

STORMWATER C.3 GUIDEBOOK

Stormwater Quality Requirements for Development Applications

Review & Update of the Stormwater C.3 Guidebook

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Topics

Review: What <u>hasn't</u> changed LID requirements Design procedure Dry wells, flow-through planters, and bioretention facilities Update: What <u>has</u> changed Two new IMP designs IMP Sizing Calculator

Chapters 1, 2, 3 and 5

Stormwater Control Plan required Consistency and completeness Delineate drainage areas on exhibits Describe drainage and facilities Integrate with site and landscape design submittals Consider operation & maintenance

Soils, Plantings, and Irrigation

Appendix B published January 2009 Soils Detailed soil specification "Brand name" mixes by local suppliers Plantings Plant list Fertilization, weed control, pest control Irrigation Smart irrigation controllers **Drip emitters**

Chapter 4: LID Design Process

Analyze Project for LID Develop and Document LID Drainage Design Specify LID Preliminary Design Details

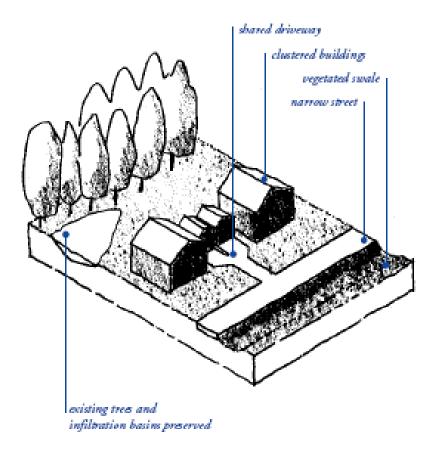
Coordinate with Site Design and Landscape Design

Analyze Your Project for LID

Optimize the site layout Use pervious surfaces 2. **Disperse runoff where possible** 3. Drain remaining runoff to: **4**. Bioretention Facilities **Flow-through Planters** Dry Wells **Cisterns + Bioretention** Bioretention + Vault

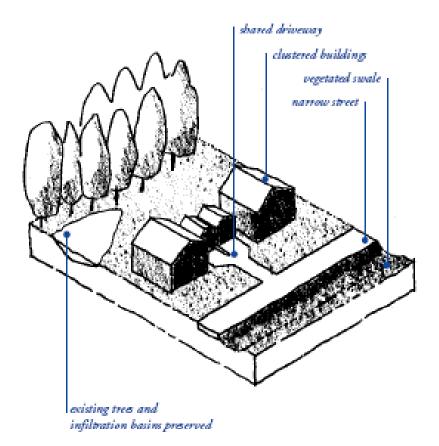
1. Optimize the Site Layout

Define the development envelope Set back from creeks, wetlands, and riparian habitats Preserve significant trees Minimize grading



1. Optimize the Site Layout

Preserve and use permeable soils Limit roofs and paving Detain and retain runoff throughout the site Use drainage as a design element



2. Use Pervious Surfaces

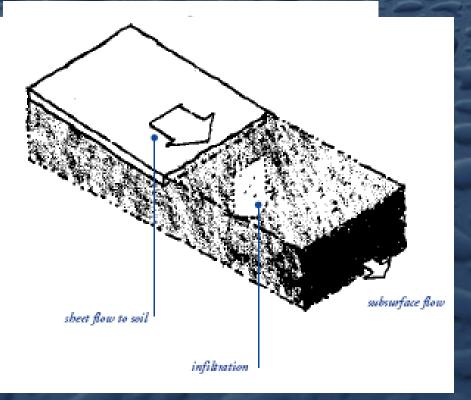
Permeable pavements





Green roofs

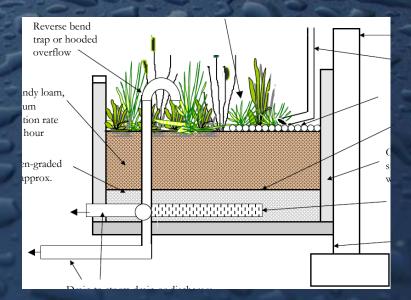
3. Disperse Runoff



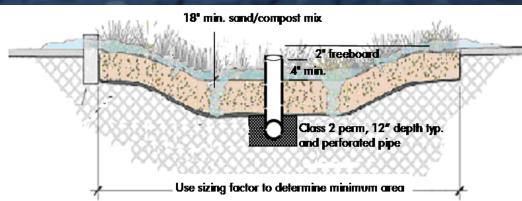


4. Direct Runoff to Facilities

Bioretention facilities
Flow-through planters
Dry wells
Cisterns + Bioretention
Bioretention + Vault







LID Design Process

Analyze Project for LID Develop and Document LID Drainage Design Specify LID Preliminary Design Details

Coordinate with Site Design and Landscape Design

Document Drainage Design

Delineate drainage management 1. areas (DMAs) 2. Classify DMAs and determine runoff factors **Tabulate DMAs** 3. Lay out facilities **4**.

Drainage Management Areas

Only one surface type within each area Many-to-one relationship between drainage areas and facilities Four Types of Areas Self-treating areas 1. Self-retaining areas 2. Areas draining to a self-retaining area 3. Areas draining to a treatment facilities **4**.

Self-treating DMAs

Must be 100% pervious Must drain offsite Must not drain on to impervious areas Must not receive drainage from impervious areas Must not drain to treatment facilities No treatment or flow control required No further calculations required

Self-retaining DMAs

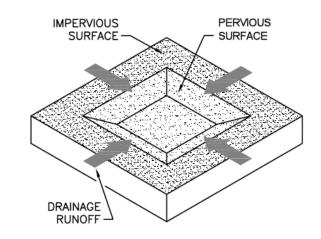
Berm or depress grade to retain 1" rain Set area drain inlets above grade Amend soils Terrace mild slopes Have limited applicability in **RETENTION AREA/** TERRACE Dense RETAINING WAL developments EXISTING GROUND Hillsides

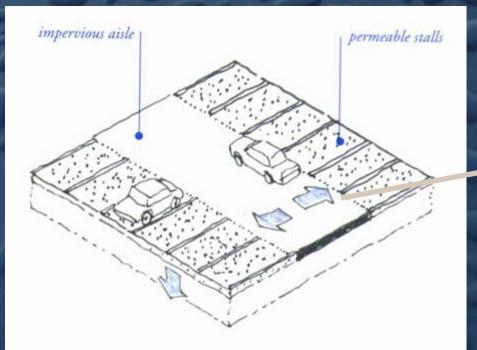
Areas draining to self-retaining areas

Impervious areas can drain on to self-retaining areas Example: Roof leaders directed to lawn or landscape Maximum ratio is 2:1 for treatment; 1:1 for flow control No maintenance verification required



Areas draining to self-retaining DMAs





$\frac{\text{Impervious}}{\text{Pervious}} \le 1$

Tabulating Areas

Self-Treating Areas

DMA Name

Area (SF)

Self-Retaining Areas

DMA Name

Area (SF)

Areas Draining to Self-Retaining Areas

DMA Name	Area (SF)	Post- project surface type	Runoff factor	Receiving Self-retaining DMA	Receiving DMA Area (SF)	Ratio
	1	1.18	2000			

Areas draining to Bioretention Facilities Areas used to calculate the required size of the bioretention facility Where possible, drain only impervious roofs and pavement to bioretention facilities Delineate any pervious areas as separate Drainage Management Areas

DMAs draining to facilities

Treatment-only example

DMA Name	DMA Sq. Ft	Surface Type	Runoff Factor	Area x runoff factor	120 S	500	
				0000			
			1.5			233	
2			123		Sizing Factor	Min. Size	Size Planned
1	Facilit	y A→	1	30	S.	Nº1	

Calculating Facility Size



A-2: Paving 10,000 SF

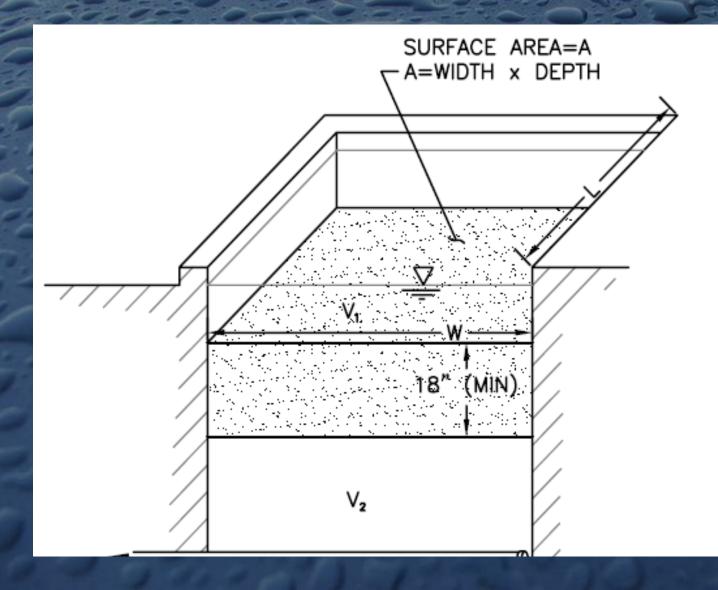
Bioretention Facility A

A-3: Turf 20,000 SF

DMAs draining to facilities

DMA Name	DMA Sq. Ft	<i>Surface Type</i>	Runoff Factor	Area x runoff factor		Run Factors Table 4	s from
A-1	5000	Roof	1.0	5000	35	p. 4	42
A-2	10000	Paved	1.0	10000		23	
A-3	20000	Grass	0.1	2000	Sizing Factor	Min. Size	Size Planned
3	Facilit	y A→		17000	0.04	680	800

Sizing Factors for Flow Control



Surface Storage, V_1

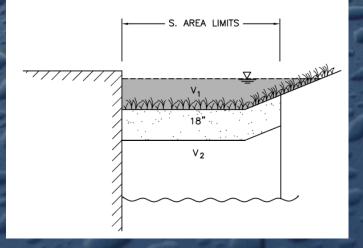
Area of soil flooded before overflow, A

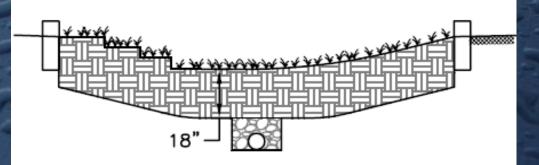
Subsurface Storage, V_2

Bioretention Design Options

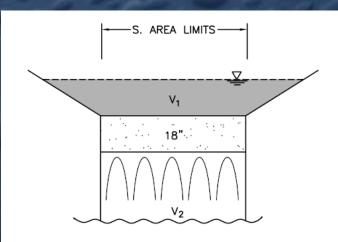
Edge Treatments

Stepped-back side slope

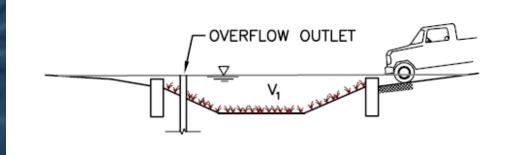




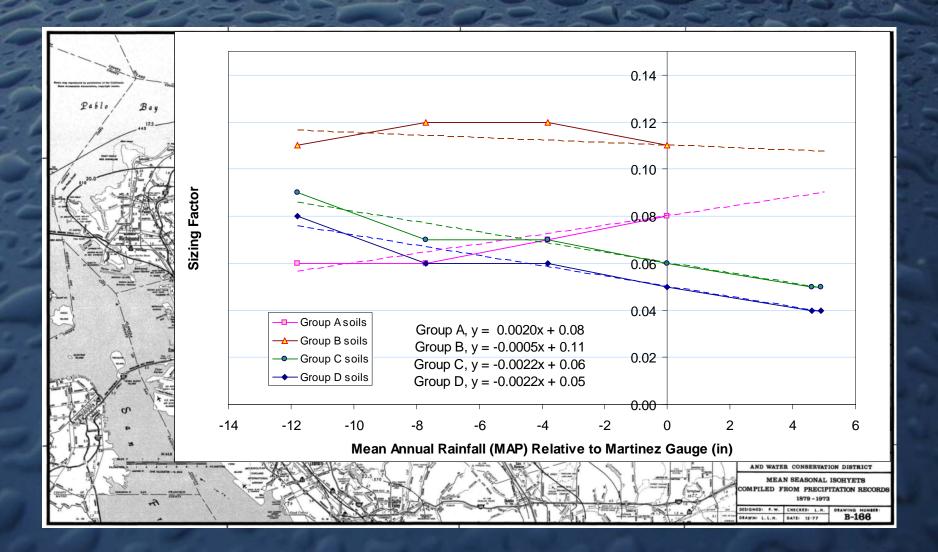
Subsurface Storage Options



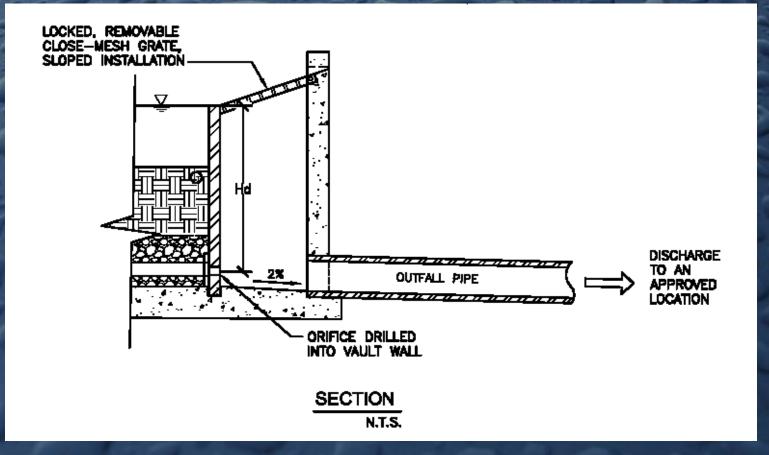
Using Shallow Flooding for Storage



Adjustment for Rainfall



Orifice Sizing for Flow Control



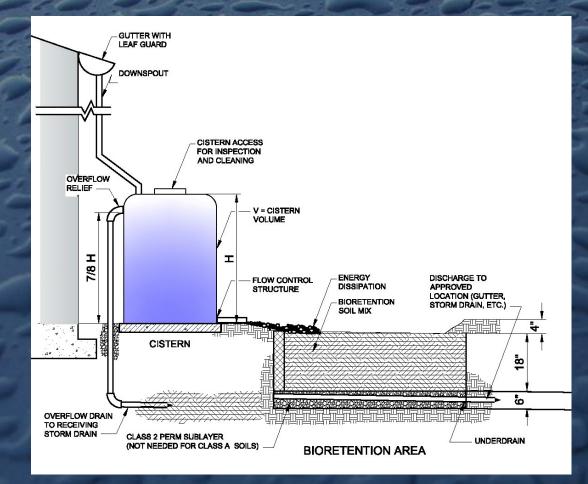
Calculation Format with Flow Control

DMA Name	DMA Area (square feet)	Post- project surface type	DMA Runoff factor	DMA Area × runoff factor	Soil Type:		IMP Name		
					IMP Sizing factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume	
			Total						IMP Area
									Vor V1
									V2
								Orifice Size:	

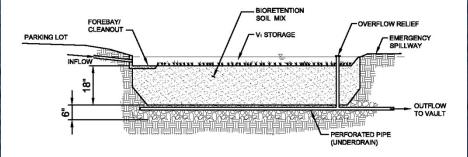
Update

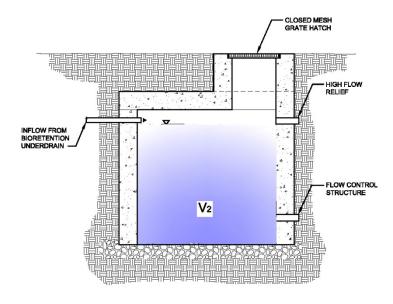
Two new IMPs
Sizing Calculator

Cistern + Bioretention



Bioretention + Vault





BIORETENTION WITH VAULT

Sizing Calculator

	at Practice Calculator (Commercial yml)
Integrated Managemer	nt Practice Calculator [Commercial.xml]
File Tools Help	
Project Information	
All of the project information	is required. Please fill in all of the information before editing the DMAs and IMPs.
Project Name Commercial	
Location Base of Slo	Treatment Plus Flow Control
APN 000-00-000	0 Treatment Only
Total Area	30530 sq.ft Mean Annual Precip 19 in
Drainage Management Are	as (DMAs) Integrated Management Practices (IMPs) Calculation Warnings(0) Summary Report
ST-1 SR-1 SR-2	LS-1 PAVE-1 PAVE-2 PAVE-3 PAVE-4 ROOF-1 ROOF-2 ROOF-3 ROOF-4
DMA Type	Self-Treating IMP IMP Please select NOTE: The DMA can drain only to IMPs with the same soil type.
Drainage Area (sq. ft.)	11600 Drains to DMA Please select v
NRCS Soil Group	Please select *
Post-project Surface 1	ype Please select
	Add New DMA Remove Current DMA Rename Current DMA
Total Area (Calculated)	
Drainage Management Are	
Integrated Management Pr	
Total	30530 sq. ft.