Sacramento Region
STORMWATER QUALITY DESIGN MANUAL
2017 Update

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CITY of CITRUS HEIGHTS
JANUARY 1, 1997

CITY OF ELK GROVE

CITY OF FOLSOM
DISTINCTIVE BY NATURE

City of GALT

a fresh take.
RANCHO CORDOVA
CALIFORNIA

City of
SACRAMENTO

SACRAMENTO COUNTY

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Overview of Discussion Topics

- Reorganization of Manual
  - Revised Hydromodification and LID sections
  - Trash Amendment
- Hydromodification Management Update and Applicability
- Low Impact Development Compliance (point system)
- Sacramento Area Hydrology Model (SAHM) Updates
- Green Streets
- Implementation examples

Reorganization of Manual Sections

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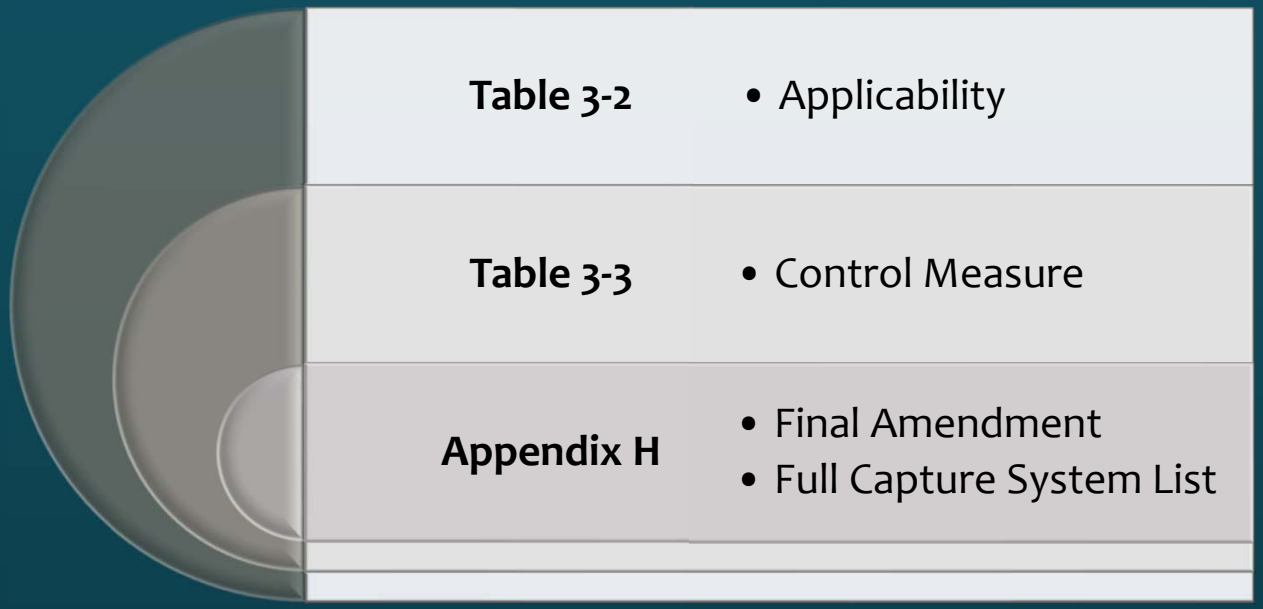
Incorporation of Hydromodification, LID, and Green Streets

2007 Manual	2014 Draft - 2017 Manual
Acknowledgements, Disclaimer, Glossary	Acknowledgements, Disclaimer, Glossary
Ch. 1 – Introduction	Ch. 1 – Introduction
Ch. 2 – Integrated Approach to Stormwater Management	Ch. 2 – Integrated Approach to Stormwater Management
Ch. 3 – Steps to Managing Stormwater Quality	Ch. 3 – Steps to Managing Stormwater Quality
Ch. 4 – Source Control Measures	Ch. 4 – Source Control Measures
Ch. 5 – Runoff Reduction Control Measures	**Ch. 5 – Hydromodification Management, Low Impact Development, and Treatment Control Measures**
Ch. 6 – Treatment Control Measures	**Ch. 6 – Green Streets**

Changes from 2014 Design Manual

- Update the HMP Exemptions (per latest Permit)
- Update design criteria for stormwater planters
- Update some figures for clarity
- Add trash requirements (Chapter 3 & Appendices)
- Update dry weather flows table in basin fact sheet
- Add BMP construction inspection checklist
- Update SAHM User's Manual (for better coordination with Design Manual)

Trash Amendment



Hydromodification Management Updates and Applicability

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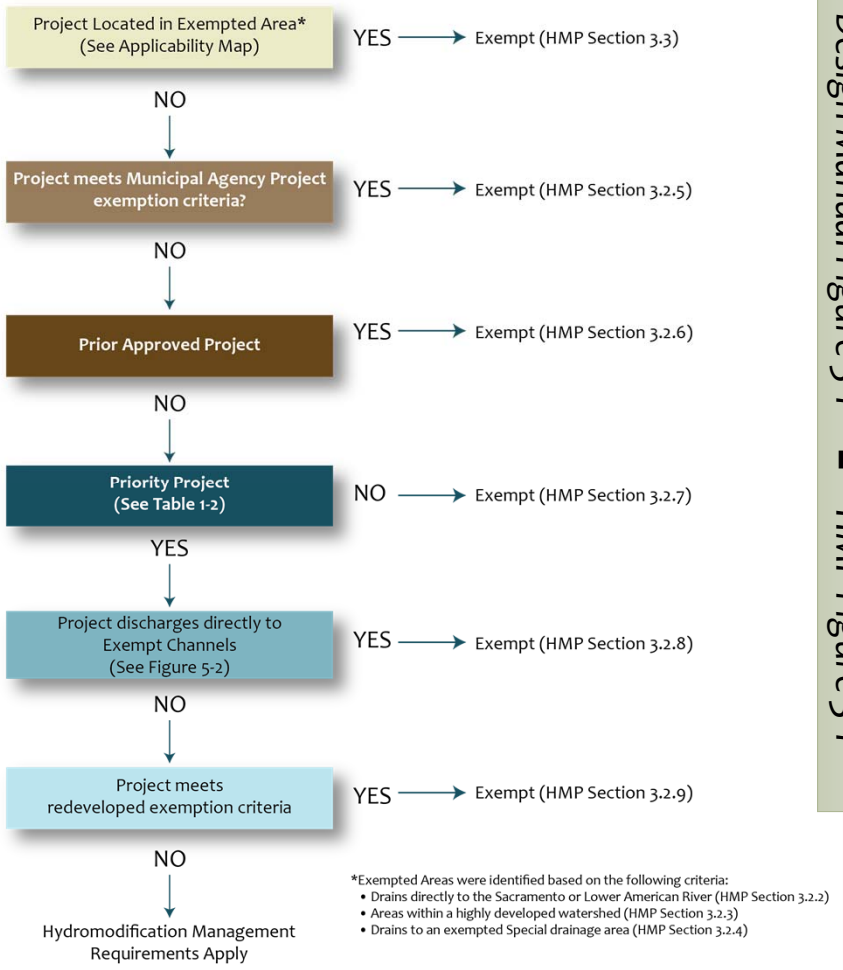
Project Applicability

- Exemptions for Municipal Agency Projects
  - *"Projects that are replacement, maintenance, or repair of the Permittees' existing flood control facilities, storm drains, public utilities, or transportation network."*
    [2016 MS4 Permit, Attachment J, Provision F.2.i.ii.(1)]



Design Manual Figure 5-1 ■ HMP Figure 3-1

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Project Applicability (contd.)

Prior approved projects will not be subject to hydromodification management requirements if they meet one of the following criteria:

1. The project's site design is approved by one of the following methods no later than **July 1, 2018:**

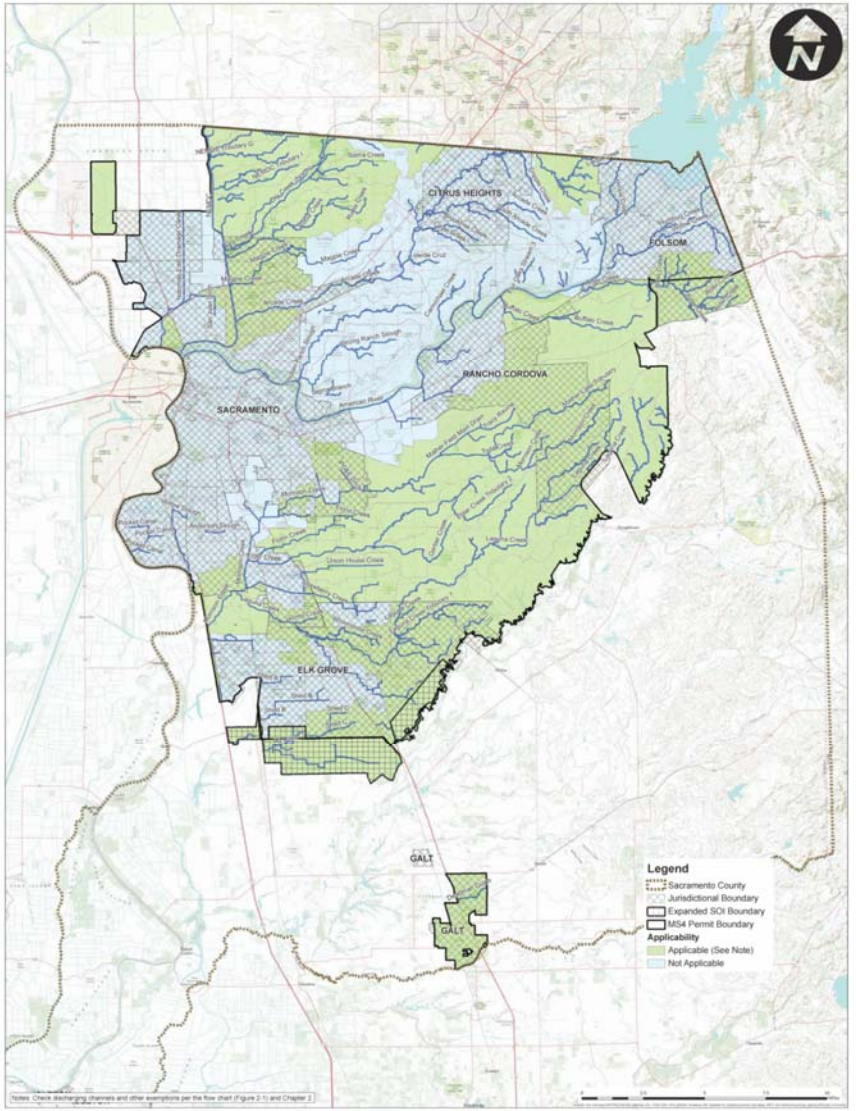
The site has a complete application submitted for a tentative map to construct a single family subdivision.	The site has an approved Special Permit or Conditional Use Permit, Design Review/Preservation Review entitlement.	The project has a complete building permit application submitted.	The project has a complete set of improvement plans submitted.	A project being issued a new building permit to complete work commenced under a prior permit may be considered exempt from HMP requirements at the discretion of the local Permitting Agency.

2. A project discharging directly to a segment of a channel or creek with permitted improvements under a 404 permit or 401 certification (currently valid or obtained no later than **July 2018**).

3. A public agency project for which design has been completed (final bid documents submitted) and/or a contract has been advertised no later than **July 1, 2018**.

Project Applicability
(contd.)

- Applicability Map



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Selecting and Designing Hydromodification Controls (contd.)

- Utilizing Multi-benefit Control Measures

Table 5-1 Summary of Control Measure Functionality

✓ Acceptable Option "RR" Runoff Reduction, used in combination with other measures

Control Measure	Appropriate for Compliance With		
	Hydromodification Management Standards	Low Impact Development Implementation	Treatment Control
Alternative Driveways	RR	✓	RR
Capture and Re-Use	RR	✓	RR
Compost Amended Soil	RR	✓	RR
Constructed Wetland Basin	✓		✓
Disconnected Pavement	RR	✓	RR
Disconnected Roof Drains	RR	✓	RR
Green Roof	RR	✓	✓
Infiltration Basin	✓		✓
Infiltration Trench	✓	✓	✓
Interceptor Trees	RR	✓	RR
Porous Pavement	RR	✓	RR
Sand Filter (Austin Sand Filter)	✓		✓
Stormwater Planter (Flow-Through)	✓	✓	✓
Stormwater Planter (Infiltration)	✓	✓	✓
Underground Storage (Tanks, Vaults, etc.)	✓		
Vegetated Filter Strip		✓	
Vegetated Swale		✓	✓
Water Quality Detention Basin	✓		✓
Proprietary Devices			✓

Note: Runoff Reduction (RR) measures contribute to the overall required mitigation, but are not standalone measures and need to be combined with appropriate treatment controls or hydromodification management controls as needed.

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Low Impact Development Compliance

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Low Impact Development (LID)

LID Goal:

- **Mimic a site's predevelopment balance of runoff and infiltration** by using design techniques that infiltrate, store, evaporate, and detain runoff close to its source.

- LID measures are typically integrated into:
  - site landscaping (including open space, yards, streetscapes, road medians, and parking lot and sidewalk planters) or
  - the design of paved and other impervious areas, such as the building roof.

Low Impact Development (LID) (contd.)

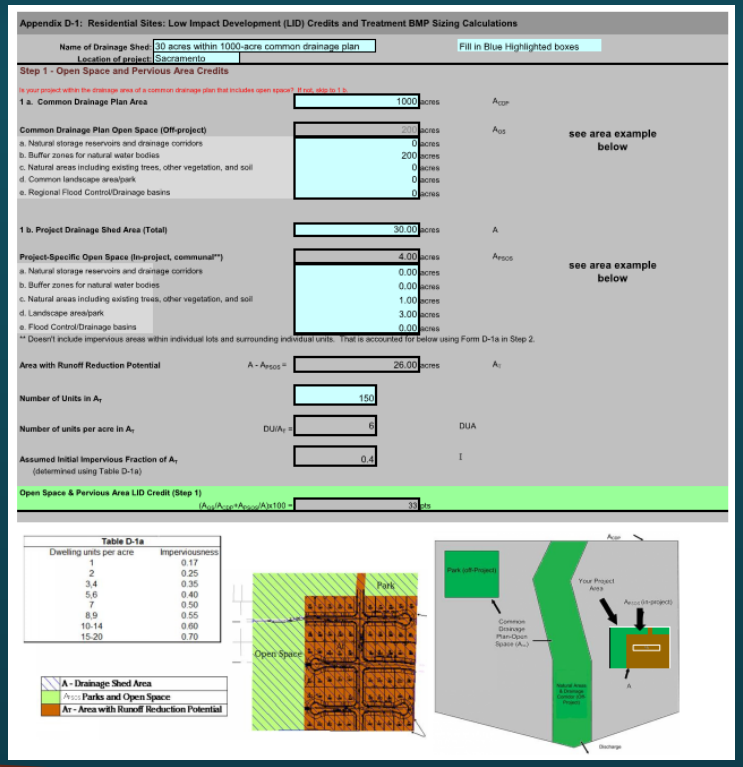
2007 Manual

- Concept introduced and woven throughout document
- No specific numeric LID requirements
- Runoff reduction credit worksheets

2017 Manual

- Specific "control" category
- 100 point requirement
- Updated worksheets
- SAHM

Updated LID Points Worksheets



Appendix D-1: Residential Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: 30 acres within 1000-acre common drainage plan — Fill in Blue Highlighted boxes
Location of project: Sacramento

Step 1 - Open Space and Pervious Area Credits

Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1.b.

1 a. Common Drainage Plan Area	1000	acres	A_{CDP}
Common Drainage Plan Open Space (Off-project)	200	acres	A_{OS}
a. Natural storage reservoirs and drainage corridors	0	acres	
b. Buffer zones for natural water bodies	200	acres	
c. Natural areas including existing trees, other vegetation, and soil	0	acres	
d. Common landscape area/park	0	acres	
e. Regional Flood Control/Drainage basins	0	acres	
1 b. Project Drainage Shed Area (Total)	30.00	acres	A
Project-Specific Open Space (In-project, communal)**	4.00	acres	A_{PSOS}
a. Natural storage reservoirs and drainage corridors	0.00	acres	
b. Buffer zones for natural water bodies	0.00	acres	
c. Natural areas including existing trees, other vegetation, and soil	1.00	acres	
d. Landscape area/park	3.00	acres	
e. Flood Control/Drainage basins	0.00	acres	
Area with Runoff Reduction Potential	A - A_{PSOS} = 26.00	acres	A_T
Number of Units in A_T	150		
Number of units per acre in A_T	DU/A_T = 6		DUA
Assumed Initial Impervious Fraction of A_T (determined using Table D-1a)	0.4		I
Open Space & Pervious Area LID Credit (Step 1) (A_{OS}/A_{CDP}+A_{PSOS}/A)x100 =	33	pts	

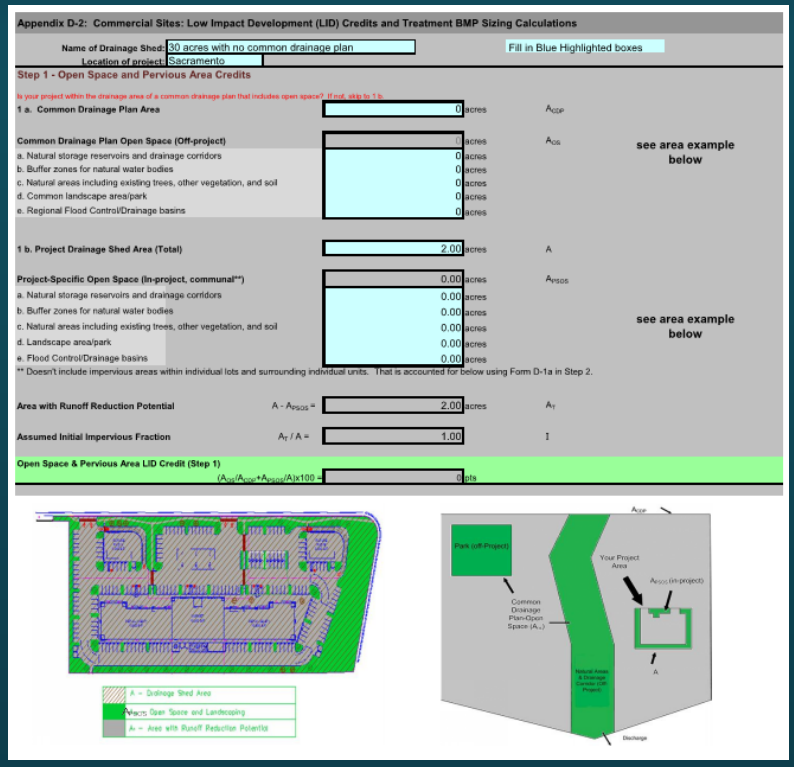
see area example below

see area example below

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Table D-1a

Dwelling units per acre	Imperviousness
1	0.17
2	0.25
3,4	0.35
5,6	0.40
7	0.50
8,9	0.55
10-14	0.60
15-20	0.70



Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: 30 acres with no common drainage plan — Fill in Blue Highlighted boxes
Location of project: Sacramento

Step 1 - Open Space and Pervious Area Credits

Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1.b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}
a. Natural storage reservoirs and drainage corridors	0	acres	
b. Buffer zones for natural water bodies	0	acres	
c. Natural areas including existing trees, other vegetation, and soil	0	acres	
d. Common landscape area/park	0	acres	
e. Regional Flood Control/Drainage basins	0	acres	
1 b. Project Drainage Shed Area (Total)	2.00	acres	A
Project-Specific Open Space (In-project, communal)**	0.00	acres	A_{PSOS}
a. Natural storage reservoirs and drainage corridors	0.00	acres	
b. Buffer zones for natural water bodies	0.00	acres	
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres	
d. Landscape area/park	0.00	acres	
e. Flood Control/Drainage basins	0.00	acres	
Area with Runoff Reduction Potential	A - A_{PSOS} = 2.00	acres	A_T
Assumed Initial Impervious Fraction	A_T / A = 1.00		I
Open Space & Pervious Area LID Credit (Step 1) (A_{OS}/A_{CDP}+A_{PSOS}/A)x100 =	0	pts	

see area example below

see area example below

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

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Sacramento Area Hydrology Model (SAHM)

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SAHM Development

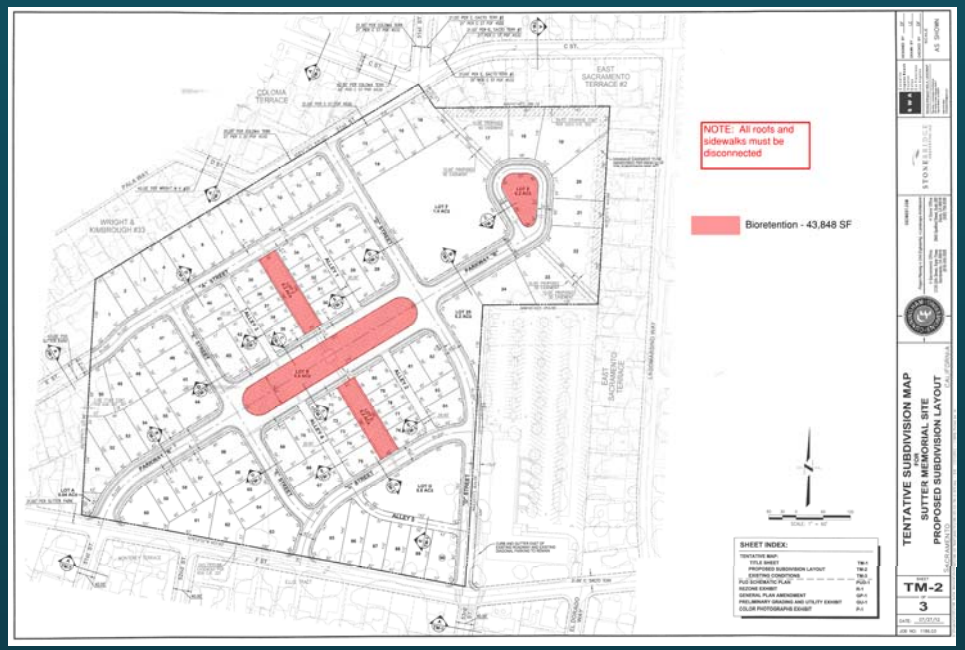
- Developed by the Partnership and Clear Creek Solutions
- Adapted from the Western Washington Hydrology Model (WWHM)
- Guidance Document included in Manual
  - Update forthcoming
- Includes LID point calculation based on volume reduction
  - Must model an unmitigated condition

SAHM Methodology

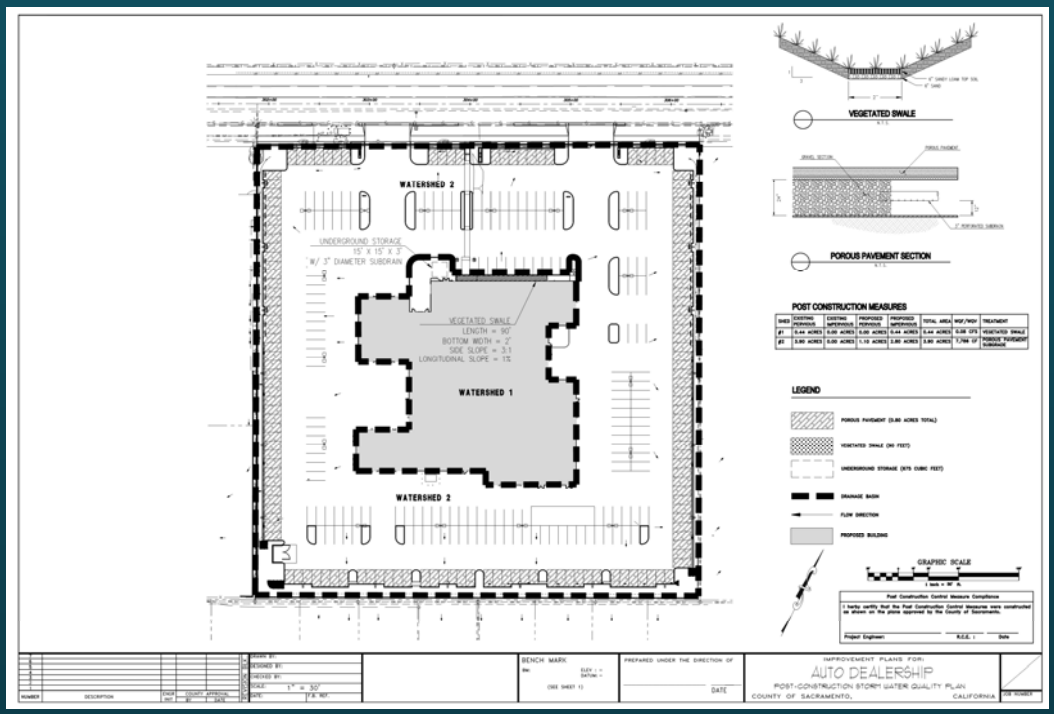
- Based on HSPF continuous simulation hydrology
  - Utilizes regional HSPF parameters
- Uses actual long-term precipitation and evaporation data
  - Elk Grove
  - Natomas
  - Orangevale
  - Rancho Cordova

Examples in Manual (Appendix A)

Residential Subdivision



Commercial Auto Dealership



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Green Streets

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Green Street Design Procedure

Address Site Layout Issues

Incorporate Alternative Transportation Options

Choose Stormwater Facilities

- Vegetated Swale
- Bioretention within Sidewalk Planter
- Bioretention within Curb Extension Area
- Pervious Paving
- Green Gutters
- Bioretention (as Rain Garden)

Perform Final Sizing and Implement Detailed Design Strategies

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Other Considerations

- BMPs in the R/w:
  - Limit ponding depth to 3-inch
  - Add 1-ft bench on each side of planter
  - Install pedestrian safety rails if BMP depth is 1-ft or more
- O&M Plan:
  - Setup CFD for long term O&M funds
  - Execute maintenance agreements with HOAs
  - Local municipality as backup for O&M, if funds are available and agency agrees

Q&A

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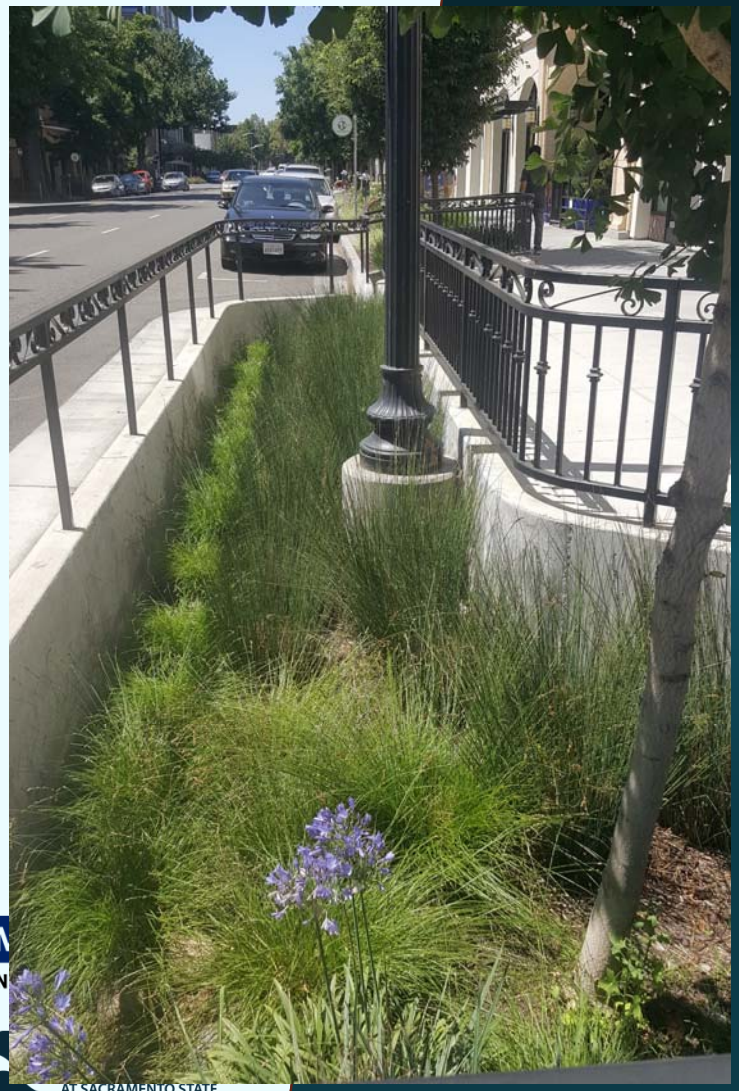

16th Street Planters

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Railyards Project

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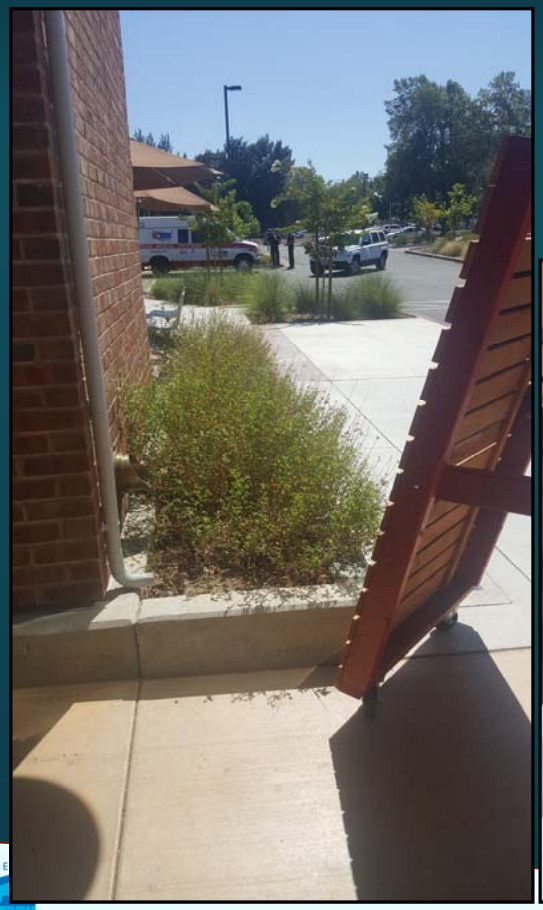
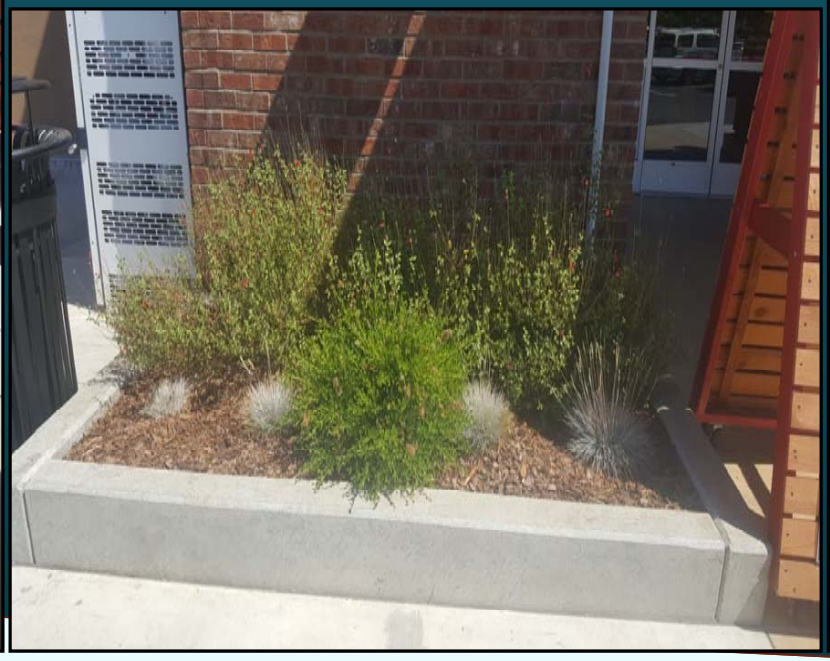
Got swagger!





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3075 Redding Ave

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Disconnected Pavement

- Make the grassy area work for you!

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CSUS:
Bioretention planters

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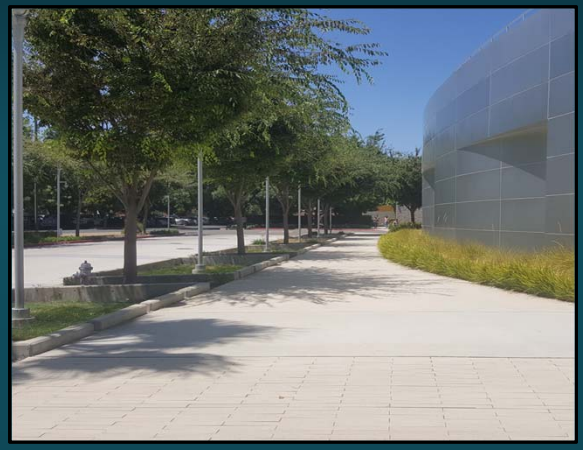
CA Lottery Building, East 10th Street

- Disconnected roof drains
- Disconnected pavement



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