Overview of Post-Construction BMPs

FOR COMMERCIAL LANDSCAPERS

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What Are Post-Construction BMPs?

- Permanent practices that reduce storm water volume and/or the discharge of pollutants in storm water runoff

- Two types
  - Non-structural BMPs
    - Prevent the creation of runoff by reducing the footprint and sprawl of impervious area
    - Maintain or enhance protective buffers between the land and the water
  - Structural BMPs
    - Treat runoff before it is discharged from the site by settling, filtering, absorbing or adsorbing pollutants
    - Some rely on biological action, so maintenance of desired plantings is important
    - Reduce runoff by infiltrating, or harvesting and reusing it
Structural vs Non-Structural BMPs

Bioretention Area

Wet Extended Detention Pond

VS

Conservation Development

Riparian Setbacks
Requirements for Post-Construction BMPs

- Must be provided on all new development or redevelopment where larger common plan (LCP) disturbs 1 or more acre
  - Includes parcels less than 1 acre if part of LCP
- Structural BMPs must be incorporated into the permanent drainage systems of the site
  - Where LCP disturbs ≥ 5 acres
    - BMP must treat the Water Quality Volume (WQv)
    - BMP must provide an additional storage area for accumulated pollutants ≥ 20% WQv
  - For small construction sites, per requirements of community
- Long-term maintenance plan must be provided for all post-construction BMPs
  - Community must ensure that property owner or home owners’ association (HOA) is implementing plan
BMPs for Commercial Development

- **Most Common Structural Practices:**
  - Extended Detention Ponds
    - Wet and Dry Ponds
    - Constructed Wetlands
  - Bioretention Area or “Bioswale”
  - Permeable Pavement
  - Proprietary (Manufactured) BMPs

- **Other Practices You May Run Into:**
  - Rainwater Harvesting
  - Green Roofs
  - Infiltration Trench
  - Sand Filters
  - Non-Structural Practices

BMPs in green are green infrastructure that reduce runoff volume.
Extended Detention Ponds

- **Three types**
  - Dry Extended Detention Basin
  - Wet Extended Detention Basin
  - Constructed Wetland
- **Lowest orifice controls discharge rate of $WQv$**
  - 48 hours for dry extended detention basins
  - 24 hours for wet extended detention basins and constructed wetlands
Extended Detention Pond Outlets

These orifice designs reduce clogging and allow pond to trap floatables.
Dry Extended Detention Basins

- Forebay
- Micropool
Dry Extended Detention Basin
Wet Extended Detention Pond
Constructed Wetland
Extended Detention Ponds

- Extended detention ponds provide little to no runoff reduction value
  - Thus, they are not “green infrastructure” and will not reduce the occurrence of combined sewer overflow
  - However, they do meet NPDES requirements for post-construction storm water requirements for new development and redevelopment that disturbs ≥ 1 acre

- These ponds do provide a flood control function
  - Peak rate of discharge and total storage volume is set by local requirements, not Ohio EPA
Bioretention Areas

Cleveland WPC Building
Bioretention Retrofit

Sheetz Gas Station
Jackson Twp/Stark Co

Taco Bell
Springfield Twp
Summit Co

Third Federal Savings Bank
North Olmsted
Bioretention is green infrastructure and will reduce runoff volume!

>24” planting soil mix

2-3” filter – clean concrete sand

2-3” filter - clean gravel (#8)

12” clean gravel (#57)

Use specifications found in *Rainwater and Land Development*
http://www.dnr.state.oh.us/tabid/9186/Default.aspx
## Planting Soil Mix

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Soil Type</td>
<td>Sandy Loam&lt;br&gt;➢ &gt; 80% Sand  &lt; 10% Clay&lt;br&gt;➢ Sand shall be clean and meet AASHTO M-6 or ASTM C-33</td>
</tr>
<tr>
<td>pH</td>
<td>5.2 – 8.0</td>
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<tr>
<td>Organic Matter</td>
<td>3 – 5% by Weight</td>
</tr>
<tr>
<td>Phosphorus Content</td>
<td>15-60 mg/kg by Mehlich3</td>
</tr>
<tr>
<td>Soil Test Certification</td>
<td>Soil mixes must be certified by a qualified laboratory&lt;br&gt;(1 test per 100 yd$^3$ of soil)</td>
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By volume, this roughly equates to 75% sand, 15% topsoil & 10% organic matter. Good source of organic matter is leaf compost, pine bark fines & mulch fines.
Installing Bioretention Areas

- **Ideal drainage area is 0.5 – 2.0 acres**
  - Filter area is 0.5 x drainage area
- **Planting soil mix shall be placed in 12-18 in lifts and only lightly compacted**
- **Mulch shall be placed once planting soil has had chance to settle to avoid excess compaction**
  - 3 inches of course shredded hardwood
  - Pine mulch or fine/chipped hardwood not recommended
- **Plant selection for bioretention is often intentional**
  - Follow landscape plan in approved plan set
Permeable Pavement

- Three common types
  - Pavers
  - Asphalt
  - Concrete

- Ohio EPA requires WQv to infiltrate in 24 hrs or be detained for ≥ 48 hrs

- Permeable pavement is green infrastructure
  - Reduces runoff volume
Parts of a Permeable Pavement System

- Storm water control occurs below the pavement surface
  - Void space in stone stores runoff
  - Aggregate bed is typically 8 – 36 inches deep
- In an infiltrating system
  - Storage reservoir $\geq$ WQv below underdrains
- In a detention-based system
  - Underdrain on bottom
  - Discharge from underdrain is controlled by an outlet structure w/ orifice

Source: Hunt and Collins, 2008
Proprietary (Manufactured) Systems

- **Common Types**
  - Hydrodynamic separators
  - Underground filter systems
  - Underground detention systems

- Ohio EPA must approve use on large construction projects

- **Is grey infrastructure**
  - Typically, does not reduce the volume of runoff

- Refer to manufacturer specifications for sizing, installation and maintenance
Other Practices You May See... Structural

Cistern

Rain Barrel

Green Roofs

Rainwater Harvesting

Infiltration Trench

Sand Filters
Other Practices You May See...Non-Structural

Meadow Grass Plantings

Downspout Disconnection to Grassed Swales

Soil Amendments

Riparian Buffers
For More Information

- **Websites**
  - Ohio EPA  [www.epa.ohio.gov/dsw/storm/index.aspx](http://www.epa.ohio.gov/dsw/storm/index.aspx)

- **Ohio EPA Contacts at NEDO**
  
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