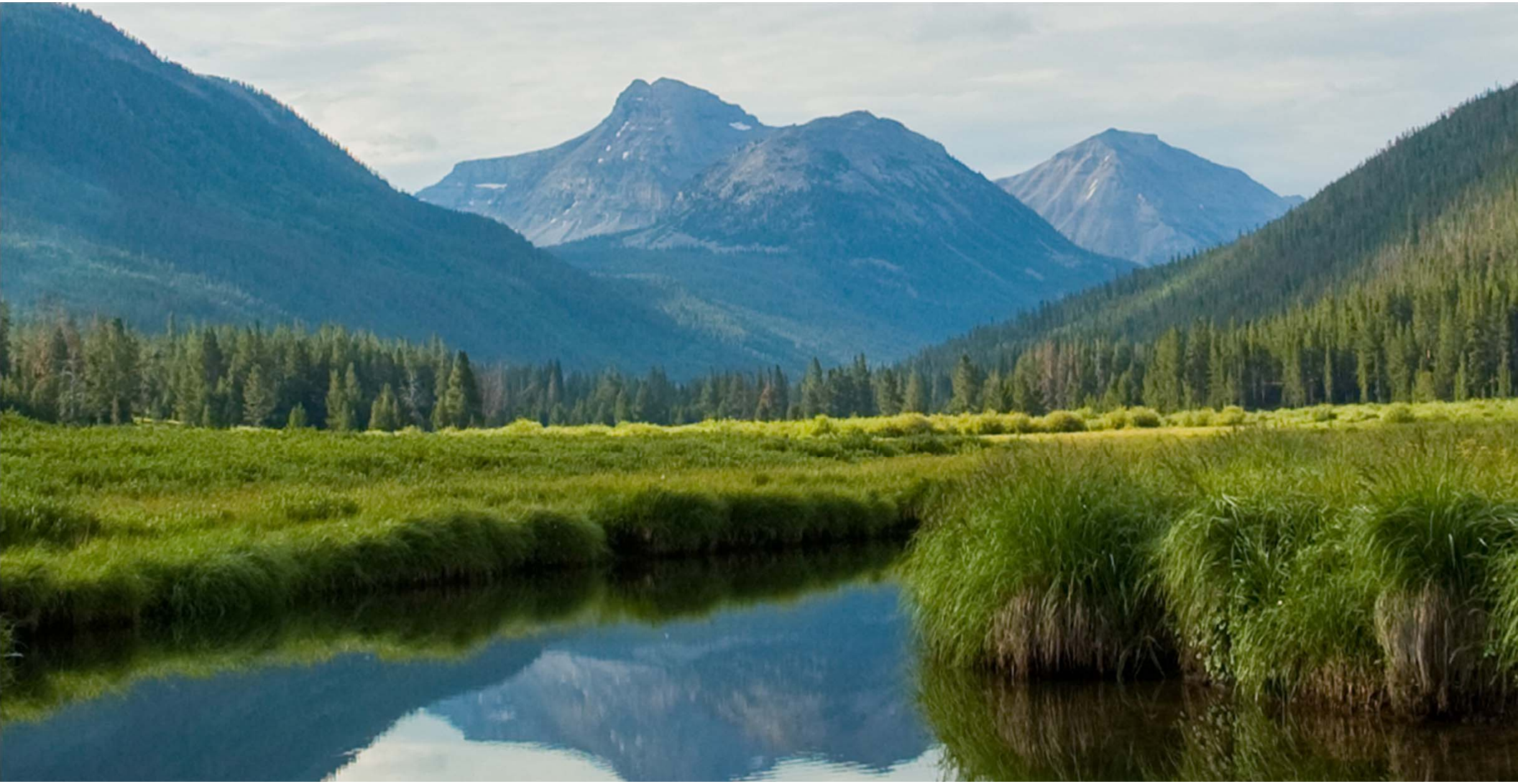


UTAH DEPARTMENT *of* ENVIRONMENTAL QUALITY

WATER QUALITY

Development of Utah's Small MS4 Storm Water Retention Standard

June 21, 2016

Presentation Overview

1. Development of Utah's Storm Water Retention Standard
2. Storm Water Hydrology & Management
3. Retention Standard: 90th percentile storm event
4. LID Techniques

DEVELOPMENT OF UTAH'S STORM WATER RETENTION STANDARD

History of Utah's Retention Standard

Utah Small MS4 General UPDES Permit (2010-2015) included a narrative standard:

- Mirror the predevelopment hydrology, or
- Improve the hydrology of a redeveloped site, and
- Reduce the discharge of storm water
- Evaluate and encourage a Low Impact Development (LID) approach

National Storm Water Rulemaking

- EPA/States current approach determined to be unlikely to adequately control storm water's contribution to water body impairment

- EPA began developing new rules in 2009 for a Retention based national performance standard for new development and redevelopment activities based on percentile storm water capture

  - ⇒ Apply to development disturbing 1 acre or more (or CPDs)
  - ⇒ Numeric performance standard.
  - ⇒ SW control measures that infiltrate, evapotranspirate, and/or harvest storm water.

Retention Standard Development Deferred to States in 2014

State Stormwater Standards for Newly Developed and Redeveloped Sites

Performance standards that are specific and measurable are an important tool to set clear expectations for controlling stormwater impacts from newly developed and redeveloped sites.

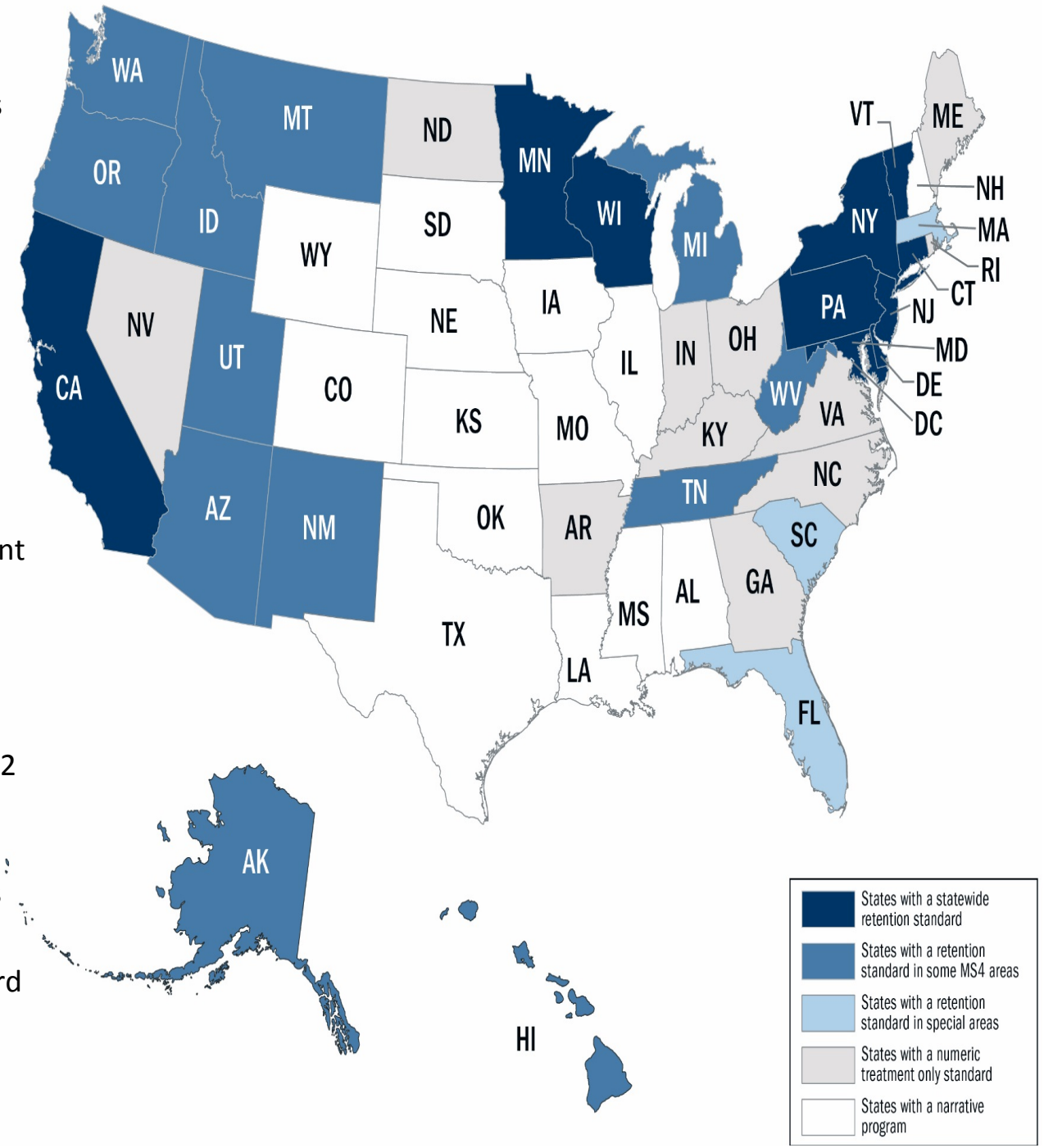
States use three types of approaches:

- Numeric retention standards (50% of states)
  (manage stormwater on-site)
- Numeric treatment standards (22% of states)
  (address pollutants only)
- Narrative program (28% of states)

States implement retention standards to different extents

- Statewide through the construction stormwater general permit or state regulation (10 states)
- Sites in Phase I and/or Phase II MS4s (12 states)
- Sites in special areas (wetland areas in MA; shellfish water in SC; closed basins in FL)

There are 9 states that apply a retention standard to sites less than one acre.



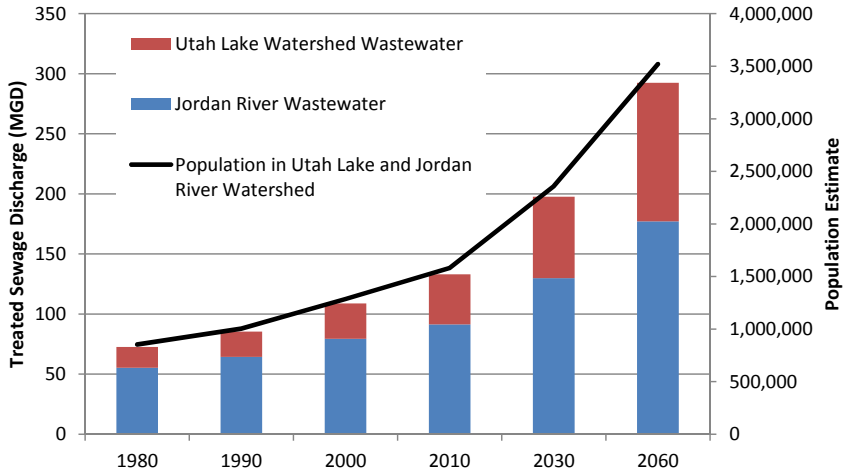
EPA's Permit Quality Review (PQR) Audit

Lone critical finding from the Storm Water Program Review:

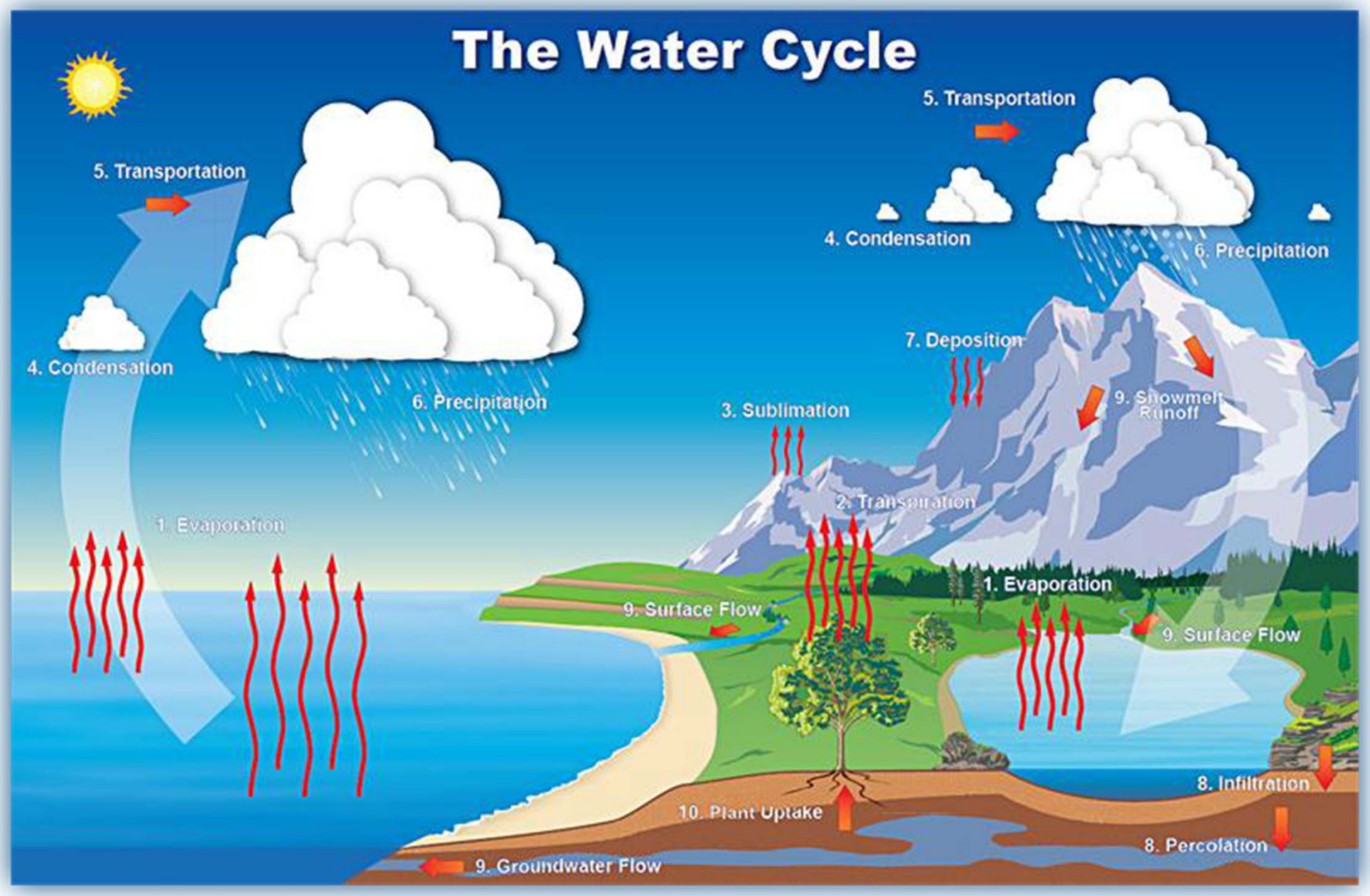
- The current narrative post-construction storm water management requirements are insufficient to meet MEP
- The permit should include a specific numeric design standard for all newly developed and redeveloped areas
- Especially in the densely populated/rapidly growing parts of Utah

Projected Growth from 2010 to 2060

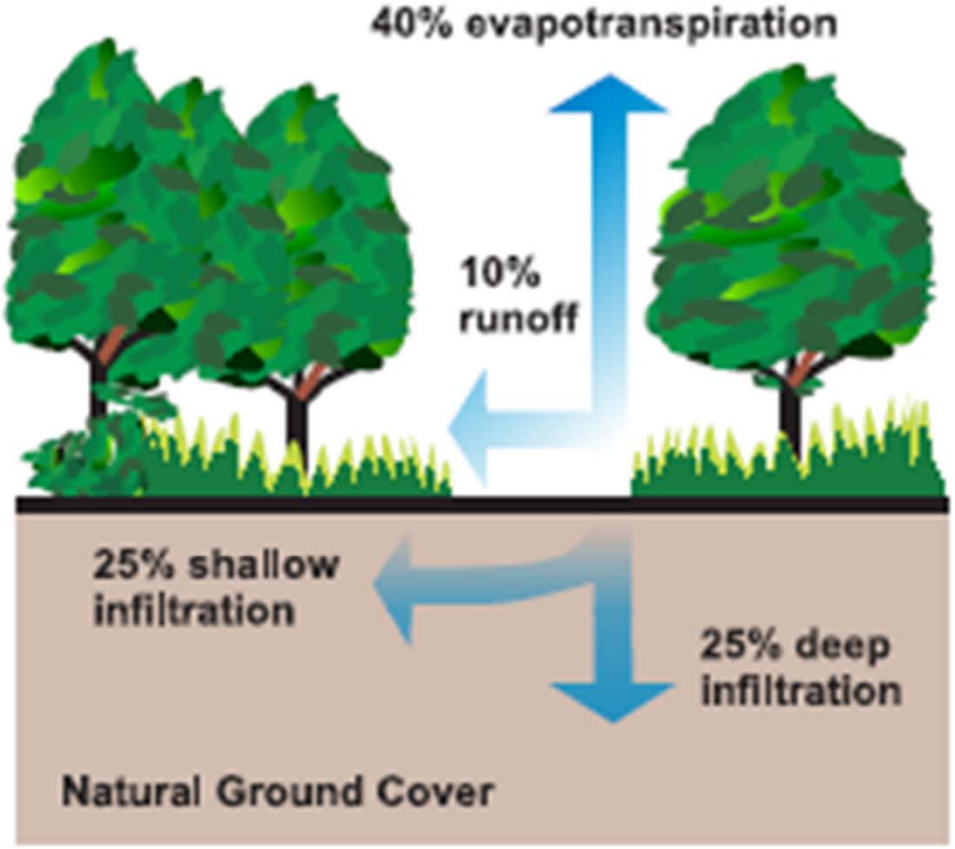
- State of Utah: 115%
- Jordan River Basin: 94%
- Utah Lake Basin: 176%

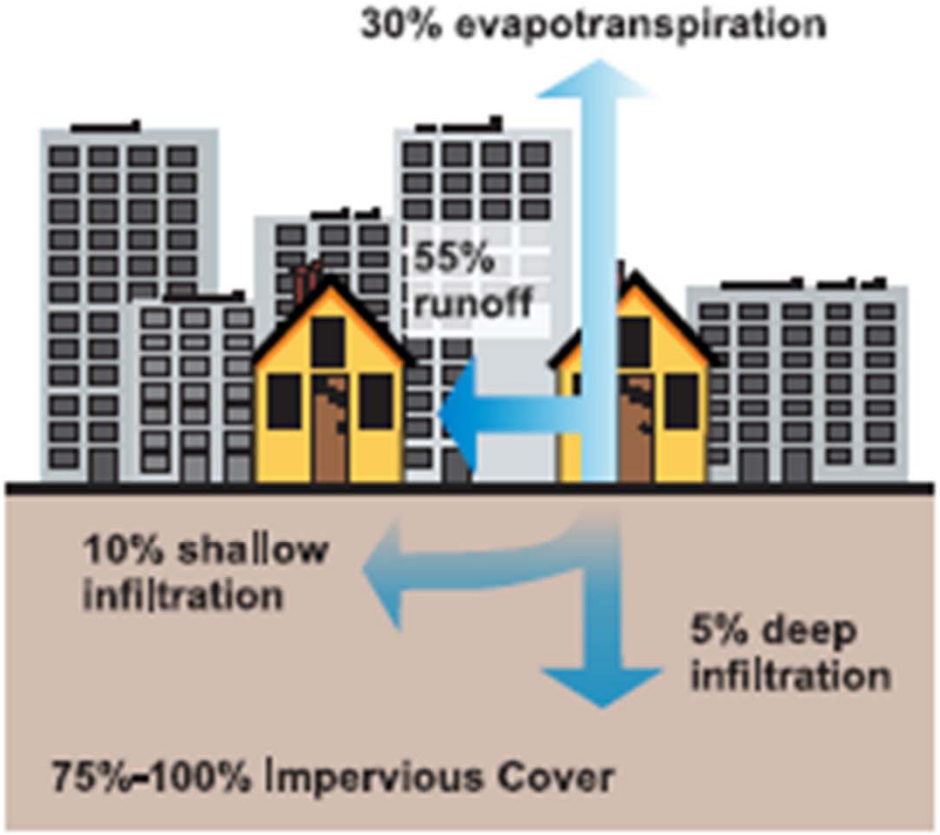


STORM WATER HYDROLOGY & MANAGEMENT

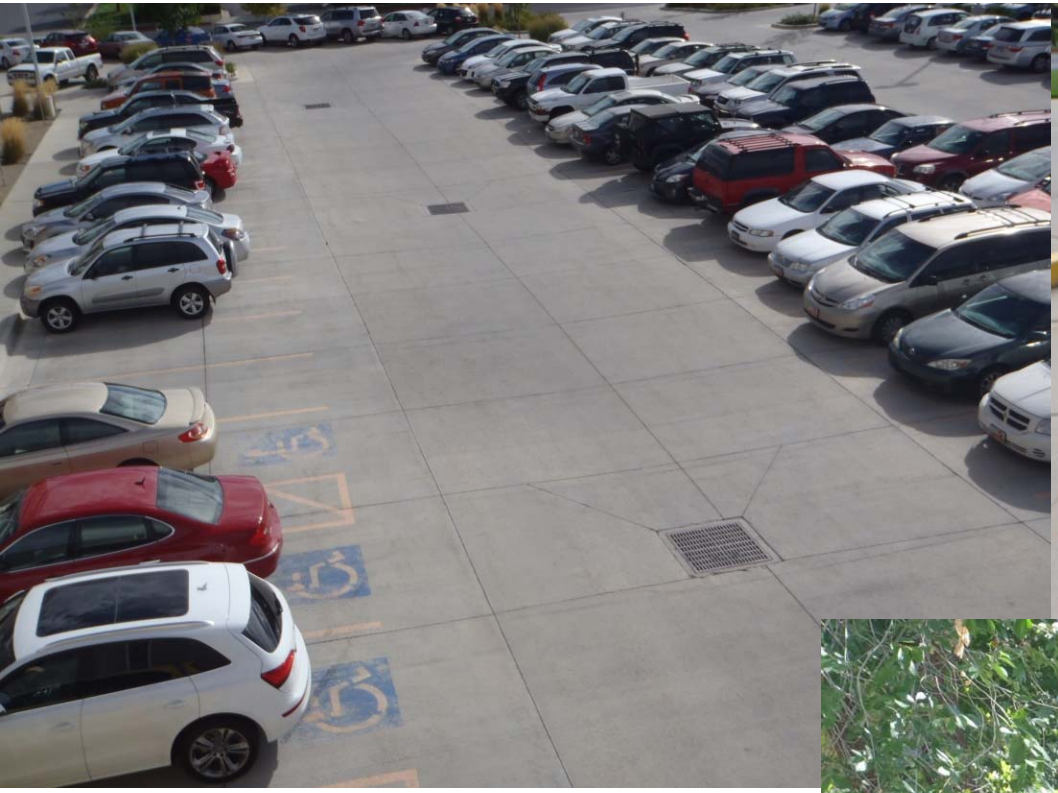

The Water Cycle
5. Transportation
4. Condensation
6. Precipitation
1. Evaporation
5. Transportation
4. Condensation
6. Precipitation
7. Deposition
9. Snowmelt Runoff
3. Sublimation
2. Transpiration
1. Evaporation
9. Surface Flow
9. Surface Flow
8. Infiltration
10. Plant Uptake
8. Percolation
9. Groundwater Flow

	Pre-Development	Post-Development
Surface Runoff	10%	55%
Infiltration	50%	15%
Evaporation	40%	30%






The Problem: Conventional Stormwater Management



Conventional Storm Water Management: What are the issues with Collect-Convey-Discharge?

Impacts on Urban Stream Water Quality

- Nutrient loads promote stream and lake algal growth
- Bacterial contamination during dry and wet weather
- Higher loads of organic matter
- Higher concentrations of metals
- Increased sediment load
- Stream warming
- Trash and debris jams

Philosophy Change

Previous Strategy

Collect and dispose of storm water quickly using engineered systems

Current Strategy

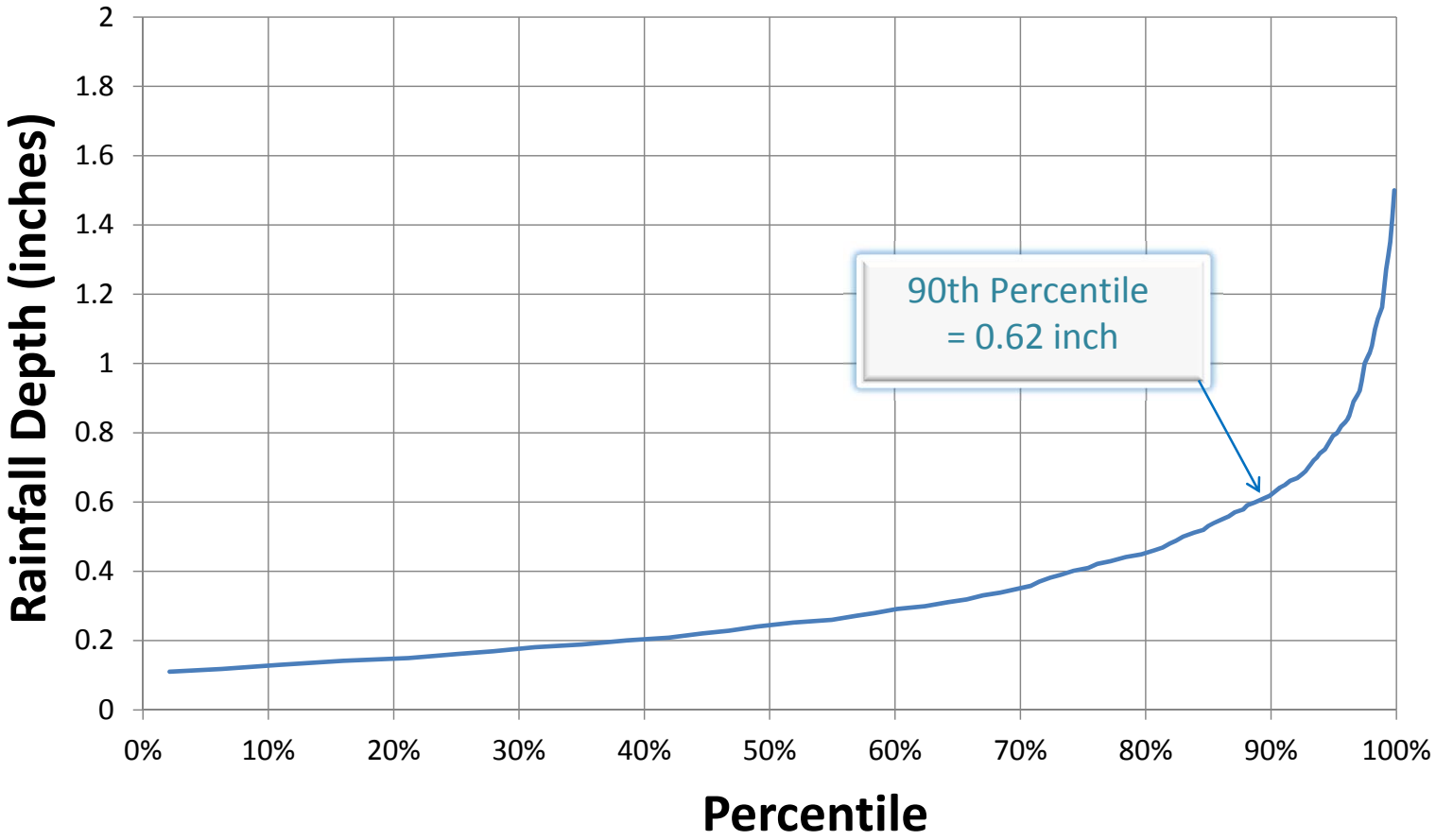
- Avoid and reduce impacts of development
- Manage storm water at its source through LID
- Emulate functions of natural systems to reintegrate rainfall into the water cycle rather than disposing of it as a waste product

RETENTION STANDARD:
90th PERCENTILE STORM EVENT

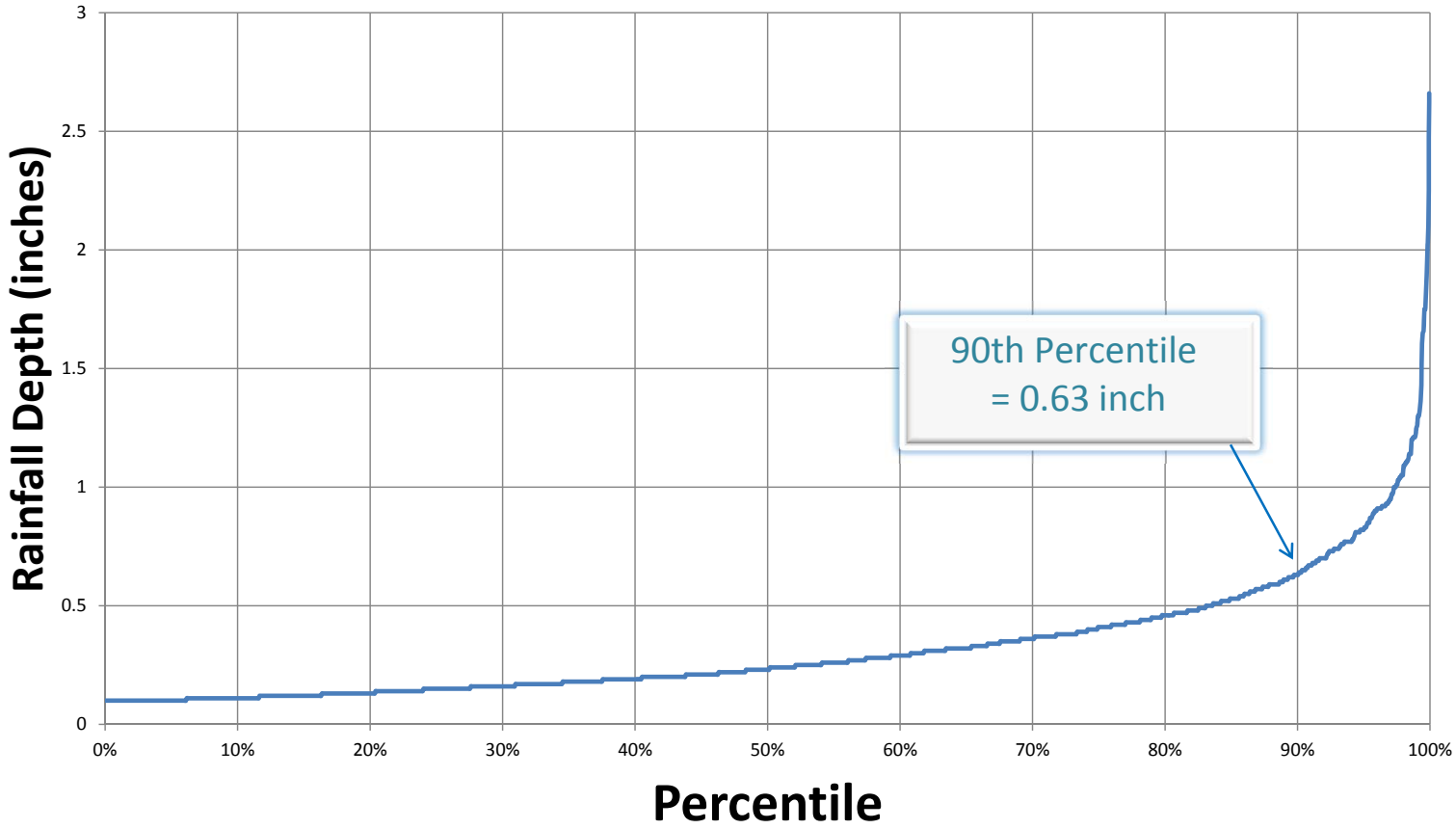
What is the 90th Percentile Storm Event?

- 90th percentile rainfall depth is a numeric translator of the narrative standard
- The depth which is $\geq$ 90% of all storm events over a given precipitation record
- Represents the small, frequently occurring storms
- For Utah MS4s: 90th Percentile = 0.6 – 0.7 inches

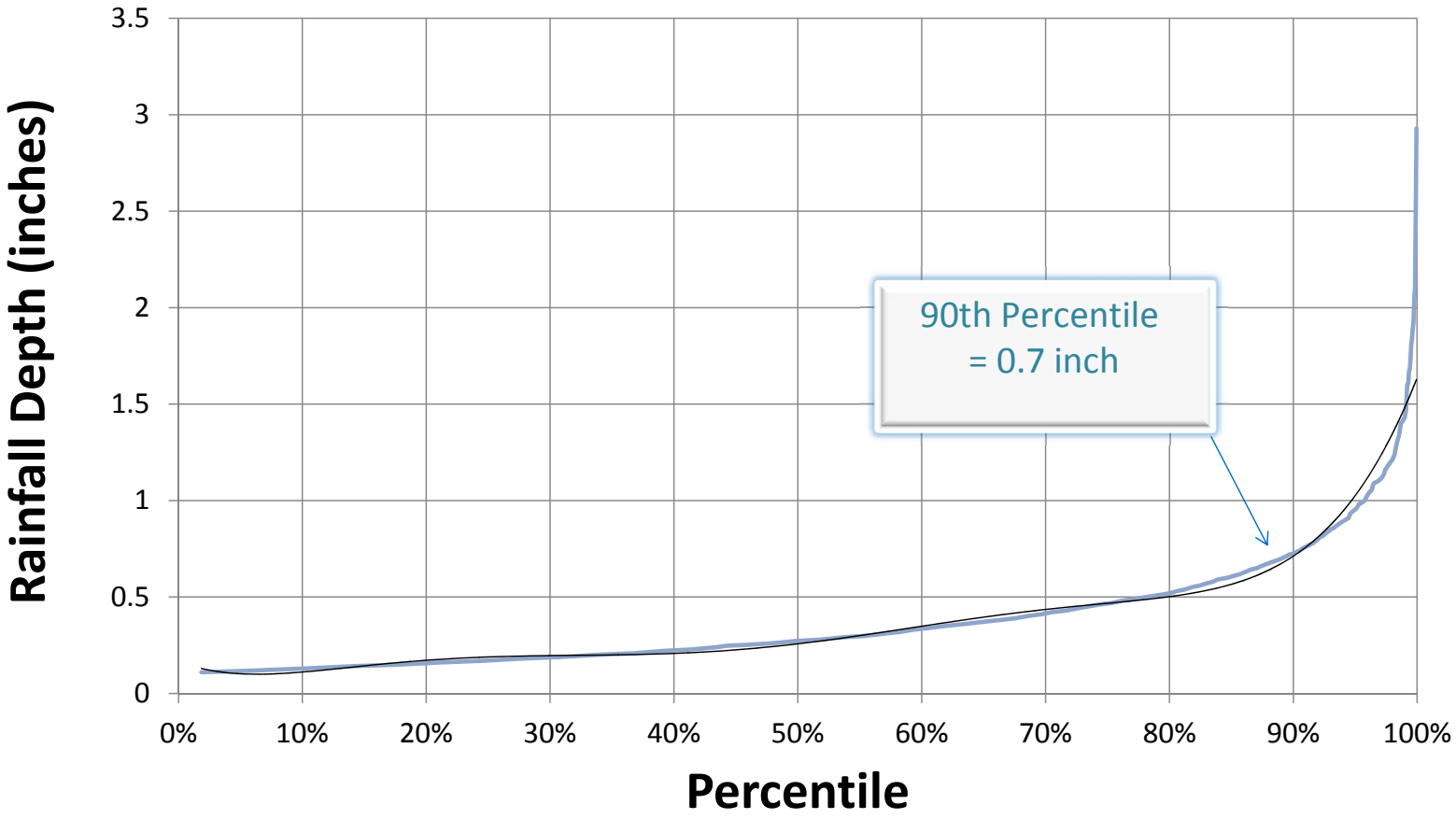
Rainfall Frequency for Orem Treatment Plant



Rainfall Frequency for Logan Experimental Farm



Rainfall Frequency for Brigham City



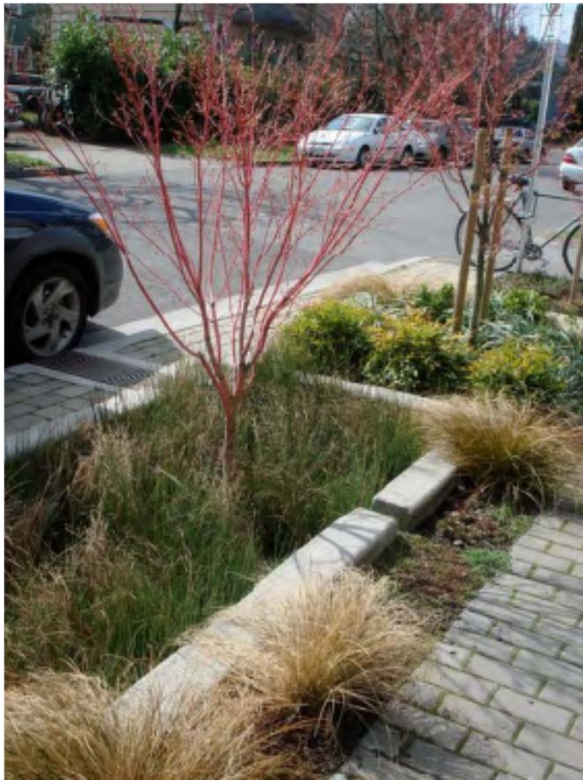
LID TECHNIQUES

What is Low Impact Development?

- Approach which mimics a site's predevelopment conditions
- Techniques that:
  - Infiltrate
  - Filter
  - Store
  - Reuse
  - Evaporate
  - Transpire
  - Detain runoff close to its source

What is Low Impact Development?

- Preservation of natural systems
- Cluster Development
- Minimization of Impervious Areas
- Green Roofs
- Permeable Paving
- Rainwater harvesting
- Bioretention
- Storm Water BMPs



Preservation of Open Space

Reduction of Impervious Area

Pervious driveways

Shared driveways

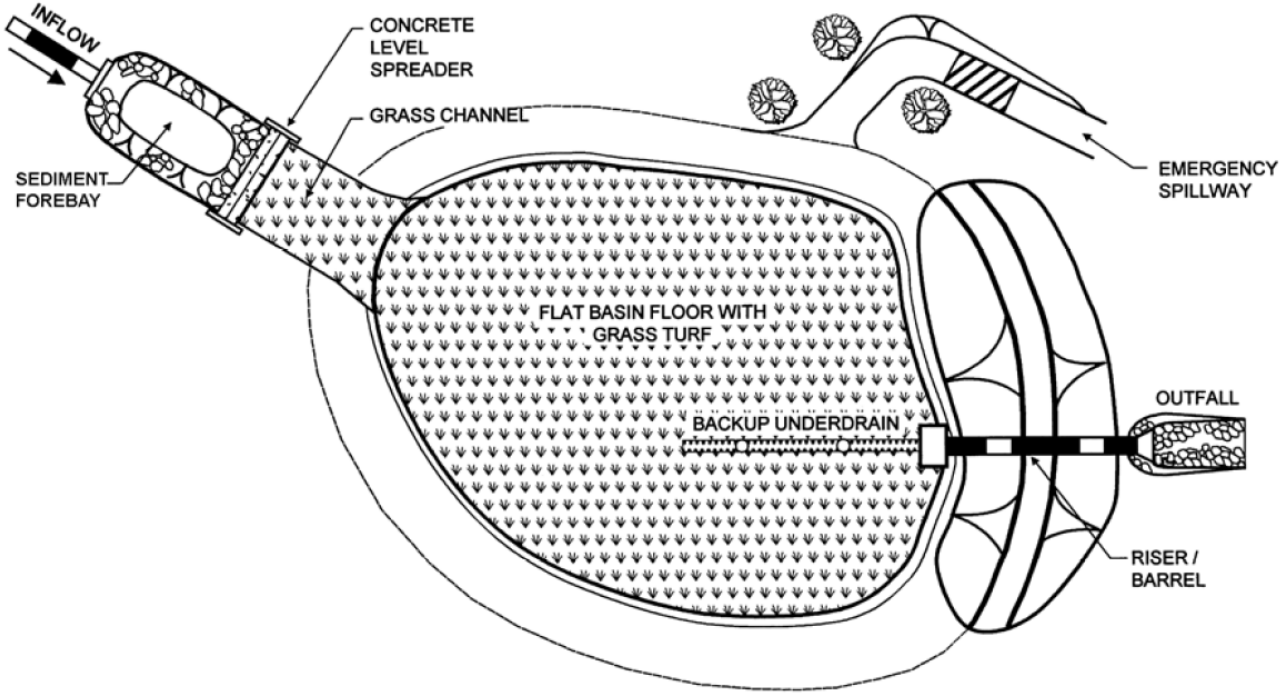
Options for Parking Lots

Grass Swale

Vegetated Swale

Vegetated Swale

Infiltration Basin



Constructed Wetland

Bioretention

Bioretention

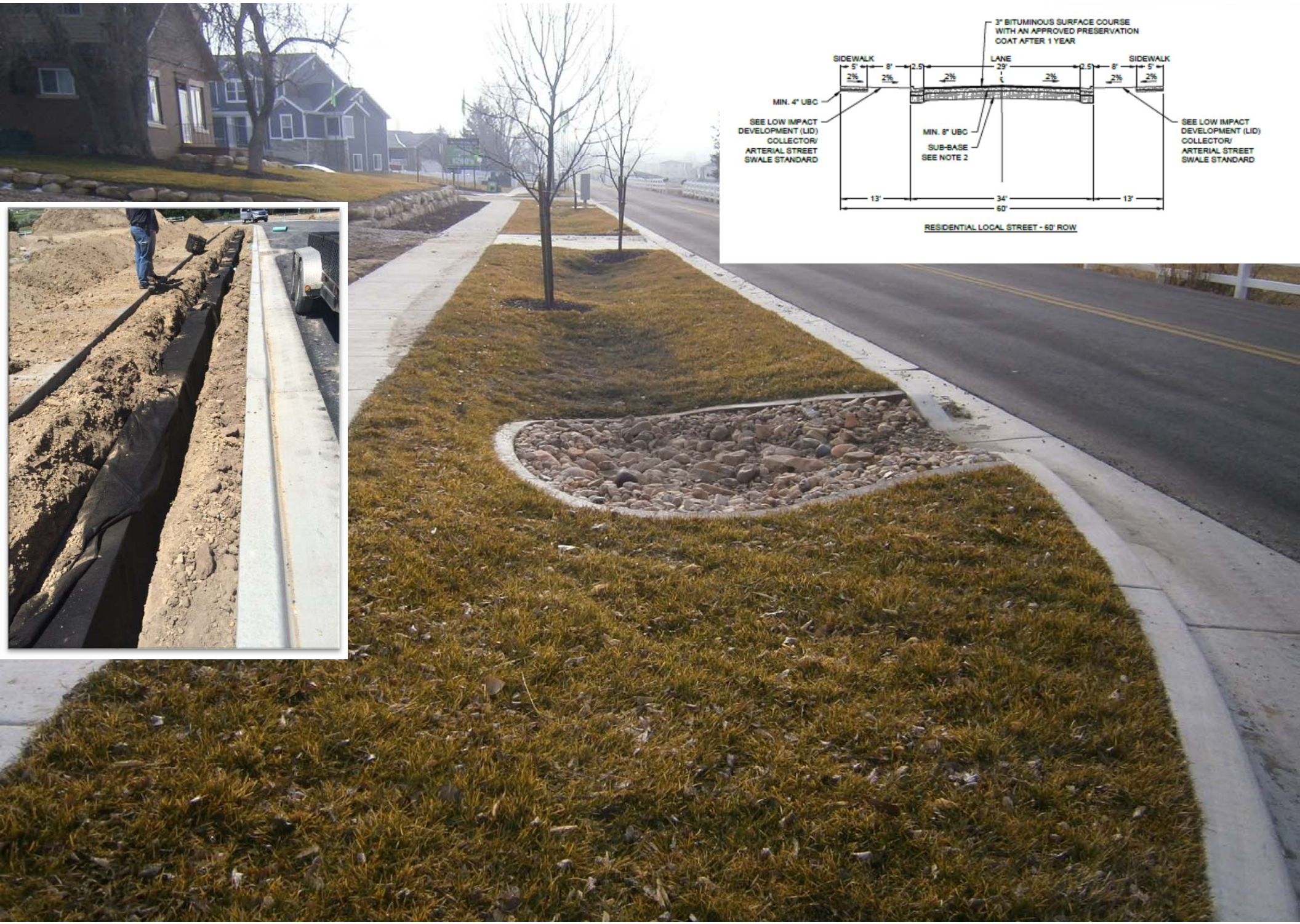
Rain Gardens

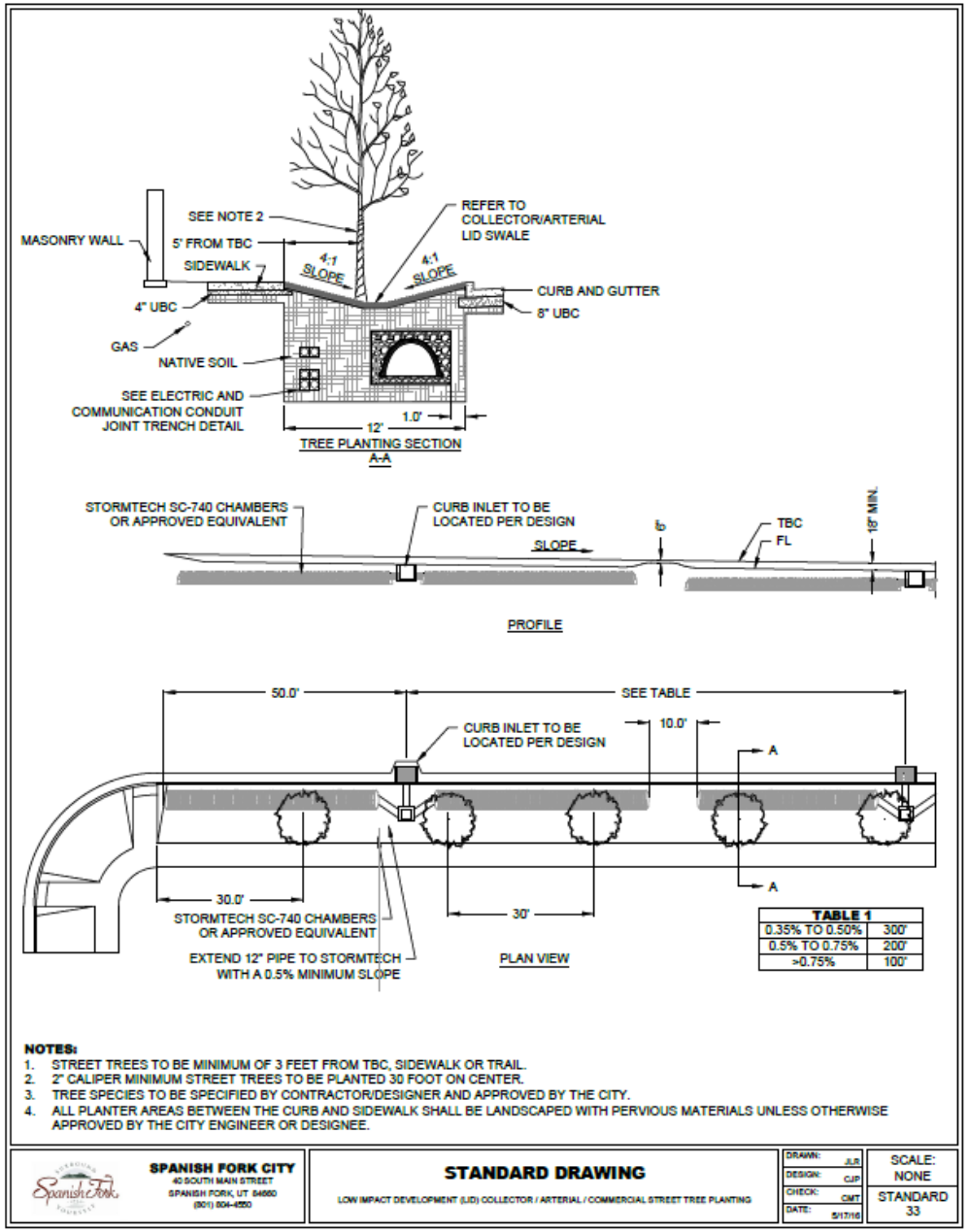
Green Roofs

Rainwater Harvesting

Rainwater Reuse

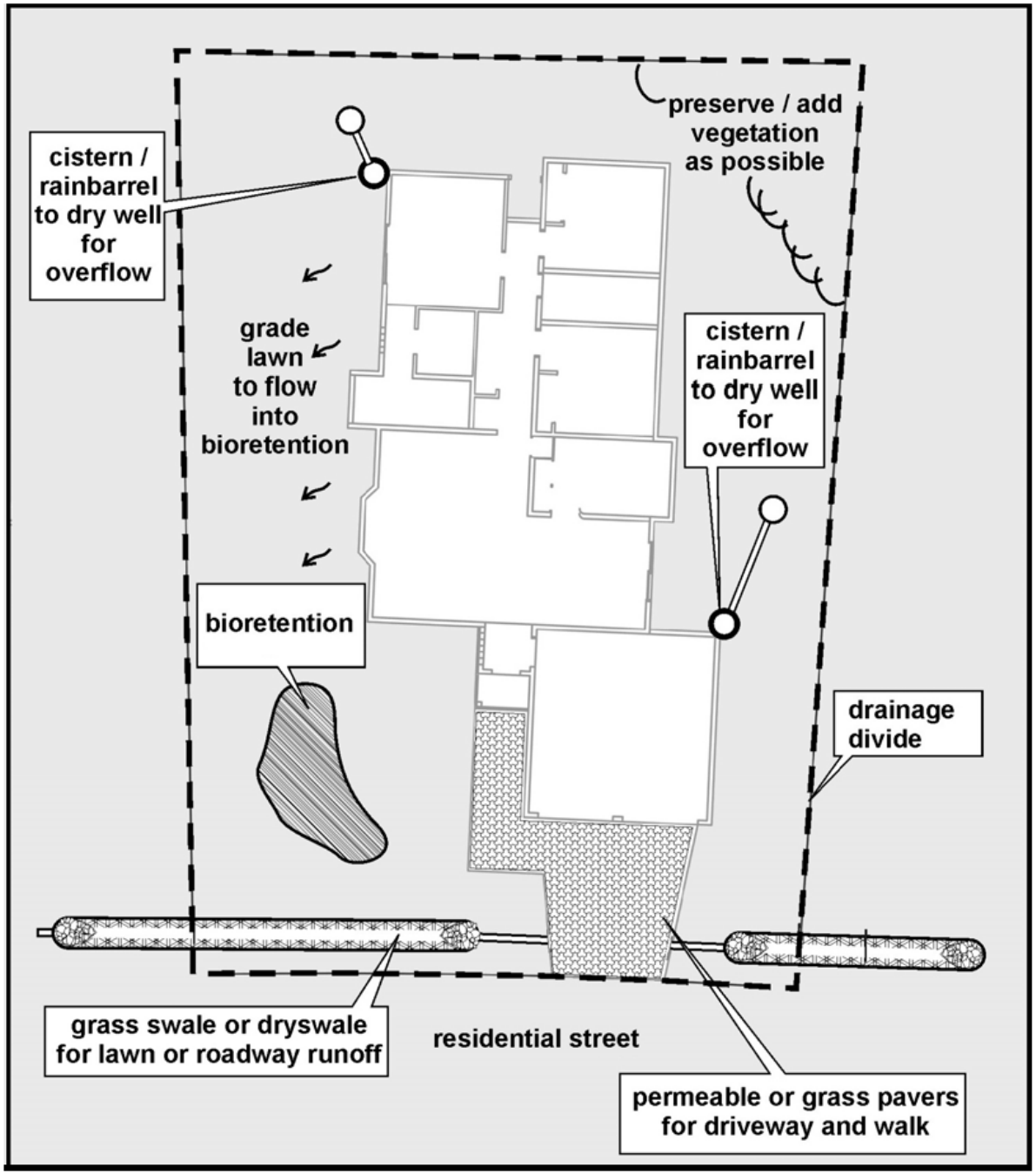
Pervious Concrete


3" BITUMINOUS SURFACE COURSE
WITH AN APPROVED PRESERVATION
COAT AFTER 1 YEAR
SIDEWALK
5'
8'
2.5
LANE
29'
2.5
8'
5'
SIDEWALK
2%
2%
2%
2%
2%
2%
MIN. 4" UBC
SEE LOW IMPACT
DEVELOPMENT (LID)
COLLECTOR/
ARTERIAL STREET
SWALE STANDARD
MIN. 8" UBC
SUB-BASE
SEE NOTE 2
SEE LOW IMPACT
DEVELOPMENT (LID)
COLLECTOR/
ARTERIAL STREET
SWALE STANDARD
13'
34'
13'
60'
RESIDENTIAL LOCAL STREET - 60' ROW


SEE NOTE 2
REFER TO COLLECTOR/ARTERIAL LID SWALE
MASONRY WALL
5' FROM TBC
SIDEWALK
4:1 SLOPE
4:1 SLOPE
CURB AND GUTTER
8" UBC
4" UBC
GAS
NATIVE SOIL
SEE ELECTRIC AND COMMUNICATION CONDUIT JOINT TRENCH DETAIL
12'
1.0'
TREE PLANTING SECTION A-A
STORMTECH SC-740 CHAMBERS OR APPROVED EQUIVALENT
CURB INLET TO BE LOCATED PER DESIGN
SLOPE
TBC
FL
18" MIN.
PROFILE
50.0'
SEE TABLE
CURB INLET TO BE LOCATED PER DESIGN
10.0'
A
A
30.0'
STORMTECH SC-740 CHAMBERS OR APPROVED EQUIVALENT
30'
EXTEND 12" PIPE TO STORMTECH WITH A 0.5% MINIMUM SLOPE
PLAN VIEW
TABLE 1
0.35% TO 0.50% 300'
0.5% TO 0.75% 200'
>0.75% 100'
NOTES:
1. STREET TREES TO BE MINIMUM OF 3 FEET FROM TBC, SIDEWALK OR TRAIL.
2. 2" CALIPER MINIMUM STREET TREES TO BE PLANTED 30 FOOT ON CENTER.
3. TREE SPECIES TO BE SPECIFIED BY CONTRACTOR/DESIGNER AND APPROVED BY THE CITY.
4. ALL PLANTER AREAS BETWEEN THE CURB AND SIDEWALK SHALL BE LANDSCAPED WITH PERVIOUS MATERIALS UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER OR DESIGNEE.
SPANISH FORK CITY
40 SOUTH MAIN STREET
SPANISH FORK, UT 84660
(801) 804-4550
STANDARD DRAWING
LOW IMPACT DEVELOPMENT (LID) COLLECTOR / ARTERIAL / COMMERCIAL STREET TREE PLANTING
DRAWN: JLR
DESIGN: CJP
CHECK: CMT
DATE: 5/17/16
SCALE: NONE
STANDARD 33


Homes clustered to allow for native vegetation retention
Permeable parking provided for guest parking - reduced roadway does not allow for on street parking
Shared driveways to reduce impervious surfaces
Bioretention facility for roadway runoff
Pervious trail through shared open space
Permeable sidewalks and driveways
Reduced roadway width to reduce impervious surfaces
Rain gardens for roof and driveway stormwater runoff
Dispersion into retained native vegetation

Options for Single Family Home



Why LID?

Environmental Benefits

- Water Quality
- Remove Pollutants
- Flood Control

Livability/Quality of Life

- Shade
- Traffic Calming
- Increased Property Values
- Community Building

Economic Benefits

- Reduce cost of new construction
- Reduced O&M costs
- Reduced water usage
- Increased market value

Cost Benefits of LID

Reduced Street Width = less costly pavement, curb and gutter

Reduce lot sizes = reduced grading and site prep
= more lots for sale

Preserving Natural Features = reduced landscaping costs
= increased property values

LID/Bioretention = fewer costly detention basins
= less piped conveyance
= reduced O & M costs

Resources

Low Impact Development Center

http://www.lowimpactdevelopment.org/

LID Urban Design Tools Website

http://www.lid-stormwater.net/

US EPA LID “Barrier Busters" Fact Sheet Series

http://water.epa.gov/polwaste/green/bbfs.cfm

US EPA LID Design Manual

http://water.epa.gov/polwaste/green/upload/lid_hydr.pdf

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