Metropolitan Water Reclamation District of Greater Chicago

Green Infrastructure Program Updates

Calumet Stormwater Collaborative
June 1, 2018 - Chicago
Stormwater Management Programs

Flooding remains our #1 issue

- Stormwater Phase I (DWP) Projects
  - Design and Construction of Regional Flood Control and Streambank Stabilization Projects

- Stormwater Phase II Projects
  - Funding of Shovel-Ready Projects
  - Design of Conceptual Projects

- Green Infrastructure
  - Partnerships with Local Communities

- Flood-Prone Property Acquisitions
  - Voluntary buyouts where no practical engineered solution exists
MWRD conveyed authority in November 2004 to plan, manage, implement, and finance activities relating to stormwater management in Cook County

Cook County Stormwater Management Plan (CCSMP) adopted in 2007 establishing program framework

Primary Stormwater Management Activities:

- Develop Capital Improvement Program (CIP) to address REGIONAL stormwater problems
- Comprehensive uniform stormwater regulations to ensure future development and redevelopment does not exacerbate flooding
Detailed Watershed Plan Development

- Poplar Creek
- Upper Salt Creek
- Lower Des Plaines River
- North Branch Chicago River
- Calumet-Sag Channel
- Little Calumet River
15 Flood Control Projects to address overbank flooding

12 Streambank Stabilization Projects to address critical erosion

Prioritized based on Benefit-to-Cost Ratio and Distributed across Cook County
Regional Streambank Projects

Streambank Stabilization Projects

• Address erosion threatening structures, roadways, utilities on regional waterways

• Natural channel design is our goal where practical

• Structural measures when necessary
  • Concrete walls
  • Sheet piles
  • Gabions
Phase II Flood Control Program

Initial (2014) Call for Projects

- 21 Shovel Ready Projects (3 GI)
- >3,000 Structures Protected
- $81M Construction Costs
- $41M in MWRD Dollars
- 13 Conceptual Projects
- 5 Pilot Study Master Plans
- >$15M in Engineering Fees
- Final Design in progress or under development
Green Infrastructure Program

Space to Grow
  • Managed by Healthy Schools Campaign and Openlands
  • Funding and technical assistance from
    • Chicago Public Schools
    • Chicago Dept. of Water Management
    • MWRDGC

Chicago Housing Authority
  • Dearborn Homes Rainwater Harvesting

Local Municipalities
  • Evanston, Blue Island, Kenilworth, Wilmette, Northbrook, Niles, and Berwyn (complete)
  • Skokie (under construction)
Green Infrastructure Program

2017 GI Call for Projects:

• Projects solicited from Cook County Municipalities, Townships, and other Governmental Organizations

• Applications mailed to elected officials, posted on mwr.d.org, and publicized through press releases, and at various public events

• Application period May 25th -July 14

• Fillable Application Form (PDF) format

• Eligibility Information and Instructions
2017 GI Call for Projects:

- 47 Projects submitted
- 20 Projects were accepted
- 730 Structures to Benefit
- $11.7M estimated total Construction Costs
- 3.6M gal Design Retention Capacity estimated
- Applicants whose projects were not selected notified their proposals may be eligible for future consideration
2017 GI Call for Project Results

Primary Selection Criteria

• Structures protected by project
• Project timeframe
• Project visibility/educational opportunity
• Median income of area

Other factors

• Total cost of project
• Combined Sewer Area
• Resources and experience in performing maintenance
• Partner agency new to MWRD GI funding
2017 Recommended Projects:

**Arlington Heights** – permeable parking lot pavers and a bioinfiltration basin at Arlington Heights Police Station.

**Calumet Park** – detention pond, bioswales, permeable pavement and rain gardens as part of the Winchester Avenue improvements.

**City of Chicago, Department of Planning and Development** – Stormwater storage at Garfield Park Community Eco Orchard.

**City of Chicago, 10th Ward** – green alleys

**Chicago Park District** – improving stormwater infiltration through the establishment of native habitat at three Chicago parks.

**Metra** – permeable pavement, naturalized plantings and other GI improvements for the new Peterson Ridge Metra station in Edgewater neighborhood.

**University of Illinois at Chicago** – permeable pavers and rain gardens at Arthington Mall and Parking Lot B2.

**Des Plaines** – green alleys.

**Forest Park** – green alleys.
2017 Recommended Projects:

**Harwood Heights** – green alleys.

**Maywood** – green alleys.

**Midlothian** – permeable pavement, bioswales and rain garden.

**Orland Park** – green roof on the Orland Park Village Hall and Nature Center.

**Palos Heights** – permeable pavers in the Lake Katherine Nature Center parking lot.

**Forest Preserve District of Cook County** – porous parking lot retrofit and pavement removal and naturalization at the Dam No. 4 Woods East.

**Posen** – rain gardens and permeable parking lots as municipal facilities.

**Riverside** – permeable pavers in the commuter parking lot.

**River Forest** – green alleys.

**Wheeling Park District** – reconstructing the Chamber Park parking lot with a rain garden.
GI Applicant Eligibility Requirements

- Project located within District’s corporate limits
- Project designed to include onsite stormwater control measures using Green Infrastructure
- Project must be bid and awarded in accordance with District’s Purchasing Act, MPLA, and Diversity Requirements
- Applicant must be willing and capable of performing maintenance of the project
- Applicant must be able to enter into an Intergovernmental Agreement with the District
- District will consider whether potential partner agency is in compliance with WMO & IICP when prioritizing
Green Infrastructure Program

Program Components

- Rain Barrel Program
- Comprehensive Land Use Policy
- Community Assistance and Public Outreach
- Projects and Design Retention Capacity

Protecting Our Water Environment
Metropolitan Water Reclamation District of Greater Chicago
Evanston Permeable Parking
Evanston Bioswale
Egan WRP Permeable Parking Lot
Berwyn Green Alleys After Construction
Wadsworth School After Construction
Design Retention Capacity: Definition & Calculation

- Volume of stormwater prevented from entering the sewer
- Includes retention volume and 6-hr infiltration
- 50% credit given for void volume above underdrain (much will drain to sewer)
- 100% credit given for void volume below underdrain (retained and infiltrated)
## Design Retention Capacity: Calculation Spreadsheet

### Section 3 BMP Specifications

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Formula</th>
<th>Reference (Page#, report, etc)</th>
</tr>
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<tbody>
<tr>
<td>10</td>
<td>Dimensions of the bioinfiltration facility (length, width, or area)</td>
<td>L, W, A&lt;sub&gt;BMP&lt;/sub&gt;</td>
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<tr>
<td>11</td>
<td>Depth of prepared soil</td>
<td>D&lt;sub&gt;1&lt;/sub&gt;</td>
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<tr>
<td>12</td>
<td>Prepared soil porosity (0.25 maximum unless detailed materials report provided)</td>
<td>P&lt;sub&gt;1&lt;/sub&gt; [unitless]</td>
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<tr>
<td>13</td>
<td>Depth of underlying aggregate (optional)</td>
<td>D&lt;sub&gt;2&lt;/sub&gt;</td>
<td></td>
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<tr>
<td>14</td>
<td>Aggregate porosity (0.38 maximum unless detailed materials report provided)</td>
<td>P&lt;sub&gt;2&lt;/sub&gt; [unitless]</td>
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<tr>
<td>15</td>
<td>Surface storage volume (provide supporting calculations, max depth 12 inches)</td>
<td>V&lt;sub&gt;AIR&lt;/sub&gt; cubic feet</td>
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<tr>
<td>16</td>
<td>Total media void volume = A&lt;sub&gt;BMP&lt;/sub&gt; * [(D&lt;sub&gt;1&lt;/sub&gt; * P&lt;sub&gt;1&lt;/sub&gt;) + (D&lt;sub&gt;2&lt;/sub&gt; * P&lt;sub&gt;2&lt;/sub])]</td>
<td>V&lt;sub&gt;SOIL&lt;/sub&gt; 0 cubic feet</td>
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### DRC Volume Including Infiltration

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<th>Formula</th>
<th>Reference (Page#, report, etc)</th>
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<td>20</td>
<td>Depth of Prepared Soil Below Drain (if drained, if not drained, total depth of prepared soil)</td>
<td>D&lt;sub&gt;3&lt;/sub&gt;</td>
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<td>21</td>
<td>Soil Void Volume Below Drain = (A&lt;sub&gt;BMP&lt;/sub&gt;*D&lt;sub&gt;3&lt;/sub&gt;*P&lt;sub&gt;1&lt;/sub&gt;)</td>
<td>V&lt;sub&gt;3&lt;/sub&gt; 0 cubic feet</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Depth of Prepared Aggregate Below Drain (if drained, if not drained, total depth of prepared aggregate) (must be less than or equal to total depth, D&lt;sub&gt;1&lt;/sub&gt;+D&lt;sub&gt;2&lt;/sub&gt;)</td>
<td>D&lt;sub&gt;4&lt;/sub&gt;</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Aggregate Void Volume Below Drain = (A&lt;sub&gt;BMP&lt;/sub&gt;*D&lt;sub&gt;4&lt;/sub&gt;*P&lt;sub&gt;2&lt;/sub&gt;)</td>
<td>V&lt;sub&gt;4&lt;/sub&gt; 0 cubic feet</td>
<td></td>
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<tr>
<td>24</td>
<td>6-hr infiltrated volume = (i*A&lt;sub&gt;BMP&lt;/sub&gt;-5[hrs]/12[in/ft])</td>
<td>V&lt;sub&gt;5&lt;/sub&gt; 0 cubic feet</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>50% of Volume Above Drain = 0.5*(V&lt;sub&gt;SOIL&lt;/sub&gt;-V&lt;sub&gt;4&lt;/sub&gt;-V&lt;sub&gt;3&lt;/sub&gt;)</td>
<td>V&lt;sub&gt;6&lt;/sub&gt; 0 cubic feet</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Total Retained and Infiltration Volume (V&lt;sub&gt;3&lt;/sub&gt;+V&lt;sub&gt;4&lt;/sub&gt;+V&lt;sub&gt;5&lt;/sub&gt;+V&lt;sub&gt;6&lt;/sub&gt;+V&lt;sub&gt;AIR&lt;/sub&gt;)</td>
<td>V&lt;sub&gt;DRC&lt;/sub&gt; 0 cubic feet</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>V&lt;sub&gt;DRC&lt;/sub&gt; = Above [in Gallons]</td>
<td>V&lt;sub&gt;DRC&lt;/sub&gt; 0 gallons</td>
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## Design Retention Capacity (Constructed So Far) – Part 1

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Type of GI</th>
<th>DRC Estimate (gal)</th>
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<tbody>
<tr>
<td>CPS Green Infrastructure 2014 (Phase I)</td>
<td>All Types</td>
<td>731,004</td>
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<tr>
<td>CPS Green Infrastructure 2015 (Phase IIA)</td>
<td>All Types</td>
<td>364,504</td>
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<tr>
<td>CPS Green Infrastructure 2016 (Phase IIB)</td>
<td>All Types</td>
<td>388,648</td>
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<tr>
<td>Blue Island GI</td>
<td>Rain Gardens, Permeable Pavement</td>
<td>150,809</td>
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<tr>
<td>Evanston Civic Center Parking Lot (GI)</td>
<td>Permeable Pavement, Rain Gardens</td>
<td>167,278</td>
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<tr>
<td>Northbrook - Wescott Park Stormwater Reuse (GI)</td>
<td>Real-Time Control, Retention and Re-use</td>
<td>162,926</td>
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</table>
### Design Retention Capacity (Constructed So Far) – Part 2

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Built Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenilworth (GI)</td>
<td>Porous Asphalt streets, rain gardens, &quot;porous parkways&quot;</td>
<td>1,319,897</td>
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<tr>
<td>Wilmette Green Alleys</td>
<td>Permeable Pavement</td>
<td>74,677</td>
</tr>
<tr>
<td>Skokie GI</td>
<td>Rain Gardens / Bioswales</td>
<td>46,424</td>
</tr>
<tr>
<td>Niles</td>
<td>Bioswale and Permeable Parking</td>
<td>53,811</td>
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<tr>
<td>Berwyn Green Alleys</td>
<td>Green Alleys</td>
<td>679,122</td>
</tr>
<tr>
<td>Egan Parking Lot and Rain Gardens</td>
<td>Rain Garden and Permeable Parking</td>
<td>360,855</td>
</tr>
<tr>
<td>Rain Barrels</td>
<td>Rain Barrels</td>
<td>5,311,570</td>
</tr>
<tr>
<td><strong>TOTAL Built</strong></td>
<td></td>
<td><strong>9,811,524</strong></td>
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<tr>
<td><strong>Total Projected by Dec 2018</strong></td>
<td></td>
<td><strong>11,129,027</strong></td>
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Bioretention Facility Detail

**Diagram Description:**
- **Deep Rooted Native Plants:** Installed as specified on plans. Use vegetation tolerant of wet and dry cycles.
- **Vegetated Filter Strip/Other BMPs:** See Note 9.
- **12'' Depth Maximum Drains in 24-48 Hours:**
- **Observation Well, 6'' PVC Pipe with Overflow Grate, Non Perforated Above Soil Media Mix 6'' - 12'' Above Ground:**
- **Shredded Hardwood Mulch Layer (3'') (See Note 8):**
- **Vegetated Filter Strip/Other BMPs:** See Note 9.
- **Perforated 6'' PVC Pipe with Nylon Sock:**
- **20'' Max Slope:**
- **18'' Soil Media Mix, 50% Sand, 30% Compost, 20% Topsoil (Or District Mix):**
- **Woven Geotextile Fabric, Not to Cover Entire Bottom of Excavation (Or Choking Stone Per Engineer Approval):**
- **Seasonally High Groundwater Level (NAVD 88):**
- **4'' to 12'' Stone Bedding (See Note 7):**
- **CA-7 Coarse Aggregate Storage Bed with 4'' Underdrain Perforated Pipe (See Note 6):**

**Volume Table:**

<table>
<thead>
<tr>
<th>Volume Type</th>
<th>Porosity</th>
<th>Media Volume</th>
<th>Storage Volume</th>
<th>Volume Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Storage</td>
<td>1.00</td>
<td>$V_A$</td>
<td>$1.00 \times V_A$</td>
<td></td>
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<tr>
<td>Soil Media Mix</td>
<td>0.25</td>
<td>$V_B$</td>
<td>$0.5 \times 0.25 \times V_B$</td>
<td></td>
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<tr>
<td>Coarse Agg. (Above Invert)</td>
<td>0.36</td>
<td>$V_C$</td>
<td>$0.5 \times 0.36 \times V_C$</td>
<td></td>
</tr>
<tr>
<td>Coarse Agg. (Below Invert)</td>
<td>0.36</td>
<td>$V_D$</td>
<td>$0.36 \times V_D$</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Permeable Pavers Detail

**Diagram Description**

- **Permeable Joint Opening**: Aggregate, crushed, angular stone, ASTM No. 8 or 1/8” to 3/16” granite chip or IDOT CA-16 or as directed by manufacturer.
- **Vegetated Filter Strips/Other BMPs (See Note 9)**
- **Permeable Pavers**
- **Surface Water Flow**
- **Vegetated Filter Strips/Other BMPs (See Note 9)**
- **2” Choking Stone Layer**: Open graded, medium (IDOT CA-16 or equivalent)
- **Woven Geotextile**: Sides only
- **Permeable Base Aggregate**: Open-graded, crushed, (see notes)
- **Native Soil**
- **1 1/2” Permeable Setting Bed Aggregate**: Open-graded, crushed, angular stone, ASTM No. 8 or IDOT CA-16 or as directed by manufacturer.
- **Observation Well**: 8” perforated PVC pipe with lockable cap
- **4” Diameter Underdrain**: Perforated pipe. Install if infiltration is less than 0.50 in/hr.
- **Seasonally High Groundwater Level**

**Table**

<table>
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<tr>
<th>Volume Type</th>
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<th>Media Volume</th>
<th>Storage Volume</th>
<th>Volume Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse Aggregate (Above Invert)</td>
<td>0.36</td>
<td>$V_A$</td>
<td>$0.50 \times 0.36 \times V_A$</td>
<td></td>
</tr>
<tr>
<td>Coarse Aggregate (Below Invert)</td>
<td>0.36</td>
<td>$V_B$</td>
<td>$0.36 \times V_B$</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
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</tbody>
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New Initiatives

Develop Green Book targeting multiple audiences:
- Guide for residents to build rain gardens, etc.
- Enhanced green infrastructure details for developers
- Suite of GI/BMP details for use by municipal engineers

Develop and Implement a Flood Relief Plan for Cook County
- Work with local communities to find solutions to stormwater issues using an outcome-based approach
- Deliver results that address stormwater and other community issues at an affordable cost
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