Creating a Green Streets Program in DC

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DC Green Streets

• LID Action Plan –
  – Mandated by DC Council in 2008
  – Completed December 2010
• LID in DDOT Projects
• Public – Private Partnerships
• Maintenance
• Funding & Contracting Strategies
• Future efforts & projects

What is Public Space?

What many streets look like
DDOT LID Action Plan

Comprehensive Stormwater Management Enhancement Act of 2008:

1. New DDOT policies to reduce impervious surface and employ other LID measures in right-of-way construction projects and retrofit projects
2. A revised DDOT public space permitting process and the development of a mechanism to minimize storm-water runoff from the public right-of-way
3. Requirements and incentives for private developers to reduce impervious surface and employ LID measures when their projects extend into the public right-of-way
4. Policies, including fees, for the use of public space to manage storm-water runoff from private property
5. Policies to address ongoing maintenance of LID or storm-water best management practices installed in public right-of-way areas adjacent to private property
6. Strategies to remove impediments to LID projects on residential properties relating to public space, and
7. Costs for each recommendation and a recommended timeline for funding in the Mayor’s proposed budget. The Mayor shall incorporate these recommendations in the next and subsequent proposed annual budgets.”
DDOT Policies & Plans

• Anacostia Waterfront Transportation Architecture Design Guidelines (2005)
• Great Streets Program (started 2005)
  – Encourages LID and includes LID detail
• DDOT Action Agenda (2010)
  – Several goals including minimizing impervious surfaces, improving stormwater management, using LID, and starting a Green Streets program
• DDOT Sustainability Plan (2010)
  – Minimize Environmental Impact of infrastructure and use LID to manage runoff
• DDOT Complete Streets Policy (2010)
  – Environmental enhancements need to be considered in ROW Improvements – including stormwater and tree space design
Strategy 1: New DDOT policies to reduce impervious surface and employ other LID measures in right-of-way construction projects and retrofit projects (CSMEA Act Item #1)

<table>
<thead>
<tr>
<th>New DDOT Policies which strive to reduce impervious surface and/or implement LID measures in construction projects/retrofit projects, include the following:</th>
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<tbody>
<tr>
<td>✓ Complete Streets Policy - reduce ROW storm water runoff, improve water quality, and prioritize and allocate sustainable tree space (2010)</td>
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<tr>
<td>✓ DDOT Action Agenda - includes goals to reduce impervious surface and use LID to manage stormwater from the ROW (2010)</td>
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<tr>
<td>✓ Sustainability Plan – calls for treating stormwater runoff and reducing runoff volume from impervious surface in the ROW using LID (2010)</td>
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Progress Made to Date:

1. Created LID design guide chapter in AWI Architecture Design Guidelines that includes 17 methods to implement LID (2005)
3. Implemented initial LID projects within DDOT construction and retrofit projects:
   - Benning Road NE bridge – Kingman Island bioretention areas (2004)
   - I-295 SE grass swale retrofit (2007)
   - Nebraska Avenue NW bioswales (2009)
   - Irving Street Cloverleaf NE, bioretention retrofits (2007)
   - Anacostia Riverwalk Trail SE & NE bioretention areas & bioswales (2008)
5. Great Streets program includes principles to “refresh” the streets by ensuring that the infrastructure works with local systems to enhance the natural and human environments (established 2005)
   - H St NE & Benning Rd (west of River): permeable paving, new Starburst park (2005-2010)
   - Nannie Helen Burroughs Ave NE - EPA Green Highway - bioretention areas, bioretention planters, bioswales, & permeable sidewalk pavement (2006-2012)
   - Pennsylvania Ave SE: bioretention areas, permeable paving, planted median (2006-2011)
   - Georgia Ave NW: bioretention areas, permeable paving, road lane conversion to park area (2006-2014)
   - Minnesota Ave NE: bioretention areas, permeable sidewalk pavement, reduced impervious surface (2006-2013)
   - LID curb bumpouts for traffic calming, Ft Dupont St & Q St SE, Erie St SE
   - Streetside stormwater management adjacent to park areas: East Beach Dr NW & Fitch Pl NE
   - Alley conversion for green infrastructure stormwater management at Q St & 45th St NW
   - Green Alleys using permeable pavement – citywide in MS4 area
   - Impervious surface removal in tree space and public space – citywide
   - RiverSmart DC - full neighborhood retrofit of maximum LID in three small sewersheds in the Rock Creek watershed to measure volume reduction and validate the Green Buildout model in partnership with DDOE and DC Water
   - Additional retrofit project sites will be identified and implemented in the MS4 area
7. Coordinating with DDOE for implementing LID retrofit projects in the ROW at Jay St NE, 34th St SE, Golden Triangle, and Shepherd St NW (2008 – 2011)
8. Including LID in both new construction projects and Transportation Planning Studies for future construction projects:
   - 14th St NW
   - 1st Pl & Galloway NE
   - Oregon Avenue NW
   - Oxon Run Trail
   - Livability Studies
   - K St NW Transitway
   - 11th St SE bridge
   - Metropolitan Branch Trail
   - 9th St NE bridge
   - Klingele Valley Trail
   - Watts Branch Bridges
### ACTION STEPS (Strategy 1, continued)

#### Near Term Tactics:

9. Continue to implement LID and look for impervious surface reduction opportunities in planning, design, and construction projects.

10. Evaluate all completed LID projects for effectiveness and durability of design, construction, and maintenance.

#### Timeframe: January 2011 – September 2014

<table>
<thead>
<tr>
<th>Lead: SWM-WG</th>
<th>Cost: $500,000 (^1) (Evaluation)</th>
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11. Develop Drainage Manual to guide drainage design from the ROW, including strategies to provide SWM, reduce volume and improve water quality.

#### Timeframe: January 2011 – July 2012

<table>
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<tr>
<th>Lead: IPMA</th>
<th>Cost: $200,000 (^2,3) (non LID aspect of manual = $400,000)</th>
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12. Evaluate/ develop all options for reducing impervious surface in the ROW

**OPTIONS INCLUDE (but not limited to):**

a) Maximize tree space and pervious surface options in furnishing zone

b) Identify and implement sidewalk widths based on use and density of street

c) Use vegetated medians where appropriate

d) Ensure lane widths and number of lanes do not exceed level of service requirements for roadway

e) Use permeable pavements

13. Evaluate/develop all LID Options for managing stormwater from the ROW

**OPTIONS Include (but not limited to):**

a) Vegetated infiltration & filtration systems such as bioretention areas, bioswales, and rain gardens

b) Permeable paving systems (pervious concrete, porous asphalt, paver blocks – concrete, cobbles)

c) Subsurface storage or filter system (Sand filters, rock infiltration trench, storage tanks)

d) Filter Catch basins – inserts or filter systems

14. Start a DDOT Green Streets Program to include all aspects of incorporating LID and reducing impervious surface in the ROW.

15. Establish design guidelines and standards for LID systems in the ROW.

- Develop design criteria and guidance, detail drawings, specifications, and cost estimates for use of each LID practice.

16. Develop a city-wide master plan to identify all LID retrofit and impervious surface reduction opportunities in the public ROW.

- Use developed DDOT planning studies and Transportation Improvement Plan to match sites with construction opportunities.

- Coordinate with and use existing Watershed Implementation Plans available from DDOE which have already identified LID opportunities in the Anacostia River, Rock Creek, Watts Branch, Pope Branch, and Oxon Run watersheds.

- Coordinate with and use outcomes from Capital Space project, and with results of Green Build-Out Model to identify high impact areas.

- Revise goals for impervious surface reduction in Action Agenda and LID implementation in Sustainability Agenda based on master plan.

#### Timeframe: January 2011 – September 2013

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<thead>
<tr>
<th>Lead: SWM-WG</th>
<th>Cost: $1,500,000 (^4)</th>
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17. Develop a policy for the implementation of Maximum Extent Practicable (MEP) for stormwater retention requirements which will be specified in the anticipated MS4 permit and anticipated updated DC Municipal Regulations. Coordinate with DDOE to achieve concurrence.

#### Timeframe: January 2011 - September 2012

<table>
<thead>
<tr>
<th>Lead: SWM-WG</th>
<th>Cost: Handled at current staff level</th>
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Cost Footnotes:  
\(^1\) Capital  \(^2\) Staff Augmentation  \(^3\) Equipment/Materials  \(^4\) Training  \(^5\) Consultant/Contractor  \(^6\) Administrative
ACTION STEPS  *(Strategy 1, continued)*

Longer Term Tactics:

18. Adopt revised standards, design criteria, design details, and construction specifications and update appropriate DDOT documentation, including:
   - *Design and Engineering Manual*
   - *Context Sensitive Design Guidelines*
   - *Standard Specifications for Highways & Structures*
   - *Standard Drawings*
   - *Drainage Manual*
   - *Public Realm Design Handbook*
   - *Sustainability Plan*

| Timeframe: October 2013 - September 2014 | Lead: SWM-WG | Cost: $300,000 \(^5\) |

19. Incorporate accepted stand-alone projects into TIP starting in planning for Fiscal Year 2012, defining both budget and schedule. Include SWM costs in construction project budgets for TIP.

20. Implement processes to ensure proper oversight and quality control for the implementation of LID projects in DDOT construction and retrofit projects, which may include (but are not limited to):
   a) Design review process by staff and/or consultants
   b) Construction oversight by staff inspectors and/or contract inspectors
   c) Process for stormwater management designs to meet MEP requirements for DDOE stormwater permit review
   d) Training for DDOT staff, including project managers, transportation planners, construction engineers, construction inspectors, and public space inspectors.
   e) Qualifications and criteria that design consultants must meet
   f) Certifications and/or qualifications that construction contractors must meet.

| Timeframe: January 2011 – September 2013 | Lead: SWM-WG | Cost: $200,000 \(^4\) per year (initial) |

21. Roll out full implementation of the initiative in FY 2015, with appropriate communications to DC agencies and consultant and construction community.

| Timeframe: October 2014 forward (as defined in step 19) | Lead: SWM-WG | Cost: To be defined in step 19 (TIP budget) |

Cost Footnotes: \(^1\) Capital, \(^2\) Staff Augmentation, \(^3\) Equipment/Materials, \(^4\) Training, \(^5\) Consultant/Contractor, \(^6\) Administrative
Progress: Policies & Plans

  - Includes 17 Low Impact Development measures & construction details

<table>
<thead>
<tr>
<th>Anacostia Waterfront Transportation Architecture Design Guidelines</th>
<th>Roadway Functional Classification</th>
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<tbody>
<tr>
<td></td>
<td>Interstate</td>
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<tr>
<td></td>
<td>Mixed-Use</td>
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<tr>
<td>LOW IMPACT DEVELOPMENT (LID)</td>
<td></td>
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<tr>
<td>NON-STRUCTURAL APPROACH</td>
<td></td>
</tr>
<tr>
<td>OPTION 1</td>
<td>Conservation</td>
</tr>
<tr>
<td>OPTION 2</td>
<td>Planting Vegetation</td>
</tr>
<tr>
<td>OPTION 3</td>
<td>Reforestation</td>
</tr>
<tr>
<td>OPTION 4</td>
<td>Disconnectivity</td>
</tr>
<tr>
<td>OPTION 5</td>
<td>Permeable Concrete</td>
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<tr>
<td>OPTION 6</td>
<td>Permeable Asphalt</td>
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<tr>
<td>OPTION 7</td>
<td>Permeable Unit Pavers</td>
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<tr>
<td>OPTION 8</td>
<td>Soil Amendments</td>
</tr>
<tr>
<td>OPTION 9</td>
<td>Inlet Controls</td>
</tr>
<tr>
<td>OPTION 10</td>
<td>Underground Storage Chamber</td>
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<tr>
<td>OPTION 11</td>
<td>Gutter Filters</td>
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<tr>
<td>OPTION 12</td>
<td>Infiltration Trench</td>
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<tr>
<td>OPTION 13</td>
<td>Surface Sand Filter</td>
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<tr>
<td>OPTION 14</td>
<td>Vegetated Filter Strip</td>
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<tr>
<td>OPTION 15</td>
<td>Bioswale</td>
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<tr>
<td>OPTION 16</td>
<td>Bioslope</td>
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<tr>
<td>OPTION 17</td>
<td>Bioretention Cell</td>
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Progress: Great Streets Program

- Six corridor improvements that include goals for sustainable environmental design
- Completed
  - H St – 2011
- Under Construction
  - Georgia Ave NW
  - Pennsylvania Ave SE
  - Nannie Helen Burroughs Ave NE
  - Benning Rd NE
- In Design
  - Minnesota Ave NE
  - Martin Luther King Ave SE
Progress: Pennsylvania Avenue SE LID

Before: P St open

After: P St closed, Bioretention #1

Bioretention #2

Under Construction 2010-11
Progress: NHB Ave Green Street

- **Bioswale**
  - Safer bioswales feature: rain storm water
  - Simulates natural stream channel form
  - Simulates storm volume as water is conveyed
  - Absorbs stormwater pollutants, organics, sediment, metals
  - Provides habitat and green space
  - Possible locations:
    - Near Eastern Ave. DC waterfront
    - Between 5th and 4th Streets

- **Bioretention Cell**
  - Small-scale shallow vegetated depression
  - Reduces runoff volume
  - Removes stormwater pollutants, organics, sediment, metals
  - Provides habitat and green space
  - Possible locations:
    - Near Eastern Ave. DC waterfront
    - Between 5th and 4th Streets

- **Permeable Pavement**
  - Reduces runoff volume
  - Removes polluting substances
  - Absorbs rainwater, pollutants, metals
  - Provides habitat and green space
  - Possible locations:
    - Between 5th and 4th Streets

- **Vegetated Filter Strip**
  - Infiltrates soil amendments and sustainable landscaping
  - Reduces stormwater volume
  - Provides habitat and green space
  - Possible locations:
    - Near 5th Street, Phase of the north side of H St.
    - Near 1st Street, Phase of H St.
    - Between 5th and 4th Streets, Phase of 5th Street, Phase of H St.

- **Street Trees**
  - Absorbs runoff volume
  - Reduces air pollutants, improves air quality
  - Improves stormwater, snow, and water effects
  - Provides shade
  - Healthy tree pilot locations:
    - Near 5th Street, Phase of the north side of H St.
    - Near 1st Street, Phase of H St.

Under Construction 2011
Progress: Permeable Pavement in Tree Space

Nationals Ballpark Streetscape 2008

Georgia Ave Streetscape 2010-11
Progress: Nebraska Ave Bioswales
Progress: Paving Removal Program

ARRA Funded project began 2010

P St & North Capitol St NE

Calvert St Median
Strategy 1: LID in DDOT Projects

• Near and Long Term Tactics
• Steps to reach full-scale implementation 2011-2015
  – Continue including LID in projects & Evaluate projects
  – Evaluate & Develop all options for reducing impervious surface & using LID in ROW
  – Establish LID Design Guidelines & Standards
  – Develop City-wide LID Master Plan for ROW
  – Include LID retrofits in Transportation Improvement Plan
  – Implement processes for design, construction, training for DDOT staff & contractors
Strategy 2 & 4: Private management of ROW Stormwater

- Strong Private development Initiative for innovate stormwater management
- Want all private development to reduce impervious surface & use LID to reduce runoff from ROW adjacent to projects
- Manage stormwater from sidewalk & public space
- Public Space Permit Process
- Maintenance Covenant Required
Public-Private Partnerships

Constitution Square
Extreme Makeover House
Pervious Concrete Sidewalk
The Yards
Casey Trees
Strategy 2 & 4: Private management of ROW Stormwater

- **Near Term Tactics**
  - Review all projects for stormwater within DDOT Permitting process
  - Start review process earlier & make permit process easier
  - Coordinate maintenance covenant requirements

- **Longer Term Tactics**
  - Set maximum impervious surface area allowed
  - Enforce stormwater regulations for public space
  - Set impervious surface fee or give credit to existing fees
  - Incorporate Stormwater review into development & zoning review processes
  - Work with proposed off-site mitigation program
Strategy 3 & 6: Manage Private SW in ROW

• RiverSmart Homes – Common Permit allows most practices
• Commercial, Larger Residential
  – Currently not allowed
  – Near term review to develop qualifying criteria
Strategy 5: Maintenance

• Maintenance of DDOT ROW sites
  – Map all sites in GIS
  – Vegetated sites
    • Urban Forestry Dept
  – Permeable Pavement
    • Partner with Department of Public Works for Street Sweeping
    • Purchase street sweeper for in-house crew
  – Maintenance Training Program with UDC
    – Community College

• Maintenance Covenants with Private installations
Contracting & Funding

• Exploring best contracting mechanisms for design & construction
  – Implement in road construction projects
  – Design & Construction project specific for retrofits
  – Setup on call or IDIQ Unit Item contracts for retrofits

• Funding Sources
  – Local Stormwater Fee (DDOE)
  – FHWA State Transportation Program
  – FHWA Transportation Enhancement funds
  – EPA (via DDOE) Clean Water State Revolving Fund
Design Issues & Challenges

- What are volume & quality control requirements for retrofit projects
- Soil Infiltration, Testing, & Underdrain Use
  - High Geotechnical testing costs
  - Large cost for underdrain connection to sewe
  - Underdrain connection to catch basins
- Managing infiltration facilities near buildings and roads – where barriers needed?
- Stormwater facilities over utility lines – Impacts and Restoration requirements
- Pedestrian safety requirements for recessed stormwater areas – are curbs and fences always needed?
- Curb cut designs for efficient operation and pedestrian safety
- Curb bumpouts & turning radius requirements
- Identify additional work required when stormwater retrofit project on block
- What design & condition criteria affect Maximum Extent Practicable (MEP)?
Implementation Issues & Challenges

• Quality control
• Push to put in a lot of projects in a short time
• Staff cuts reduced staff capacity to oversee projects & implement LID Action Plan
• Engineering staff will resist and challenge new techniques
• Training staff on new strategy for design & construction
• Qualified personnel to oversee construction
• Project problems lead to challenges for next project
• Management interest helps push projects
• Leadership & personnel turnover
• Maintenance – long term funding and division of responsibilities
Current & Future LID Projects

• Green Alleys
• RiverSmart Washington
• Q St Green Alley
• LID Retrofit for Roadways
  – Bumpouts for Traffic Calming & Stormwater
  – Curbside Bioretention
  – Curbless road w/ grass pave adjacent to stream
• LID standards
RiverSmart Washington

- A project to fully implement green infrastructure and low impact development (LID) across a sewershed on public and private lands
- Quantify stormwater volume reductions through pre & post construction monitoring as predicted in the Green Build-Out Model
- Examine the maximum extent practicable of LID in the ROW
- Build in areas identified for ROW infrastructure improvements in both MS4 and CSO
Integrating Traffic Calming & LID in Ft Dupont
Q St NW Green Alley

Q STREET GREEN ALLEY
A Project of the District Department of Transportation
The Future of DDOT Green Streets

• Implementation of the LID Action Plan
• Political Will & Oversight by DC Council
• Reporting progress to DDOE
• Citizen Interest & Environmental Advocacy
• New Stormwater regulations
• New MS4 permit

• Publicize – Program & Website
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