

Green City Clean Waters

GREEN STREET IMPLEMENTATION: POLICY AND PARTNERSHIPS

JULY 28, 2014



Green City Clean Waters

The City of Philadelphia's Program for Combined Sewer Overflow Control
A Long Term Control Plan Update

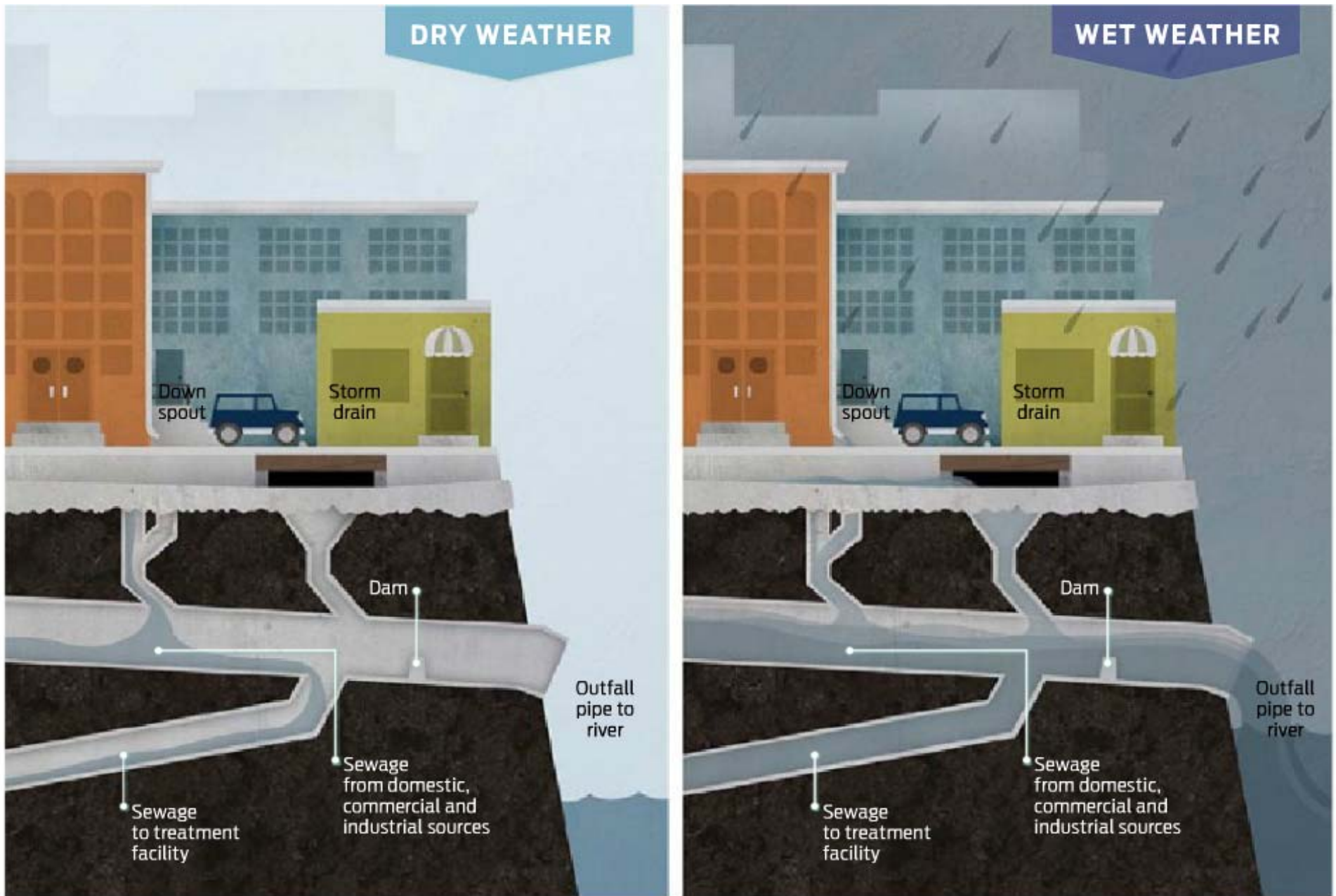
Submitted by the Philadelphia Water Department
September 1, 2009



Philadelphia's 25-year Green Stormwater Infrastructure program

- ✓ Meet EPA mandates
- ✓ Reduce citywide sewer overflows by 85%
- ✓ Manage stormwater in the most cost-effective manner, at the source
- ✓ Green streets, neighborhoods, parks, vacant lands and recreation spaces
- ✓ Mandate stormwater management of new development and redevelopment

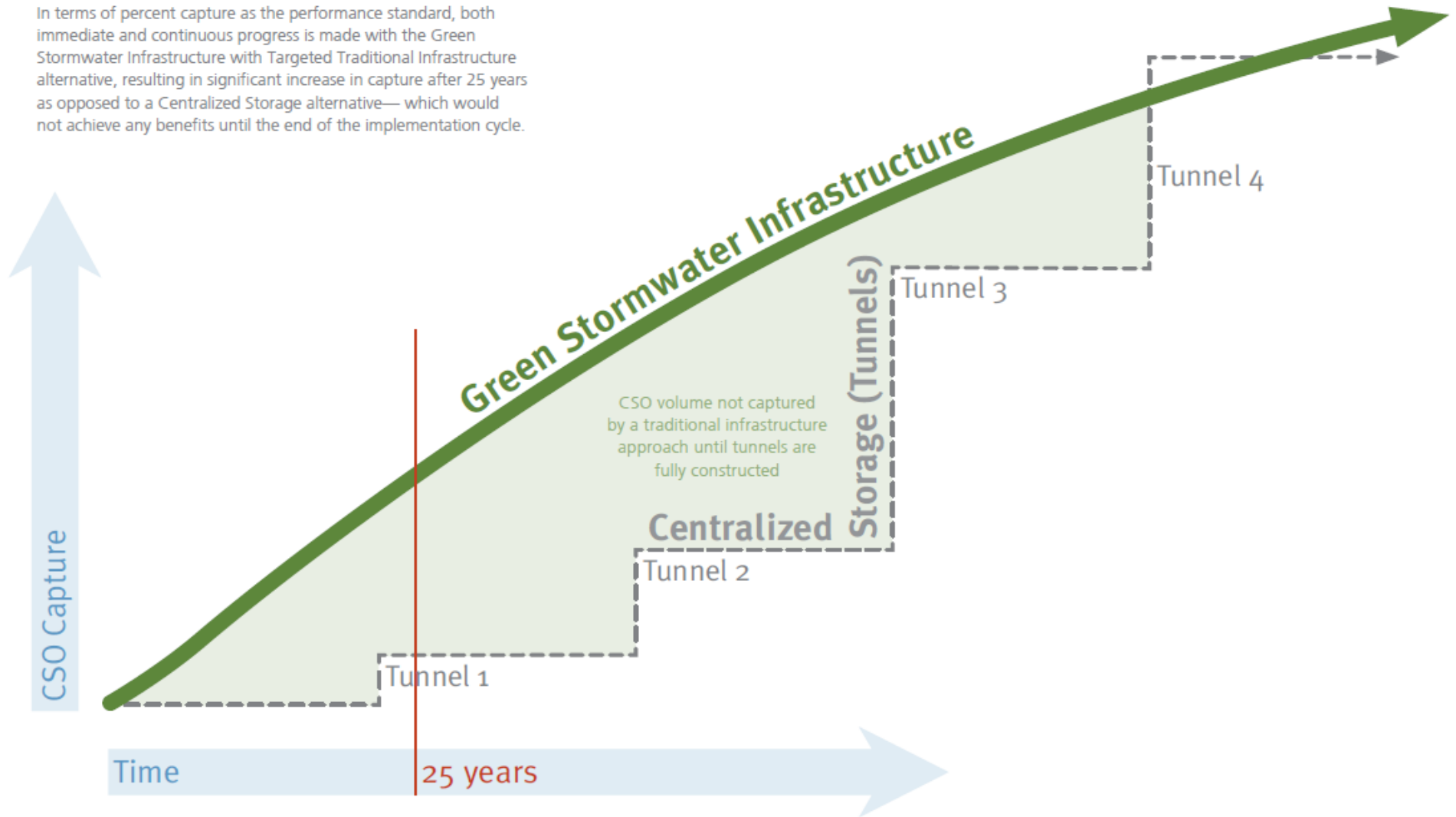
HOW COMBINED SEWER SYSTEMS WORK...AND SOMETIMES DON'T



THE PHILADELPHIA WATER DEPARTMENT

Conceptual Comparison of CSO Capture Over Time for Alternatives Evaluated by the City of Philadelphia

In terms of percent capture as the performance standard, both immediate and continuous progress is made with the Green Stormwater Infrastructure with Targeted Traditional Infrastructure alternative, resulting in significant increase in capture after 25 years as opposed to a Centralized Storage alternative— which would not achieve any benefits until the end of the implementation cycle.



WHAT IS GREEN STORMWATER INFRASTRUCTURE?

Green Stormwater Infrastructure:

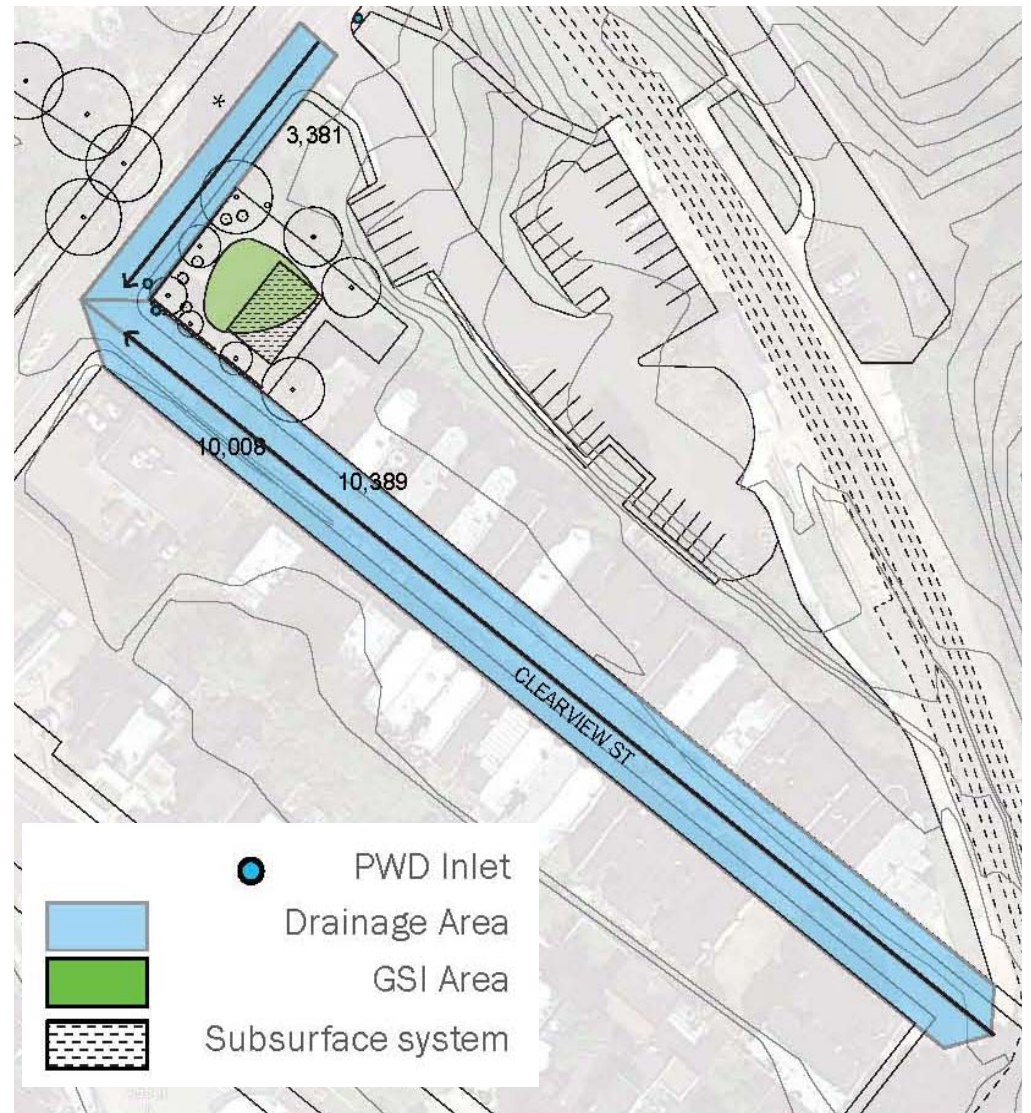
- ✓ Capture stormwater at its source
- ✓ Allows water to filter through soil and infiltrate back into groundwater aquifers
- ✓ Allows evapotranspiration through vegetation
- ✓ Provides overflow to the City stormwater system
- ✓ Surface and subsurface features
- ✓ Reduces the need for underground “grey” infrastructure



WHAT ARE GREEN STREETS?

Green Streets:

- ✓ 38% impervious surface in the City
- ✓ Primary focus of GCCW
- ✓ Polluted runoff
- ✓ Maximize drainage area
- ✓ Avoid utility conflicts
- ✓ Pricier to construct within the ROW



WHAT ARE GREEN STREETS?



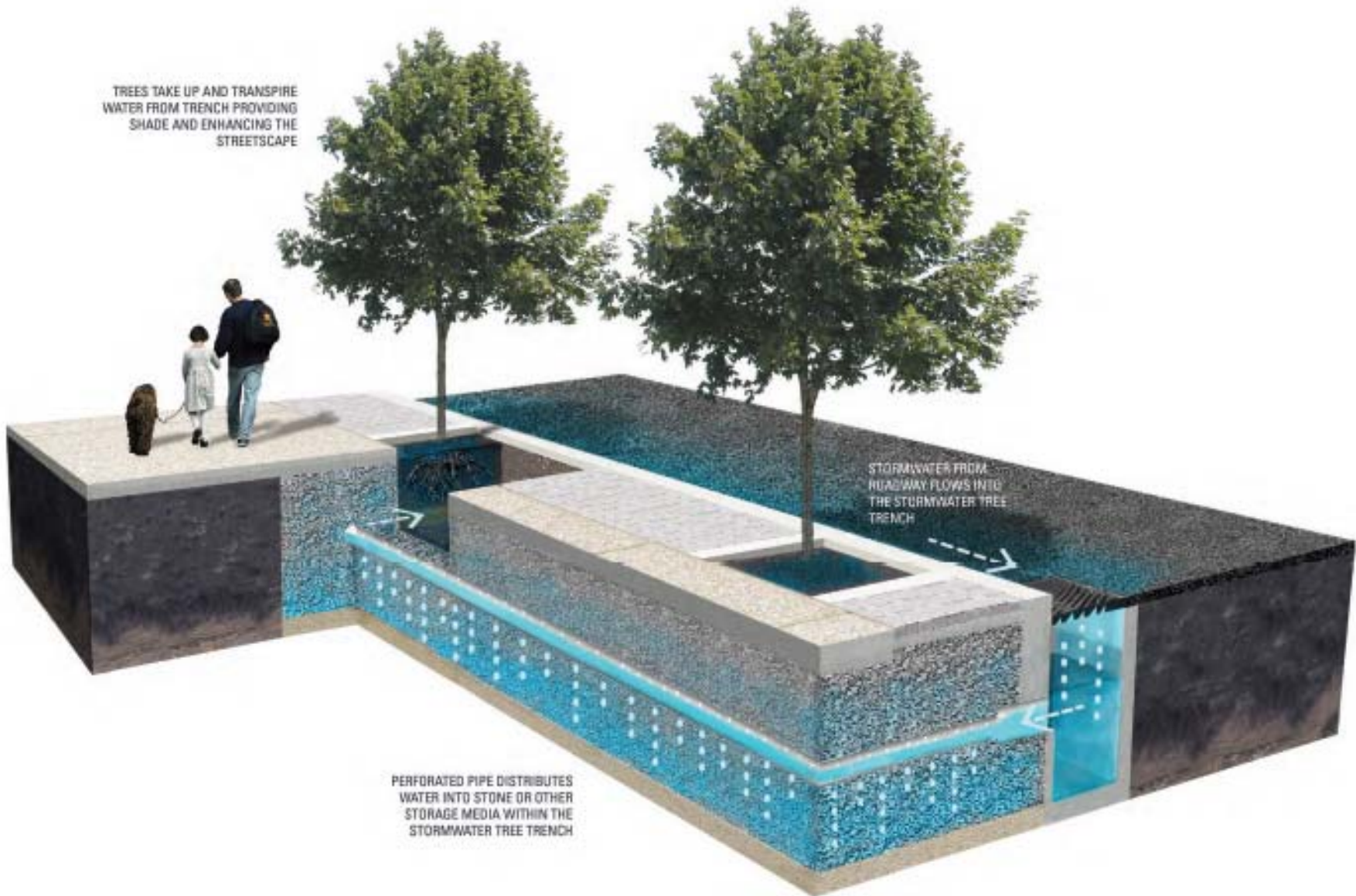
**Good
Candidates**



**Difficult
Streets**



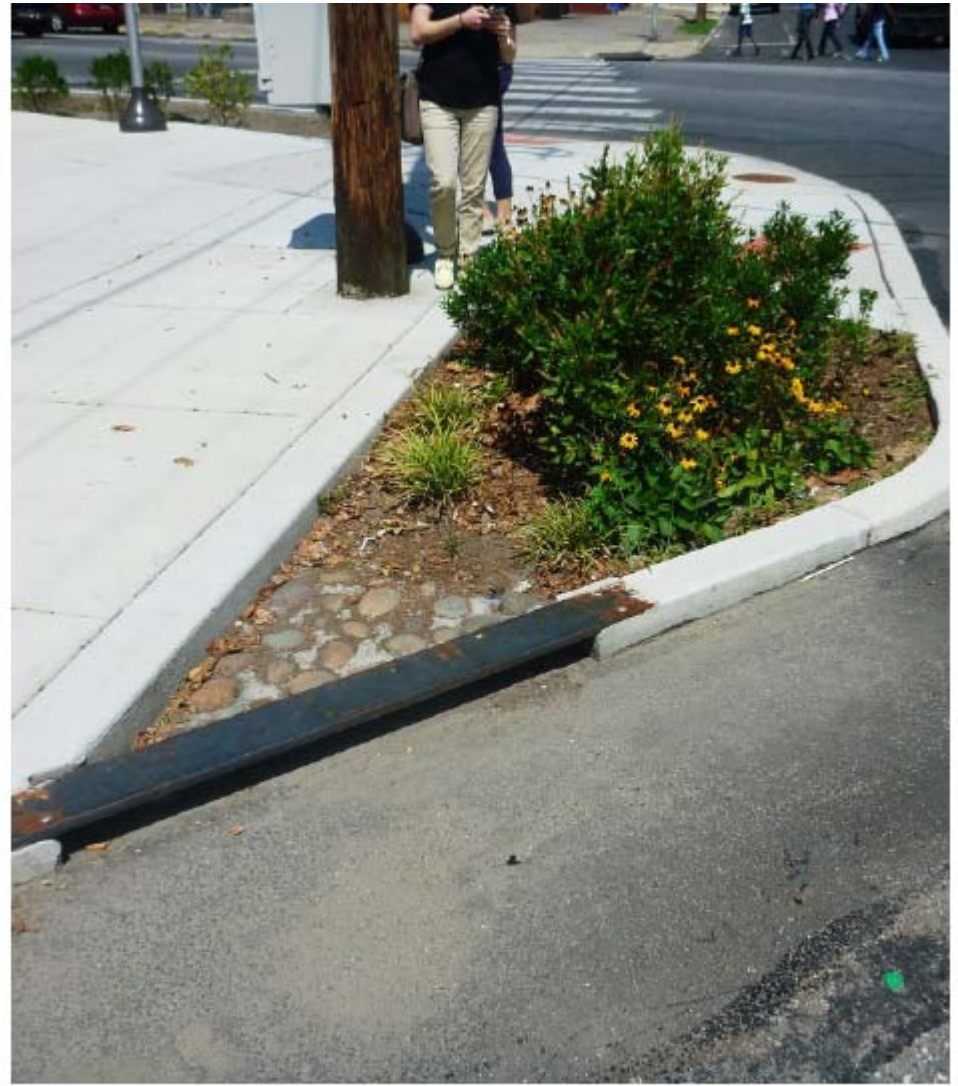
WHAT ARE GREEN STREETS?



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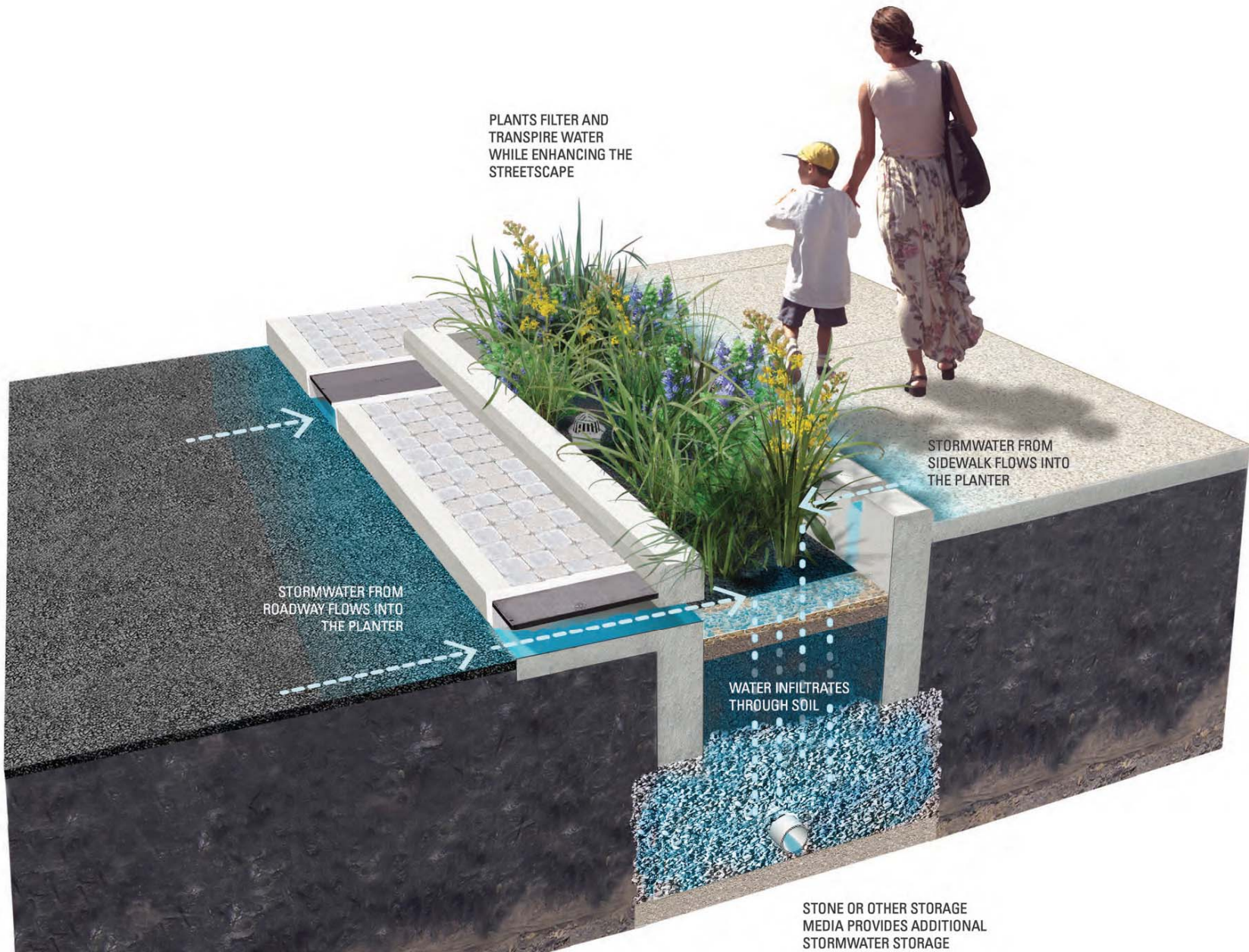


Queen Lane Mid-Block Bump-out

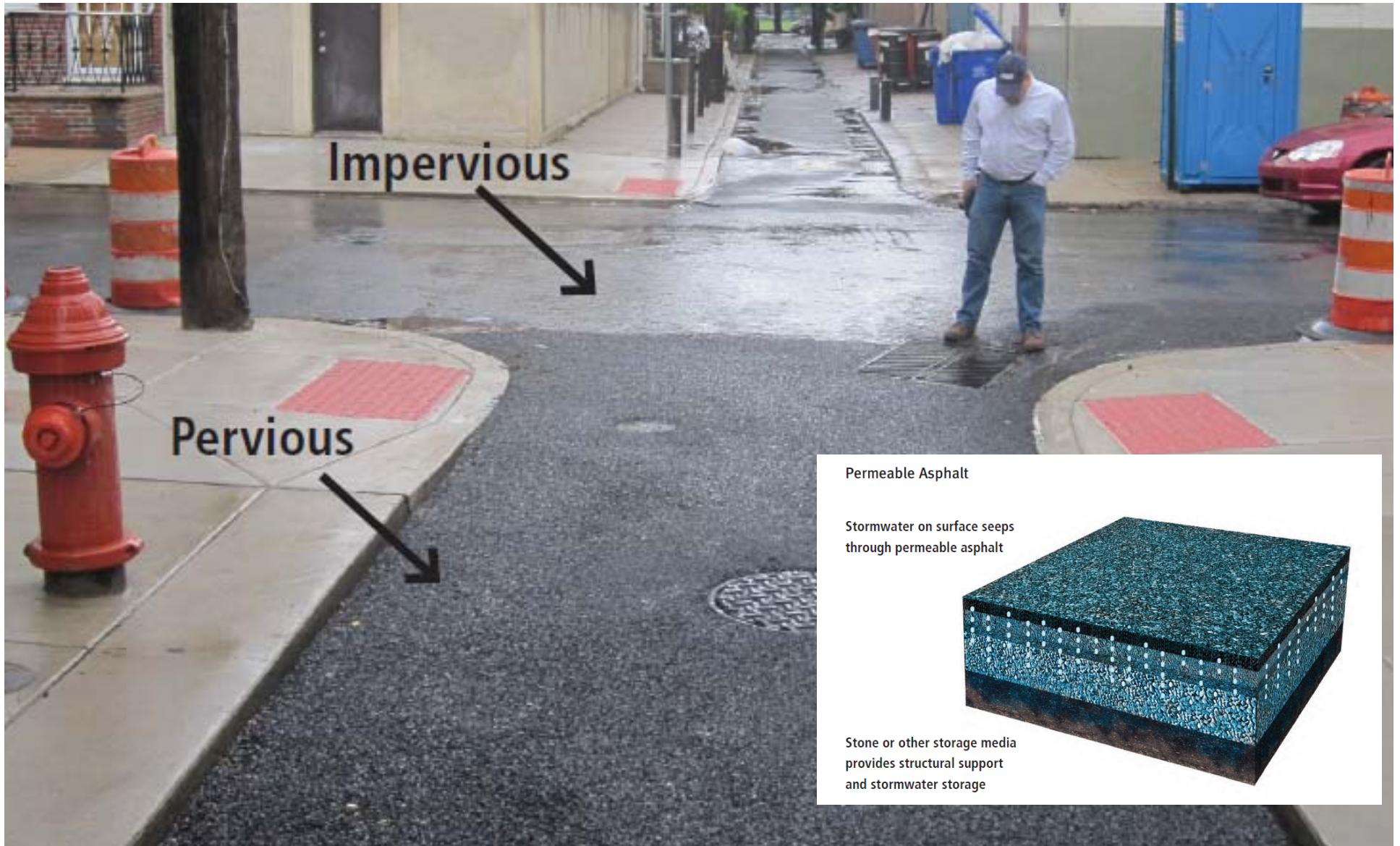


Shepard Recreation Center Corner Bump-out

WHAT ARE GREEN STREETS?

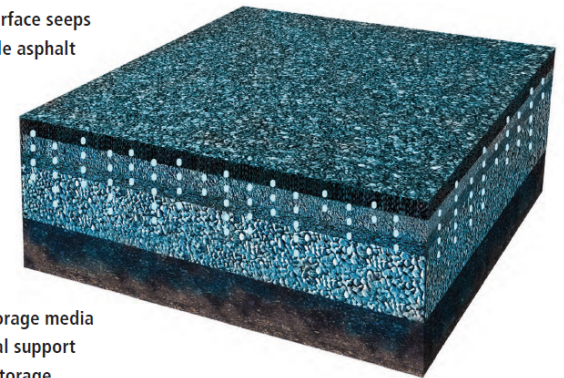


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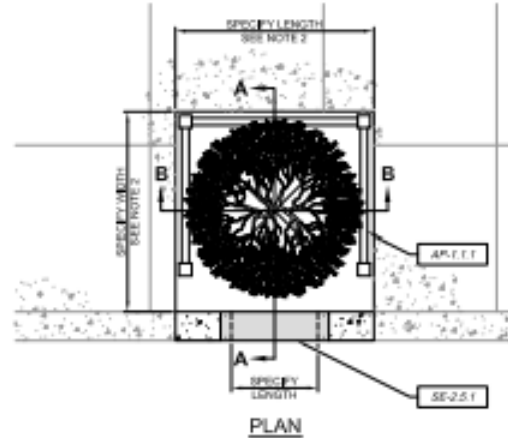
Permeable Asphalt

Stormwater on surface seeps through permeable asphalt

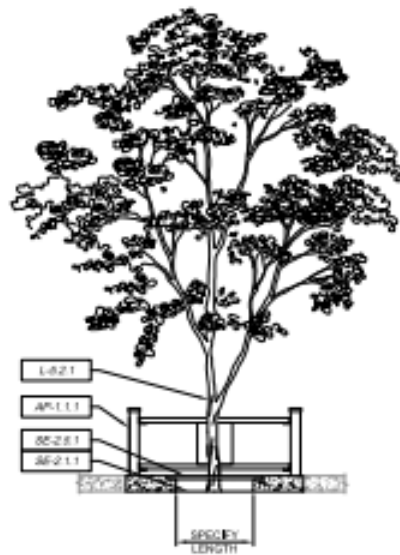


Stone or other storage media provides structural support and stormwater storage

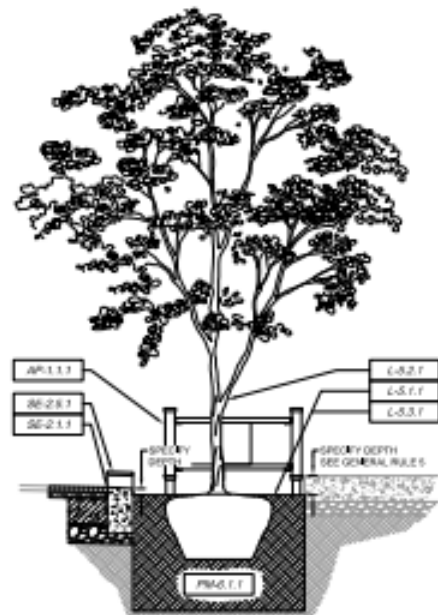
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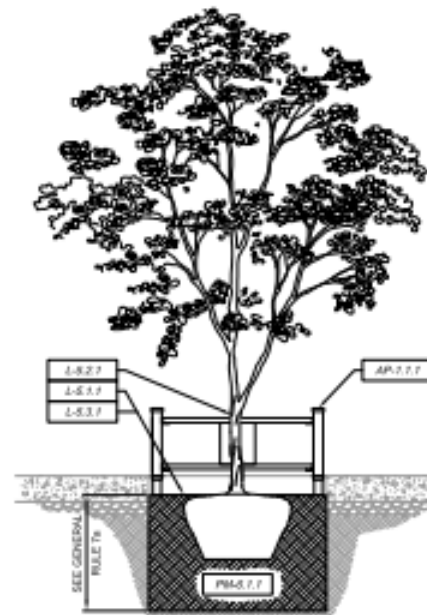
PLAN



FRONT ELEVATION



SECTION A-A



SECTION B-B

NOTES TO DESIGNER

1. This design detail should be adapted to your specific engineered design and to respective jurisdiction.
2. The minimum tree diameter for tree pits is 34-in. Larger tree pit areas are preferred for the health of the tree and should be used if space is available. Also, tree pit may also be rectangular in shape.
3. Design should include location and species selection of tree. Note, however, that location and species of all trees are reviewed and approved by PP&A. PP&A can also select tree species, if requested.
4. Although surface is shown as concrete slabs, stormwater trees can be constructed adjacent to various surfaces including grass strips, pavers, and other materials.
5. Designer must ensure the planting media surface is set at an elevation to prevent exposure of the tree's aggregate surface. If depth of the planting media surface will cause this material to be exposed, designer should design a system to prevent this material from sloping into the tree pit.
6. The ponding depth of water in the stormwater tree is considered a safety of the specific factors such as surrounding grades, offsets between stormwater tree entrance elevations and top of planting media, offsets between stormwater tree entrance and overtop elevations, decked treeboard, and the design depth of the stormwater tree. The designer should evaluate site specific conditions such as those mentioned in order to set the design ponding depth in the stormwater tree. As a point of reference, ponding depths for PWD's Green Street stormwater trees have typically been between 24 inches and 64 inches.

APPLICABLE DESIGN COMPONENTS

AP.1 Area Protection

- AP.1.1 Fencing

L-6 Landscaping

- L-6.1 Crown Control Marker
- L-6.2 Trees
- L-6.3 Mulch

PM-5 Planting Media

- PM-5.1 Ringwood Soil

SE-2 Stormwater Entrance

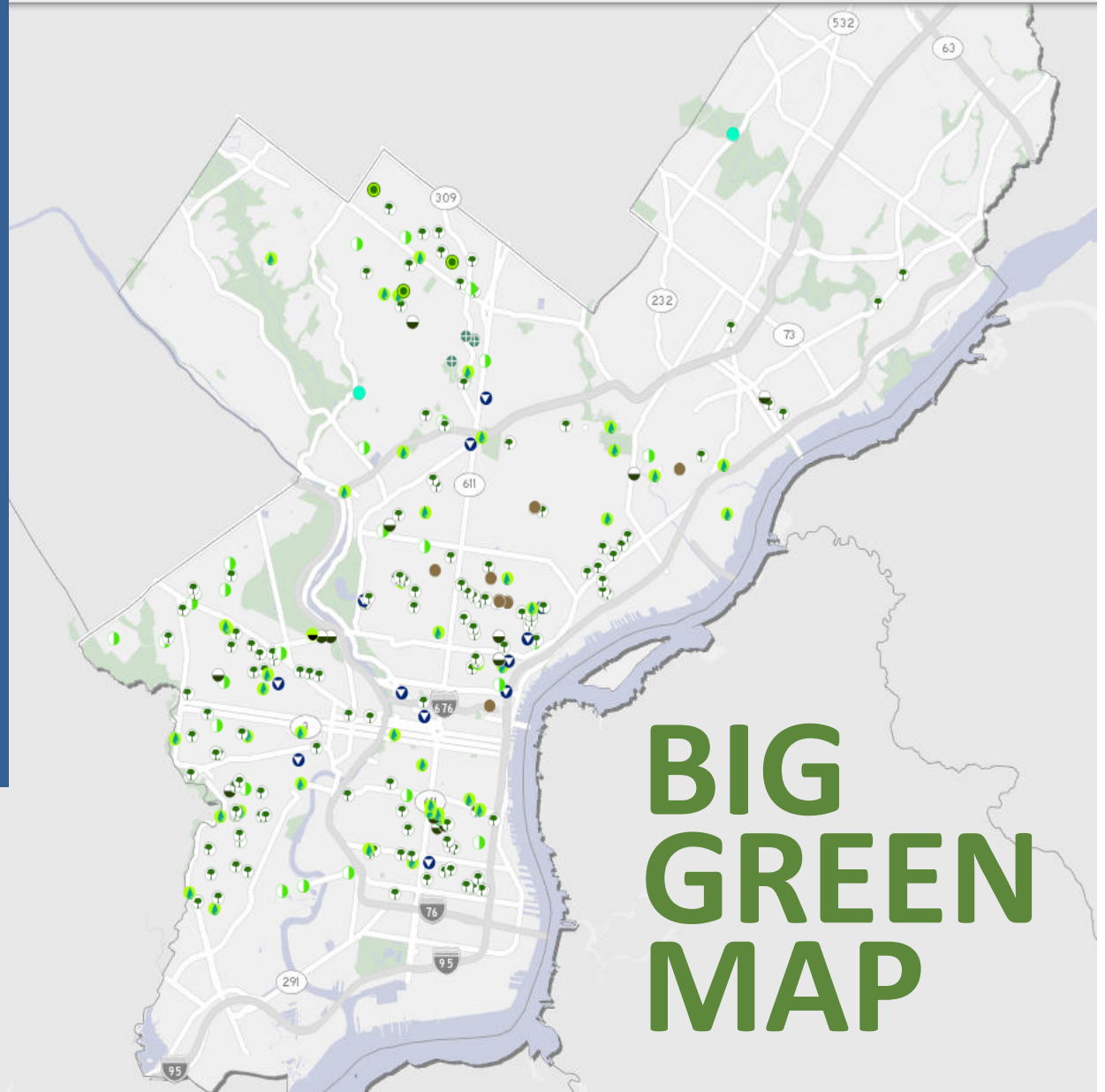
- SE-2.1 Curb Cut
- SE-2.5 Wheel Guard

PHILADELPHIA'S GREEN CITY CLEAN WATERS PROGRAM: 2011-Present

- 172 Stormwater Tree Trenches
- 15 Stormwater Planters
- 25 Stormwater Bumpouts
- 48 Rain Gardens
- 3 Stormwater Basins
- 47 Infiltration/Storage Trenches
- 50 Porous Paving Projects
- 14 Swales
- 2 Stormwater Wetlands
- 17 Projects with Multiple SMPs

= 393 SMPs in Design,
Construction or Complete

~250 Green Street Projects
2036: 9,600 Greened Acres



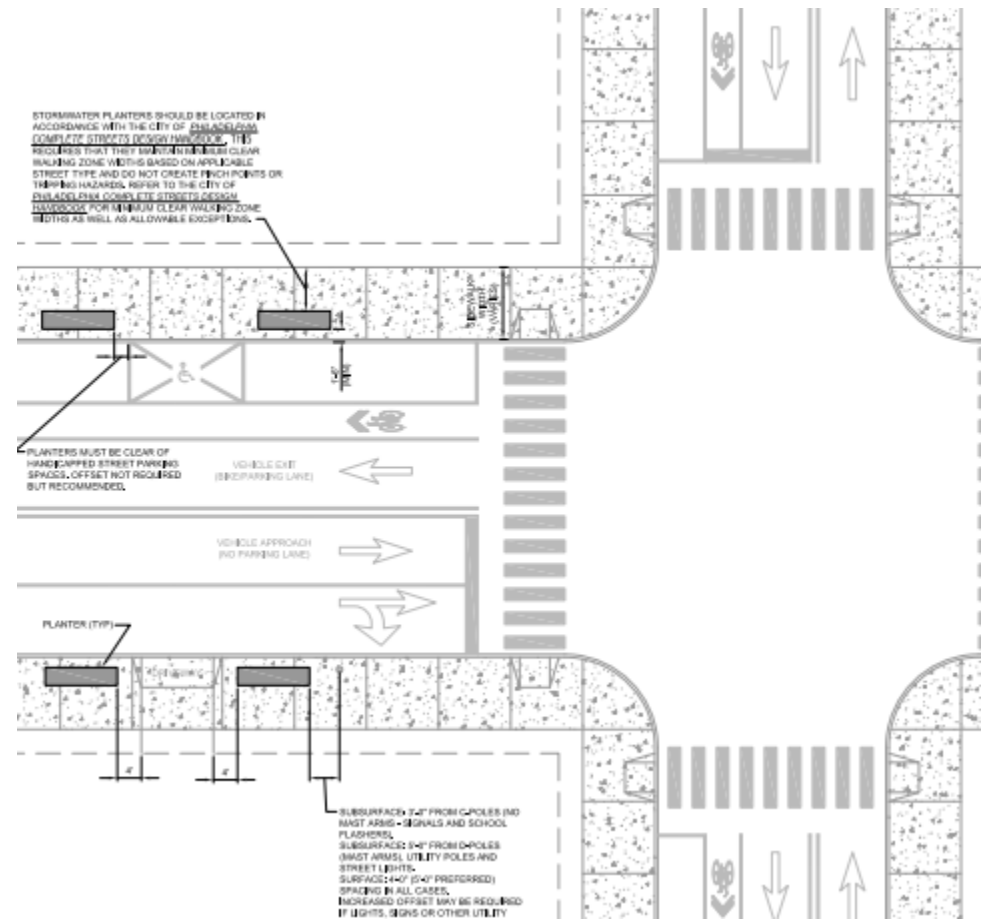
GREEN STREETS PARTNERSHIPS: PWD Water/Sewer Partnerships

- All water/sewer infrastructure jobs are reviewed for green infrastructure opportunities
- Porous pavement is often the best option in these cases, since utility conflicts often preclude green infrastructure in the sidewalks
- 15+ Porous street projects in design
- 2-3 miles of “grey” infrastructure per year



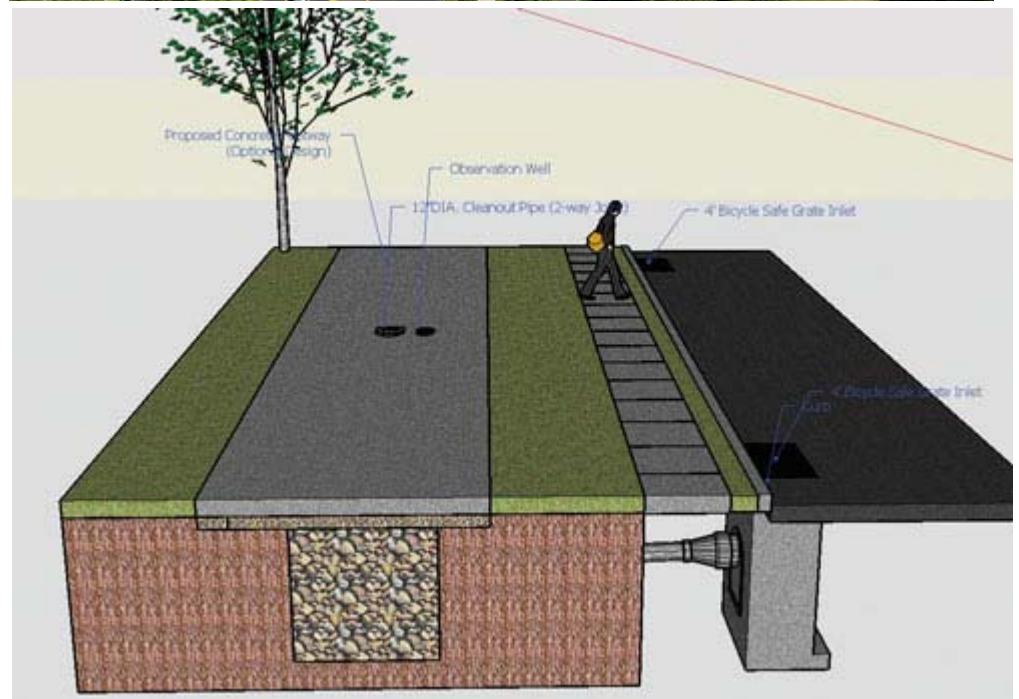
GREEN STREETS PARTNERSHIPS: Streets Department

- All Green Streets are partnerships
- Design Review process
- Parks and Utility approvals
- Repaving coordination
- Maintenance issues
- Green Infrastructure Tracking: Via One-Call, Citywide project tracking software
- GSI Maintenance greement
- PWD has jurisdiction over ROW due to water/sewer infrastructure



GREEN STREETS PARTNERSHIPS: Parks Department

- Benjamin Franklin Parkway
- Streets, Parks, PWD
- Demonstration Project
- Tree trenches and porous walkways
- Wide ROW; Limited conflicts
- Cost savings: ADA Ramps



GREEN STREETS PARTNERSHIPS: Federal Funds

- Streets Department
- 48th Street Rain Gardens
- Lane Removal
- Cost efficiency: Pavement removal, ADA Ramps, Survey work



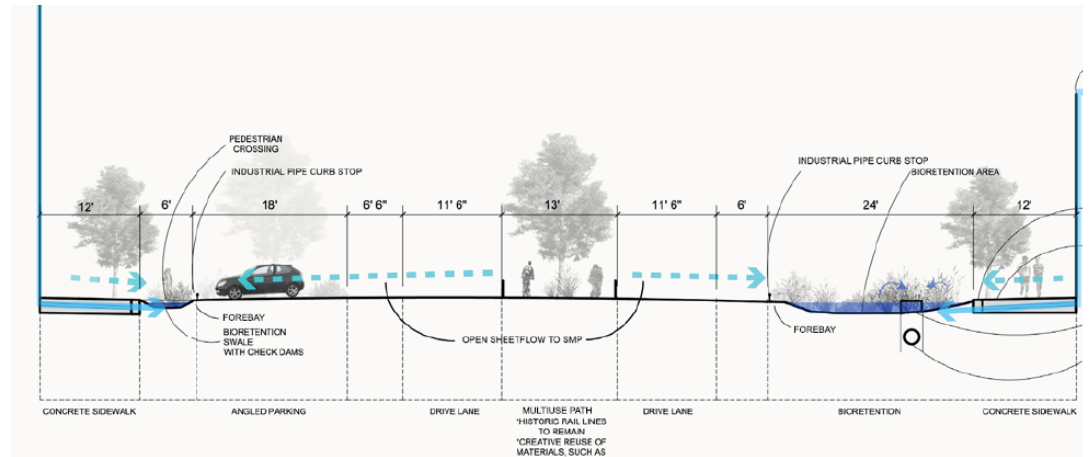
GREEN STREETS PARTNERSHIPS: TIGER Grants

- Streets Department
- Federal TIGER grant [2011]
- 58th Street Greenway
- Design and coordination challenges
- Grant-driven timeline
- 2012: TIGER-funded signal upgrades
- Cost savings: ADA Ramps, Survey work, Repaving



GREEN STREETS PARTNERSHIPS: Annual TIP

- Transportation Improvements Program
- Redesign and Reconstruction of American Street
- Leveraging PWD funds
- Cost efficiency: Design, ADA ramps, Repaving



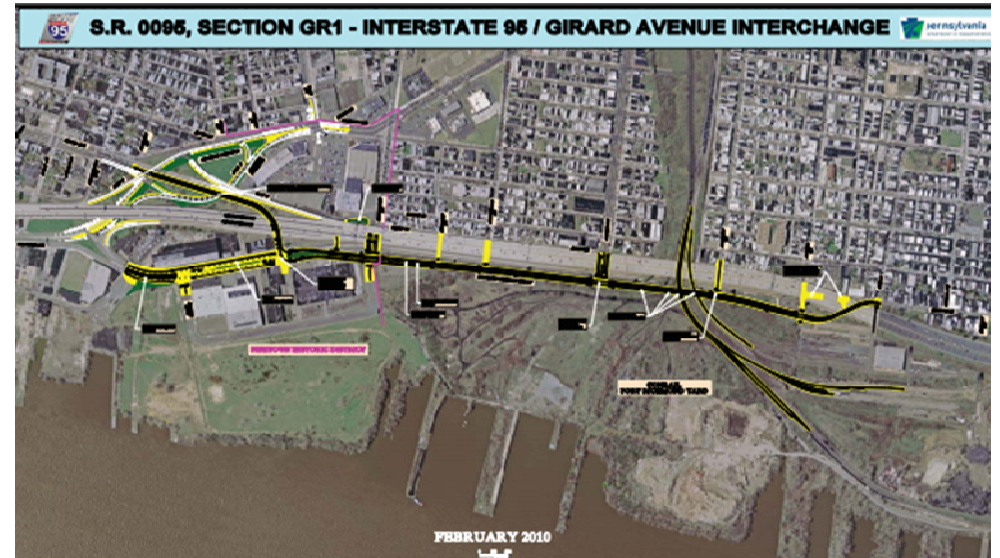
GREEN STREETS PARTNERSHIPS: SEPTA

- Southeastern Pennsylvania Transit Authority
- 33rd and Dauphin bus loop
- Bumpouts strategically placed near bus stops
- Bumpouts incorporated into trolley line redevelopment to provide sufficient height
- Partnership MOU



GREEN STREETS PARTNERSHIPS: PennDOT

- Design review and permit for any Green Streets on state-owned roads
- I-95 Expansion Partnership:
 - Meet PWD & PA DEP stormwater management regulations
 - Stormwater tree pits
 - Rain gardens
 - Community support for GSI
- PWD Design review process and specifications for PWD long-term ownership and maintenance



City of Philadelphia Green Streets Design Manual



GREEN STREETS PARTNERSHIPS: GREEN STREETS DESIGN MANUAL



	High-Volume Pedestrian	City/Ceremonial	Walkable Commercial Corridor	Urban Arterial	Auto-Oriented Commercial/Industrial	Park Road	Scenic Drive	City Neighborhood Street	Lower Density Residential	Shared Narrow	Local	Public Parking Lots
Curb Extensions												
Midblock												
Corner												
Tree Trench												
Stormwater Tree												
Planter												
Rain Garden												
Permeable Pavement												
Concrete												
Asphalt												
Pavers												
Green Gutter												

- Recommended
- Recommended, but may be restricted on PennDOT roads
- Accommodations required at MFTA bus stops
- Within pedestrian, bicycle, parking, and street tree zone only
- Possible, but probably not the best choice
- Not recommended

GREEN STREETS PARTNERSHIPS: GREEN STREETS DESIGN MANUAL



www.phillywatersheds.org/GSDM

GREEN STREETS PARTNERSHIPS: What's next?

- Green Streets Committee
 - Capital alignment
 - Manual updates
 - Issues
- Commerce Dept Partnership
- Private Green Street Funding: Sole Source Procurement Policy
- PWD/Streets Federal Fund Partnerships
- Council Partnerships
- Private Green Alleys
- Rooftop disconnection
- New technologies



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