Detention Requirements

Chapter 2 and Appendix H
Quantity Control Requirements:

• 2-year storm: control peak discharge to pre-development conditions.

• 15-year storm: control peak discharge to pre-project conditions.
How to meet Detention Requirements

• Underground storage

• Above ground storage

• Increasing size of BMPs
Chapter 2 Note

Note: 2-year post-development peak discharge requirements do not apply to projects when three conditions can be established:

1. Site discharges flow directly to, or through the separate sewer system, into the main stem of the tidal Potomac or Anacostia Rivers, the Washington Channel, or the Chesapeake and Ohio Canal;
2. Site discharges do not flow into or through a tributary to those waterbodies that runs above ground or that the District Department of the Environment (DDOE) expects to be daylighted to run above ground; and
3. Site discharges will not cause erosion of land or transport of sediment.
Curve Number Reduction

1. Calculate Curve Number and Site Runoff Volume
2. Subtract Runoff Reduction Volume Achieved from Site Runoff Volume
3. Determine Reduced Curve Number based on Reduced Site Runoff Volume
Pre-Development and Pre-Project Conditions

S.D.A. 1
Pre-Development CN = 70
Pre-Project:
Imp. Cover= 16,187 sf
CN = 98
Comp. Cover= 5,914 sf
CN = 74
Pre-Project CN: 92

S.D.A. 2
Pre-Development CN: 70
Pre-Project:
Imp. Cover= 15,593 sf
CN = 98
Comp. Cover= 12,125 sf
CN = 74
Pre-Project CN: 88
Post-Project Conditions (No BMPs)

S.D.A. 1
Post-Project:
Imp. Cover= 17,835 sf
CN = 98
Comp. Cover= 4,896 sf
CN = 74

Post-Project CN: 93

S.D.A. 2
Post-Project:
Imp. Cover= 17,468 sf
CN = 98
Comp. Cover= 10,250 sf
CN = 74

Post-Project CN: 89
## Post-Project Conditions (With BMPs)

<table>
<thead>
<tr>
<th>S.D.A. 1</th>
<th>S.D.A. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-Project:</strong></td>
<td><strong>Post-Project:</strong></td>
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<tr>
<td>Imp. Cover= 17,835 sf</td>
<td>Imp. Cover= 17,468 sf</td>
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<tr>
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</tr>
<tr>
<td>CN = 74</td>
<td>CN = 74</td>
</tr>
<tr>
<td><strong>Post-Project CN:</strong> 93</td>
<td><strong>Post-Project CN:</strong> 89</td>
</tr>
<tr>
<td>BMP: 1,800 cf</td>
<td>BMP: 2,200 cf</td>
</tr>
<tr>
<td><strong>Reduced Post-Project CN:</strong> 76 &amp; 80</td>
<td><strong>Reduced Post-Project CN:</strong> 68 &amp; 75</td>
</tr>
</tbody>
</table>
Detention Calculations

<table>
<thead>
<tr>
<th>Area</th>
<th>2-Year Pre-Development Curve Number</th>
<th>2-Year Post-Development Reduced Curve Number</th>
<th>15-Year Pre-Project Curve Number</th>
<th>15-Year Post-Development Reduced Curve Number</th>
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</thead>
<tbody>
<tr>
<td>SDA 1</td>
<td>22,731 sf</td>
<td>70</td>
<td>76</td>
<td>92</td>
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<tr>
<td>SDA 2</td>
<td>27,718 sf</td>
<td>70</td>
<td>68</td>
<td>88</td>
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<tr>
<td>Total Site</td>
<td>50,449 sf</td>
<td>70</td>
<td>72</td>
<td>90</td>
</tr>
</tbody>
</table>

Detention Required? | Yes | No

Detention Required for 2-year storm only!
Reconstruction of Existing Public Right-of-Way (PROW)

MEP tailored to the streetscape portion of a Major Regulated Project
“Bump-outs” will make streets narrower, resulting in slower traffic speeds.

Rain gardens will reduce runoff from storms.
When PROW MEP applies...

- Reconstruction of Existing Public right-of-way
  - Type 1: Federal or municipal
    - roads, alleys, sidewalks, trails, etc.
  - Type 2: Private development
    - adjacent sidewalks and alleys
When PROW MEP does not apply...

• A major regulated project that does not disturb the adjacent public right-of-way
• Voluntary retrofits of existing PROW
• PROW disturbance that is limited to
  • Trenches
  • Driveways
  • Utilities
  • Aprons
  • Minor disturbance
Principles of PROW MEP include...

• Maximize BMP placement
• Maximize BMP sizing
• Innovate--integrate “green” with “grey” infrastructure
• Minimize impervious widths
• Maximize land cover types with little stormwater runoff
• Maximize tree canopy
  • planting or preserving trees, amending soils, increasing soil volumes and connecting tree roots with stormwater runoff
• Use impervious surface disconnection strategies
  • e.g., draining sidewalk area to continuous tree planting strip
• Manage comingled stormwater runoff
  • prioritize the conveyance and control of roadway runoff
  • Over-control the roadway runoff beyond LOD to compensate for less retention elsewhere
• Use porous pavement or pavers for low traffic roadways, on-street parking, shoulders or sidewalks
• Integrate BMPs into traffic calming measures
Parcel PROW MEP steps include...

• Calculate SWRv
• Prioritize managing roadway runoff inside the curb line
• Place, size and design PROW BMPs to maximize retention
  • Stormwater Management Guidebook Chapter 3 BMP specifications
  • Stormwater Management Guidebook Appendix B BMP priorities and limitations
  • DDOT LID Standards and Specifications

[Link to DDOT LID Standards and Specifications]

dc.gov/DC/DDOT/Projects+and+Planning/Environment/Low+Impact+Development
Design Example: Scenario

- Corner property includes 200 ft x 10 ft adjacent PROW disturbance (sidewalk)
- SWRv = 1.2 in x (0.95x100%) x 2000 ft² x 7.48/12
- SWRv = 1,421 gallons

- Poor infiltration rate on site
- Sufficient head available for underdrain connections.
Design Example: Site Plan

Development Parcel

Adjacent Sidewalk
Design Example: Limitations

- ADA Crossing Requirements
Design Example: Limitations

- Driveways
Design Example: Limitations

- Bus Stop
Design Example: Limitations

- Building Exit and 5’-Wide Sidewalk

![Diagram showing Development Parcel with building exit and 5’-Wide Sidewalk]
Design Example: Limitations

- Utilities

![Development Parcel Diagram]
Design Example: Limitations

- Existing Trees

Development Parcel
Design Example: BMPs

- Bioretention
Design Example: BMPs

- Permeable Pavement considered, but trees and utilities limit space available, and much of remaining sidewalk drains to bioretention area.
Design Example: BMPs

- Reduce Impervious Cover
Design Example: Results

- Recalculate SWRv for Reduced Impervious Cover:
  - SWRv = 1.2 in x (0.95 x 84% + 0.25 x 16%) x 2000 ft\(^2\) x 7.48/12
  - SWRv = 1,254 gallons

- Poor infiltration rate on site
- Sufficient head available for underdrain connections.
Design Example: Results

- SWRv Achieved:
- 3 existing trees x 20 ft$^3$ x 7.48 = 449 gallons
- 220 ft$^2$ bioretention area (with shallow ponding) provides 823 gallons of storage
  - 823 gallons x 0.6 = 494 gallons
- SWRv Achieved = 943 gallons

- Required SWRv not met, but MEP process followed.