

Green Infrastructure Guidance Documents

- Phil Erickson
Community Design + Architecture
- New suite of model guidance documents and standards for local agency use in meeting Green Infrastructure Plan provision

MRP Provisions

- C.3.i(2)(e): General guidelines for overall streetscape and project design and construction so that projects have a unified, complete design that implements the range of functions associated with the projects.
- C.3.i(2)(f): Standard specifications and, as appropriate, typical design details and related information necessary for the Permittee to incorporate green infrastructure into projects in its jurisdiction.

Existing Documents

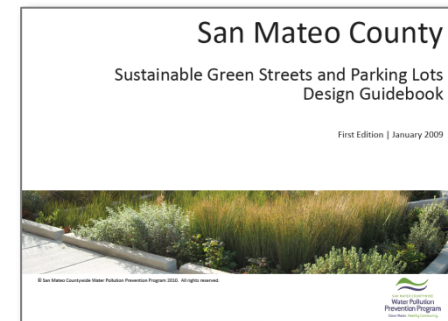
- *C.3 Stormwater Technical Guidance*, Version 5, June 2016
- *Sustainable Green Streets and Parking Lots Design Guidebook*, January 2009
- Streets and Parking Lots Guidebook
 - 8 years old
 - Some key details not provided
- Terminology differences
- Some differences in guidance
- Additional technical guidance needed for:
 - non-regulated projects
 - “under-sized” GI treatment measures / elements
- O&M not comprehensive
- Layout & graphic design not consistent

Guidelines, Standard Specifications and Design Details

Core element of MRP 2.0 requirements for the 2019 Annual Report

■ Guidelines

- Build from *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook*
 - CD+A experience through developing City of San Mateo *Sustainable Streets Guidelines*
- Reference Best Practice and other Model Documents
- Coordinate with BASMAA Development Committee and GI Design Charrette



- Best Practices
- New Custom Guidance
- Local Experience

**Green Infrastructure
Plan Guidelines**

Reference Guidance Documents

Primary Documents

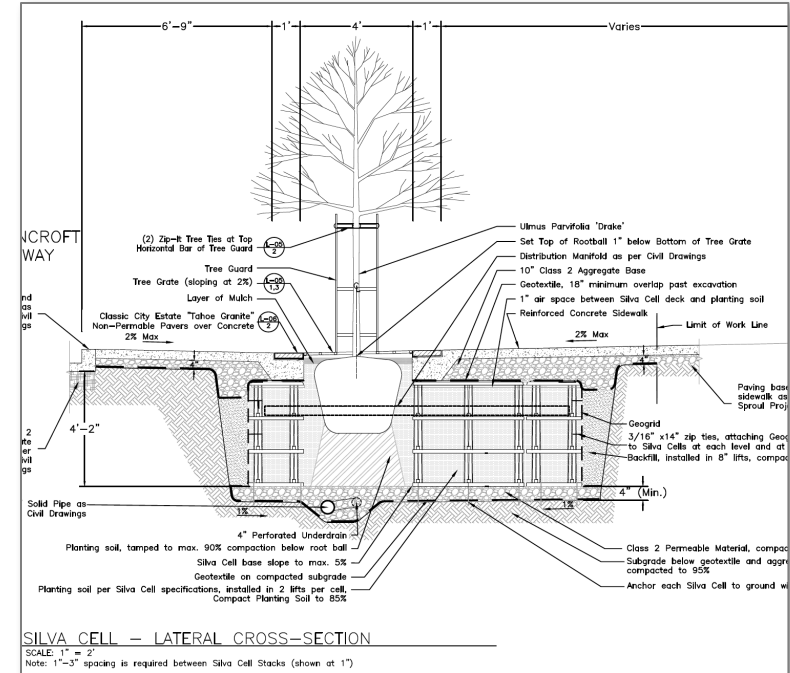
- Philadelphia
(http://www.phillywatersheds.org/what_were_doing/gsdm)
 - Green Streets Design Manual and Appendices, 2011
 - Green Stormwater Infrastructure Standard Details, 2015
 - Green Stormwater Infrastructure Design Requirements and Guidelines Packet, 2015
 - Green Stormwater Infrastructure Landscape Design Guidebook, 2014
- San Francisco (<http://sfwater.org/index.aspx?page=1007>)
 - Stormwater Management Requirements and Design Guidelines, May 2016
 - Green Stormwater Infrastructure Typical Details, version 2, September 2016
 - Green Stormwater Infrastructure Specifications, March 2016
- San Mateo, City of
(<http://sustainablestreetssanmateo.com/downloads/>)
 - Sustainable Streets Plan and Design Guidelines, 2015

Second- & Third-level Sources

- Boston
- Caltrans
- Chicago
- Cleveland
- Los Angeles, City of
- Los Angeles County
- Milwaukee
- New York City
- Portland, OR
- Puget Sound
- Salinas
- San Diego, City of
- San Diego County
- San Mateo County
- Seattle
- Washington, DC

Specifications and Design Details

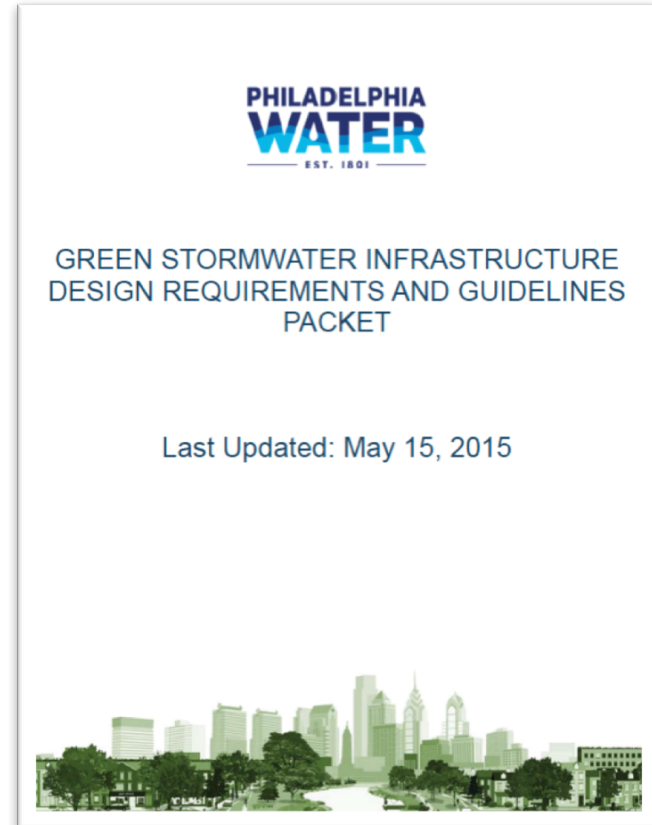
- Increasing number of recently developed model standards and details to build and learn from
 - San Francisco
 - District of Columbia
 - Philadelphia
 - Seattle
- Coordinate with BASMAA Development Committee and GI Design Charrette
- Focus on cost effective balance of construction and O&M costs




Create a “Suite” of Coordinated Documents

- Related to Philadelphia approach –

set of 10 interrelated documents



Create a “Suite” of Coordinated Documents




GSI Design Requirements and Guidelines

A. Relationships with Other Resources and References
 The publication of the PWD GSI Design Requirements & Guidelines Packet follows a number of related resources. These related resources should be used by the designer for reference and additional contextual information. Always refer to the most current resources.


Note on Other “Packets”: The PWD GSI Design Requirements & Guidelines Packet is one of three main “Packets” that describe the requirements for GSI projects funded and/or maintained by PWD: the GSI Design Process Workflow Packet, the GSI Design Requirements & Guidelines Packet, and the GSI Drawing Requirements Packet.

- 1. Philadelphia Water Department. 2015. Green Stormwater Infrastructure Design Process Workflow Packet.**




This document provides summary workflows, detailed workflows, and expanded process descriptions that describe the process for GSI projects funded and/or maintained by PWD. The workflows are to be referenced by PWD staff, providers of professional engineering services hired by PWD, and other agencies and partner organizations.

http://phillywatersheds.org/doc/GSI/GSI_Design_Process_Workflow_Packet_5-15-2015.pdf
- 2. Philadelphia Water Department. 2013. Green Stormwater Infrastructure Drawing Requirements Packet and the OOW GSI CAD Standards.**



This packet provides requirements to be used in the drawing of GSI projects funded and/or maintained by PWD. The Office of Watersheds (OOW) has also developed a GSI CAD Standard that includes all necessary files for drawing to these PWD GSI standards.


http://phillywatersheds.org/doc/GSI/GSI_Drawing_Requirements_10-21-2013.pdf
http://phillywatersheds.org/doc/GSI/GSI_CAD_Standards_10-7-13.zip
- 3. Philadelphia Water Department. 2014. Water & Sewer Design Manual.**



This manual promotes uniformity in the presentation of water and sewer plans by establishing a general format and outlining detailed information required for the preparation of complete water and sewer contract drawings. The PWD Water & Sewer Design Manual includes detailed information about standards for water and sewer design in Philadelphia.


<http://www.phillywaterdesign.org/>

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GSI Design Requirements and Guidelines

- 4. Philadelphia Water Department. 2014. Green Stormwater Infrastructure Landscape Design Guidebook.**



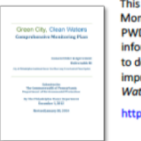
This resource provides guidance and plant selection lists for design professionals to complete successful landscape designs for GSI projects. It is a synthesis of knowledge from PWD's experience implementing GSI, partner preferences, current research, and municipal guides for other communities. This guide must be used when developing landscaping plans.

http://phillywatersheds.org/doc/Landscape_Manual_2014.pdf
- 5. Philadelphia Water Department. 2014. Green Stormwater Infrastructure Maintenance Manual.**




This manual details PWD's standard operating procedures for executing specific maintenance tasks such as vegetation removal, sediment removal, and trash removal. Maintenance requirements are outlined for the various SMP types in use by PWD. Protocols for surface and subsurface activities include details on required training, materials, health and safety, and task execution for each maintenance activity.

http://phillywatersheds.org/doc/GSIMaintenanceManual-1stEdwPreamble_Likes.pdf
- 6. Philadelphia Water Department. 2014. Green City, Clean Waters Comprehensive Monitoring Plan.**



This plan outlines the strategy for ongoing monitoring of PWD's GSI systems. Monitoring data and modeling are used to verify the functions and conditions of PWD's GSI controls, the sewer system, and the receiving waters and provide information for inclusion in hydrologic, hydraulic, and water quality models used to determine combined sewer overflow volume reduction effectiveness and improvements in area water quality conditions from the Green City, Clean Waters program.

http://www.phillywatersheds.org/doc/Revised_CMP_1_10_2014_Finalv2.pdf
- 7. Philadelphia Water Department, Philadelphia Streets Department, and Mayor's Office of Transportation and Utilities. 2014. City of Philadelphia Green Streets Design Manual.**



This manual, known as the GSOM, provides guidance for public and private entities, specifically design professionals, interested in incorporating GSI within a given right-of-way. The GSOM provides applicable users (those designing right-of-way GSI projects not initiated by PWD) with design standards, guidance on siting, information on elemental flexibility within SMPs, and an implementation process to guide users through the planning, design and construction of a green street. The GSOM follows and complements the Complete Streets Design Handbook.

<http://www.phillywatersheds.org/gsom>

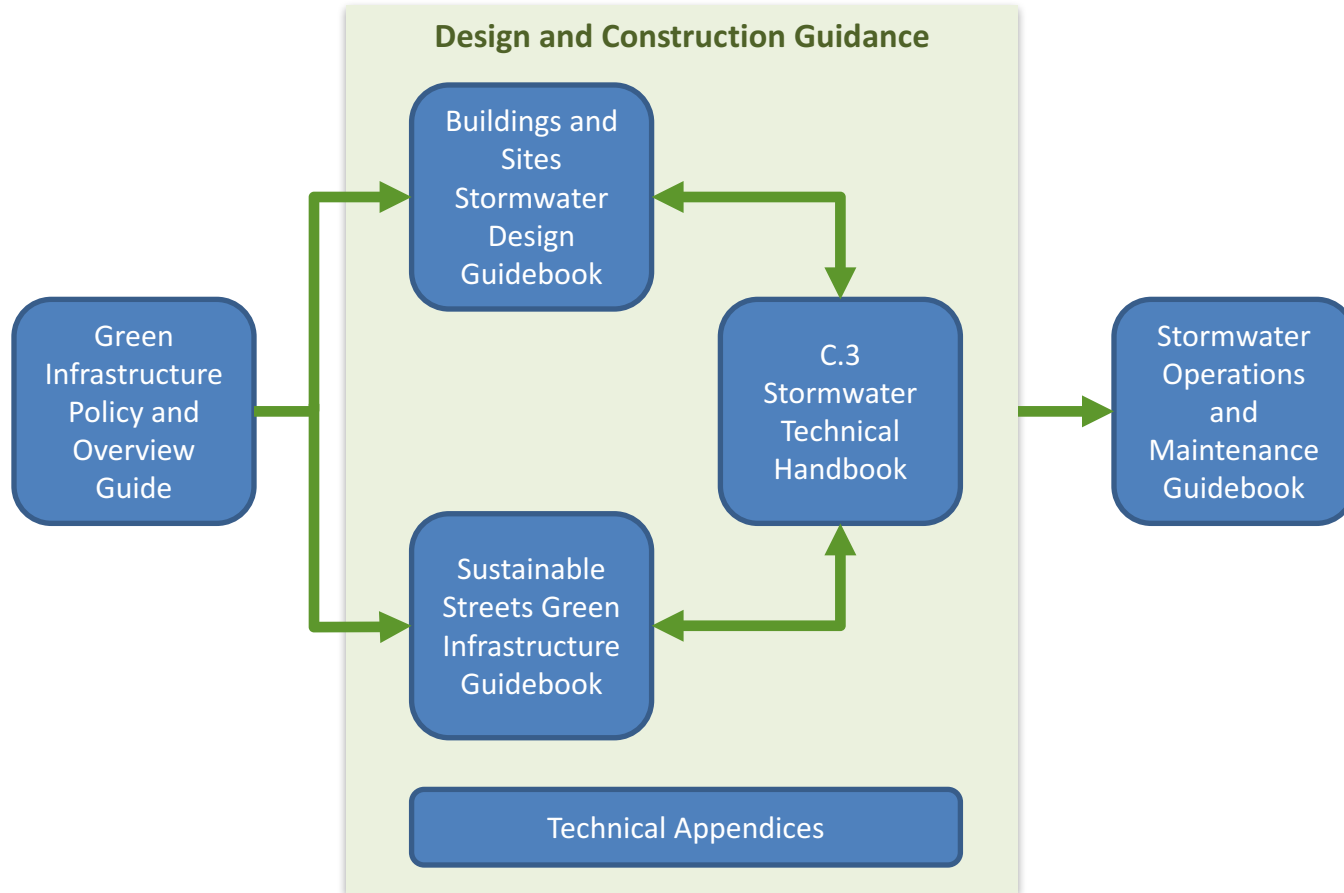
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SMCWPPP Proposed Green Infrastructure Guidance Suite

- Reorganize and develop new guidance into five documents:
 1. Green Infrastructure Policy and Overview
 2. Buildings and Sites Stormwater Design
 3. Sustainable Streets Green Infrastructure
 4. C.3 Stormwater Technical Handbook
 5. Stormwater Operations and Maintenance
- Appendices (standard details, specifications, and reference list of design manuals)



Green Infrastructure Guidance Suite



Policy and Overview Guide

■ Introduction

- Higher-level Executive Summary intro for public, elected-officials, etc.
- How to use the guidance suite and this guide

■ What is Green Infrastructure?

- Design Principals
- Benefits
- Requirements

■ Regulatory Framework

- MRP
- Overall SMCWPPP
- Local GI Plans and other policies and programs

■ Green Infrastructure Policies

- Issues to consider
- Model policies

■ GI Design Element Functions and Uses

- Unique San Mateo County considerations
- GI design strategies
- GI elements matrix

■ Other Issues

- Construction
- Operations and Maintenance

Green Infrastructure Measures	General Notes	Buildings and Sites Stormwater Design Manual			Sustainable Green Streets Manual			C.3 Stormwater Technical Guidance		Primary / Secondary Function				
		Site	Parking Lot	Building	Rural Street	Suburban Streets	Urban Streets	Compliant as Stand-alone Treatment	Compliant Only as Part of a Treatment Train	Infiltration ¹	Pollutant Removal	Bio- Retention	Interception	Detention
Treatment Measures														
C.3 Treatment Measures														
Bioretention Area/Planter	Includes flow-through planters when designed as fully lined and connected to stormdrain or discharge													
Stormwater Planter	Alternative Term: "Bioretention Swale" – linear bioretention areas, not the same as "Vegetated Swale", see Alternative Treatment Measures	●	●			●	●	●		○	●	●	○ ²	○ ³
Stormwater Curb Extension			●			●	●	●		○	●	●	○ ³	
Rain Garden		●	●		●	●	●	●		○	●	●	○ ³	
Bioinfiltration Area/Planter	Includes flow-through planters when designed as fully lined and connected to stormdrain or discharge													
Stormwater Planter	Alternative Term: "Bioretention Swale" – linear bioretention areas, not the same as "Vegetated Swale", see Alternative Treatment Measures	●	●			●	●	●		●	●	●	○ ⁴	○ ⁵
Stormwater Curb Extension			●			●	●	●		●	●	●	○ ³	
Rain Garden		●	●		●	●	●	●		●	●	●	○ ³	
Tree Well Filter/Tree Well														
Individual Tree Well Filter/Tree Well			●			●	●	●		○ ²	○	●	●	○ ⁴
Linked Tree Well Filter/Tree Well			●				●	●		○ ²	● or ○	●	●	○ ⁴
Infiltration Trench		●	●		●	●		●		●	○	○		●
Pervious/Permeable Pavement		●	●		●	●	●	●		○ ²	○			○ ⁴
Green Roof ⁶				●				●			●	●	●	
Cistern	Above or below grade tank, vault, or rain barrel	●	●	●				●						●
Subsurface Infiltration System		●	●			●	●	●		●	●			○ ⁴
Extended Detention Pond		●							●	○ ²	○	○	○	●
Media Filter	Acceptable for C.3 in limited, special conditions	●	●			●	●	●	●		●	○ ³	○ ³	

Legend

- Applicable Use/Primary Function
- Secondary Function

Sustainable Streets Guidebook

■ Introduction

- Relationship to overall program
- What is a Sustainable Green and Complete Street?
- Why use Green Infrastructure?
- How to use the Suite and this Guidebook

■ Sustainable Green Streets Design Elements and Process

- Green Streets infrastructure elements
- Complete Streets types
- Sustainable Streets design

■ Design Guidelines and Standards

- Focus on considerations for GI within street environment

■ Examples for San Mateo County

■ Additional Considerations

- Construction
- Operations and maintenance
- Additional

Constrained Sites/Retrofitting Streets

- Pavements
- Modular pavement support systems
 - Silvacell, Stratacell
- Bulbouts and curb extensions



Source: Green Infrastructure for Southwest Neighborhoods



Source: nacto.org



Source: Deeproot.com

Multi-modal Complete & Green Streets

- Pedestrian
- Bike
- Transit



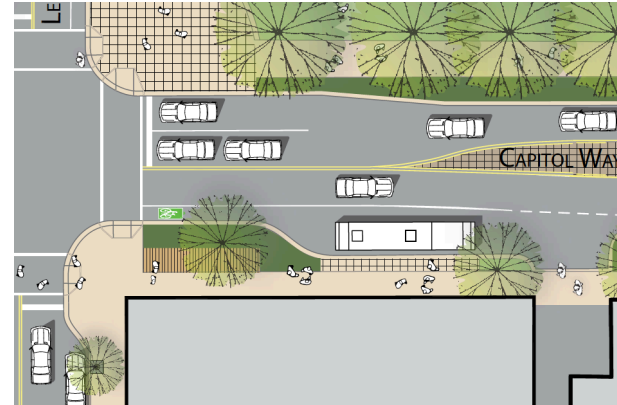
Source: [legal-planet.org/Nell Green Nylen](http://legal-planet.org/Nell-Green-Nylen)



Source: thisoldcity.com



Source: nacto.org



Next Steps

- Responding to GI Committee comments on four of the guide outlines
- Sections of the Overview and Streets guides will be distributed for GI Committee review
- Fully develop and finalize Overview and Streets guides in FY 17/18