GREEN INFRASTRUCTURE & LANDSCAPE ARCHITECTURE

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Deputy Commissioner / Chief Operating Officer
New York City Parks & Recreation

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Combined (Sanitary & Stormwater) Sewer Systems

- Over 860 communities
- Serving over 40 million people
- From small pipes to huge tunnels
- Separating systems is prohibitively expensive
Combined vs. Separate Sewers

60% of Philadelphia

40% of Philadelphia
Combined vs. Separate Sewers

**Combined Sewer**
- Downspout
- Storm drain
- Sewage and stormwater
- Dam
- Outfall pipe to creek
- Sewer to Water Treatment Plant

**Separate Sewer**
- Downspout
- Storm drain
- Stormwater
- Sewage
- Outfall pipe to creek
- Sewer to Water Treatment Plant

60% of Philadelphia

40% of Philadelphia
Choosing the Right Investment with Limited Funds

GRAY infrastructure or GREEN infrastructure
Green City, Clean Waters: The Philadelphia Story

**Environmental Benefits**
- Fishable, Swimmable
- Habitat Enhancement
- Air Quality
- Energy Savings
- Carbon Footprint

**Economic Benefits**
- Property Values
- Job Creation
- City Competitiveness

**Social Benefits**
- Recreation
- Aesthetics
- Public Health
- Equity

**Triple Bottom Line Benefits of Green Infrastructure**
Green Infrastructure Plans
An Unconventional Path

Rationale for the Green Infrastructure Approach

Time 25 years

Green Stormwater Infrastructure

CSO volume not captured by a traditional infrastructure approach until tunnels are fully constructed

Centralized Storage (Tunnels)

Tunnel 1

Tunnel 2

Tunnel 3

Tunnel 4
Green Infrastructure Components

- BUILDINGS
- HARDSCAPE
- LANDSCAPE
- WATER

green infrastructure
Green Infrastructure Tools

Stormwater Tree Trench
Rain Garden
Green Roofs
Porous Paving
Stormwater Bumpout
Stormwater Planter
Infiltration Trench
Stormwater Wetland
Stormwater Basin
Step Pools
Philadelphia’s Plan – *Green City, Clean Water*

- Maintain and upgrade the infrastructure network
- Advance City-wide Sustainability Programs
- Improve public health / quality of life
  - greening our neighborhoods,
- Transform river and stream corridors
  - restoring our waterfronts,
  - improving our outdoor recreation spaces, and
- Preserve and restore aquatic habitat
- Maximize return on every dollar spent
A Momentous Day

April 10, 2012: The U.S. EPA and the City of Philadelphia joined in a partnership to advance green infrastructure for urban wet weather pollution control. This partnership demonstrates EPA’s strong support for sustainable storm water management yielding multiple benefits for community livability and other urban environment improvements.

“[Philadelphia] has earned a place as a national and global leader on sustainable innovation and clean water protection.”

Lisa Jackson, EPA Administrator

June 1, 2011

25-year Program

June 1, 2036
**Investment - $2.4 billion**

Green Stormwater Infrastructure

$1.6 billion

Wet Weather Treatment Plant Upgrades

$400 million

Adaptive Management

$400 million

Compared to a ‘gray infrastructure’ investment estimated at + $7.0 billion to achieve the same outcomes.
What is a ‘Greened Acre’?

Greened Acre (GA) = one acre-inch = 27,158 gallons

- One Greened Acre is equivalent to 1 inch of managed stormwater from 1 acre of impervious drainage area, or 27,158 gallons of stormwater.

\[ GA = IC \times Wd \]

Impervious cover \hspace{5mm} Water Depth
Goal – Conversion of 9,600 impervious acres

<table>
<thead>
<tr>
<th>Year</th>
<th>Greened Acres</th>
<th>Square Miles</th>
<th>% Impervious cover removed</th>
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<tbody>
<tr>
<td>5</td>
<td>750</td>
<td>1</td>
<td>3%</td>
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<td>3</td>
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<td>3,800</td>
<td>6</td>
<td>14%</td>
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<td>20</td>
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<td>25</td>
<td>9,600</td>
<td>15</td>
<td>34%</td>
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25-Year Implementation of Green City, Clean Waters
Public Works Green Infrastructure Manual

- Collaboration between:
  - Mayor’s Office of Transportation & Utilities
  - Philadelphia Water Dept
  - Streets Dept
- Development of standards and specifications for green street components
- Allows Green Stormwater Infrastructure to follow Streets and Sewer work
Green Infrastructure Illustrative Details
Philadelphia Green Infrastructure

PECO Headquarters

Free Library

Green Roofs

Apartment Complex
Philadelphia Green Infrastructure

Womrath Park
Kensington

Shissler Rec Center
Fishtown

Stormwater Basins

Liberty Lands
North Liberties
Philadelphia Green Infrastructure

Shoemaker Green Infiltration Lawn
U of PA

Cliveden Step Pools
Germantown

2nd Street Stormwater Bumpouts
Northern Liberties
Philadelphia Green Infrastructure

Venice Island
Green Infiltration
Basin & Playground
Manayunk

Columbus Square
Infiltration Trench
South Philadelphia
Other City’s Green Infrastructure
Herron Playground

Porous Pavement

Recreation Center & Playground

Infiltration Garden
Ingersoll Park
Ingersoll Park

Can achieve approximately **two ‘Greened Acres’** by re-directing surface and sub-surface drainage to Ingersoll Park.
Ingersoll Park

Neighborhood Park
Ingersoll Park
Hawthorne Park

Neighborhood Park
Hawthorne Park

Neighborhood Park
Hawthorne Park

Neighborhood Park
Hawthorne Park

Neighborhood Park
Franklin Paine’s Skate Park 

Neighborhood Amenities
Franklin Paine’s Skate Park

Neighborhood Amenities
Schuylkill River Dog Park

Neighborhood Amenities
Schuylkill River Dog Park

Neighborhood Amenities
Bartram’s Mile

Regional Trail
Schuylkill Banks Boardwalk

Trail Connections
Schuylkill Banks Boardwalk

Trail Connections
Schuylkill Banks Boardwalk

Trail Connections
Maintenance

- The Philadelphia Water Department (PWD) has developed a Green Stormwater Infrastructure Maintenance Manual.
- The manual is a regulatory deliverable.
- PWD is working with the existing Green Stormwater Infrastructure maintenance contractors that have been performing maintenance tasks for PWD to refine a set of Standard Operation Procedures (SOP) for maintenance.
- The manual consists of an assemblage of these SOPs.
- Over the coming years PWD will continue to refine the SOPs.
- The maintenance manual will be updated as required.
How is Philly doing?

June 2016 marked the five year milestone in the 25 year plan.

- 838 Greened Acres (5 year target = 750 acres)
- 441 green stormwater infrastructure sites
- 1.5 billion gallons of polluted water kept out of rivers each year
- 430 ‘green industry’ jobs created
- $51 million in public and private funds leveraged for GSI
- Over 300,000 citizens engaged
- 2985 Rain Check (residential) projects completed; diverting 7.5 million gallons of water from CSOs for every one inch of rainfall
- 10.3% estimated property value increase for sites adjacent to GSI
- 6,000 tons of trash & debris removed from creeks and streams
- 8 awards won!
How will Philly do over 25 years?

**Economic Benefits**

- Annually, **250 people** are expected to be employed in green jobs.
- Increase of up to **$390 million** in property values near parks and green areas over the next 45 years.

**Social Benefits**

- Increase of up to **10% more** visits to Parks & Recreation sites.
- Reduction of up to **140 fatalities** caused by excessive heat over the next 45 years.
- Up to **1-2 avoided** premature deaths, **20 avoided** deaths from asthma and up to **250 fewer** missed school or work days.

**Environmental Benefits**

- Up to **1.5 billion lbs.** of carbon dioxide emission avoided or absorbed, equivalent to removing close to **3400 vehicles** from roadways each year.
- Up to **$8.5 million** in water quality and habitat improvements over 40 years.
Lessons Learned

• Importance of city-wide planning frameworks
• Strong mayoral commitment
• Increased resources
• Concurrent policy efforts
• New partnerships and shared agendas across city agencies
• Commitment to equity and sustainable investment
• Community support
GREEN CITY, CLEAN WATERS: The Philadelphia Story
Mark A. Focht, PLA FASLA

Education
• Masters of Landscape Architecture, University of Massachusetts, Amherst – 1985
• Bachelor of Science in Landscape Architecture, Penn State University – 1983

Professional Experience
• Founder & Principal, Common Ground – 2016
• First Deputy Commissioner, Philadelphia Parks & Recreation – 2011-2016
• Executive Director, Fairmount Park – 2005-2011
• Director, Environment, Stewardship & Education, Fairmount Park – 2002-2005
• Director, Natural Land Restoration, Fairmount Park – 2000-2002
• Natural Lands Manager, Fairmount Park – 1998-2000
• Director, Capital Projects, Center City District – 1995-1998
• Landscape Architect, Wallace Roberts & Todd – 1989-1995
• Land Planner, John Rahenkamp Consultants – 1985-1989

Licensure
• PA Licensed Landscape Architect - 1989
Mark A. Focht, PLA FASLA

**Teaching Experience**
- Adjunct Professor, Temple University, Dept. of LA & Horticulture – 1989-2011
  - Taught the Professional Practice class 34 times over 21 academic years
- Teaching Assistant, University of Massachusetts – 1983-1985

**Service to American Society of Landscape Architects**
- Immediate Past-President – 2015
- President – 2014
- President-Elect – 2013
- Vice-President, Communications – 2010-2011
- Annual Meeting Co-Chair – 2008

**Honors**
- University Fellow, Penn State University – 2015
- Distinguished Alumni Award, University of Massachusetts – 2013
- Fellow, American Society of Landscape Architects – 2008
- Arts & Architecture Alumni Award, Penn State University – 2007