**Design Assistance Program**

- **PWD’s Stormwater Billing and Crediting Program**
  - Parcel-based billing program implemented in 2010
  - Non-residential customers are charged for stormwater based on GA and IA
  - FY2015 monthly charges are $4.75/500 sf of IA and $0.59/500 sf of GA
  - Customers can appeal, apply for existing credits, and are eligible for up to 80% credit for installing GSI practices
  - PWD offers incentives (e.g. CAP program, Green Roof Tax Credit, SMIP grants, Design Assistance Program)
AKRF’s Design Assistance Role

- Work with customers to provide design assistance for stormwater credit projects
  - Site Inspection/Characterization
  - Conceptual designs
  - Financial analysis
- Worked with approx. 250 customers to date
- Perform special studies (e.g., rainwater harvesting, regional management concept, mitigation banking concept, etc.)
- Help to increase awareness and education through public presentations to local community groups
Assess Feasibility
- Data Collection – Site Visit and Questionnaire
- Determine SMP Type
- Design Issues

Review the Importance of an Inspection and Maintenance Program
Assess Site Feasibility
Assess Site Feasibility

- Evaluate existing drainage patterns and land use
- Desktop Due Diligence – Limited Phase I
- Subsurface utility investigation
- Soil Borings and Infiltration Testing
  ✓ Urban Fill and soil profile variability
Determine SMP Type

- Large-scale surface practices are the most cost effective
- Small-scale surface practices are next (e.g. rain gardens/bioretention facilities)
- Porous Pavement, Subsurface Storage and Blue Roofs are recommended for highly constrained properties
- Rainwater Harvesting offers multiple savings
- Green Roof is most expensive
AKRF Cost Curve for Vegetated SMPs

\[ y = 27.175x^{-0.257} \]
Design Issues

- Infiltration vs. Extended Detention
- Diversion and Conveyance Piping
  - Internal/External Downspouts
  - Diversion piping sized to convey first inch
  - Safe Overflow
  - No direct connections to inlets
- Avoid existing utilities!
- Landscaping Plan – emphasis on drought tolerant native species
- Simple approach and pre-treatment minimizes risk of clogging (e.g. sediment, debris, trash, etc.)
Findings

- Retrofit costs vary significantly based on:
  - Site constraints/opportunities
  - SMP type
  - SMP size

- Stormwater fees are approximately $0.13 per sf per year.

- For most properties, the cost to retrofit is greater than $1 per square foot, often significantly higher.

- Customers are often not able to invest at this level due to lengthy payback periods.

- SMIP grant program will pay up to $100,000 per acre (or $2.30 per sf) for SMPs.
Example

Project Cost and Stormwater Fee Breakdown

<table>
<thead>
<tr>
<th>Amounts ($/sf)</th>
<th>Total Project Cost</th>
<th>SMIP Grant Amount</th>
<th>Customer Contribution</th>
<th>Stormwater Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.50</td>
<td>2.00</td>
<td>0.50</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Other cost reducing strategies include the following:

- PWD cost share for managing public runoff
- Water reuse
- Regional management
- Offsite mitigation
- Volunteer or in-house labor
- Larger project size (economy of scale)
- Managing up to 1.5 inches of runoff
Concluding Thoughts from Design Assistance

- PWD’s Stormwater Credit Program offers significant potential for reducing customer stormwater charges, however in most cases the credit alone is not significant enough to incentivize private investment.

- The SMIP grant program has resulted in a significant increase in private investment.

- Regional planning helps to identify feasible cost-effective projects over a larger area.

- Simple surface practices work the best (i.e. less chance for clogging) and offer additional social, economic and environmental benefits.
Aramingo Business Improvement District

- The BID is a business association/shopping district
  - Economic Development & Job Creation
  - Sanitation and Security Services

- BID covers an area of roughly 70 acres
  - Highly impervious
  - Highly constrained
  - Unmanaged stormwater
  - Unwelcoming environment
Developed Stormwater Mitigation Scenarios

ajaran

GSI Master Planning Project

✓ Identified opportunities and constraints through desktop assessment and field inspections
✓ Interactive Design Sessions to evaluate and rank alternatives
  • Regional GSI systems
  • 2 Public ROW Scenarios
  • Smaller GSI systems on private property
Cost for Public GSI

- Developed cost estimates for design scenarios
  - Scenario 1 - public only $7.71 per sf
  - Scenario 1 – public & private $7.62 per sf
  - Scenario 2 – public only $5.62 per sf
  - Scenario 2 – public & private $5.16 per sf

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>TOTAL GREENED ACRES (ac-in)</th>
<th>TOTAL COST ($)</th>
<th>TOTAL COST PER GREENED ACRE ($/greened ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1 Public Drainage Area Only</td>
<td>6.5</td>
<td>$2,168,000</td>
<td>$336,000</td>
</tr>
<tr>
<td>Scenario 1 Public + Private Drainage Area</td>
<td>6.9</td>
<td>$2,282,000</td>
<td>$332,000</td>
</tr>
<tr>
<td>Scenario 2 Public Drainage Area Only</td>
<td>7.8</td>
<td>$1,919,000</td>
<td>$245,000</td>
</tr>
<tr>
<td>Scenario 2 Public + Private Drainage Area</td>
<td>9.8</td>
<td>$2,210,000</td>
<td>$225,000</td>
</tr>
</tbody>
</table>
Private Property Scenarios

- Looked at 4 individual properties
ShopRite

- 5 acre site
- 97% Impervious
- Existing Charges are $2,000 per month
ShopRite GSI Concept

Philadelphia Water Department
Office of Watersheds
Stormwater Parcel-Based Charge Design Assistance Program

Conceptual Stormwater Management Credit Summary - SMP Option 2
Owner: Aaronino Associates
Location: 3745 Aramingo Ave. Philadelphia, PA
BRT ID: 882095425

Total Gross Area (GA)*: 2,190,000 sf
Total Impervious Area (IA)*: 2,130,000 sf
Meter Sizes: 7" (1)
Sewage System Type: Combined

*GA and IA rounded up to next increment of 500 sf

Note: This concept assumes the loss of 37 parking spots.

Stormwater Management (SMP) Summary Table

<table>
<thead>
<tr>
<th>ID</th>
<th>SMP Type or Credit Type</th>
<th>SMP Size (sf)</th>
<th>Impervious Area Managed (sf)</th>
<th>Initial Construction Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planter Domes (2)</td>
<td>475</td>
<td>2,962</td>
<td>10,740</td>
</tr>
<tr>
<td>2</td>
<td>Bioretention Facility</td>
<td>155</td>
<td>2,768</td>
<td>9,880</td>
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<tr>
<td>3</td>
<td>Bioretention Facility</td>
<td>349</td>
<td>3,122</td>
<td>13,400</td>
</tr>
<tr>
<td>4</td>
<td>Bioretention Facility</td>
<td>475</td>
<td>581</td>
<td>5,760</td>
</tr>
<tr>
<td>5</td>
<td>Bioretention Facility</td>
<td>172</td>
<td>2,373</td>
<td>9,500</td>
</tr>
<tr>
<td>6</td>
<td>Bioretention Facility</td>
<td>2,182</td>
<td>57,000</td>
<td>60,800</td>
</tr>
<tr>
<td>7</td>
<td>Bioretention Facility (3)</td>
<td>2,303</td>
<td>30,322</td>
<td>30,000</td>
</tr>
<tr>
<td>8</td>
<td>Bioretention Facility</td>
<td>877</td>
<td>10,036</td>
<td>55,500</td>
</tr>
<tr>
<td>9</td>
<td>Bioretention Facility</td>
<td>623</td>
<td>12,340</td>
<td>19,700</td>
</tr>
<tr>
<td>10</td>
<td>Bioretention Facility</td>
<td>636</td>
<td>8,348</td>
<td>31,800</td>
</tr>
</tbody>
</table>

Total: 7,712 sf | 113,567 sf | 1,210,210 sf

Legend
- Parcel Boundary
- Ex. External Connected Roof Leader
- Ex. Inlet
- Pr. Bioretention/Bioretention
- PrSMP Treatment Area

1 inch = 70 feet
ShopRite GSI Concept

- Could manage 4.2 acres of IA
- Project cost is $460,000 ($110k/acre or $2.51/sf)
- SMIP Grant would cover $420,000
- Cost to ShopRite is $40,000
- Annual savings is $17,000
- Break even is roughly 2 years
- Could combine GSI with re-paving project to reduce project cost
Summary

- **GSI Improvements will provide city-wide benefits and benefits to local property owners**
  - Stormwater charge reductions for business owners
  - Will attract more visitors to the corridor
  - Could explore public/private partnerships to reduce implementation costs

- **Recommend developing public/private cost sharing policy**
  - Cost share
  - Long-term O&M
  - Financing options
American Street GSI Planning Study

- 14-Block Underdeveloped industrial corridor
- Extended Study Area
- Proposing GSI to stimulate transformation
- Over-widened right-of-way and underdeveloped area creates opportunity
Design Approach

- Manage 1” of public and private runoff
- Multi-objective
  - Maintain multiple uses – pedestrian, truck traffic, bicycles, public space
  - Preserve industrial character
  - Enhance economic development potential
  - Maintain community connections – schools, green space, trails
  - Design low maintenance systems
  - Enhance safety
Opportunities and Constraints

- Industrial – Commercial
- Vacant – Small residential pockets
- Pedestrian – Institutional – Residential
- Property value gradient
American Street Design

- Developed typical layouts and renderings
  - Curbside bioretention areas
  - Curbless design to allow direct sheet flow
  - Modular low-maintenance forebays
  - Slow-release irrigation trenches
  - Access ports for private customers
Major Strategies for Wider Study Area

- Vacant Lots
- Development/Redevelopment Partnerships
- School/Park Retrofits
- Sidewalk Bioretention
American Street Summary

- **Corridor only**
  - 55 greened acres
  - $300 - $400k per greened acre
  - Total Cost is $16.5 – 22M

- **Vacant Lots**
  - 43 Greened Acres
  - $100 - $300k per greened acre
  - Total Cost is $4.3 – 12.9M

- **Schools and Parks**
  - 36 Greened Acres
  - $100 - $300k per greened acre
  - Total Cost is $3.6 – 10.8M

- **Sidewalk Bioretention**
  - 70 Greened Acres
  - $300 - $400k per greened acre
  - Total Cost is $21 – 28M
Questions?