Nashville
Retrofit of Fulton Municipal Parking Plaza

IAFSM
Bloomington, IL
March 6, 2013
Sustainable Solutions that Last
Minimize the hydrologic impacts of development
Low Impact Design
Water Quantity
Water Quality
Water Quality
Conventional Pavements

Promote

• First Flush Pollutants
• Poor Winter Performance
• High Maintenance
• Poor Life Cycle Costing
Pervious/Porous Concrete

Shoreview, MN

Indianapolis, IN
Porous Asphalt

Akron, OH
Perception in the Marketplace

- Expensive to build
- Expensive to maintain/clogging
- Cannot drive heavy vehicles on pavement
- Cannot use in cold climates
Stormwater Management
Richard H. Fulton Complex
Low Impact Development Parking Lot
Overview
- Project Background
- Project Details
- Cost Implications
- Lessons Learned
Project Background

- Design begun in 2003, construction completed 2005
- Space constraints- Dense, heavily used, urban site
- Bedrock subgrade
- Complex underground infrastructure- Historic site from 1850’s
- Drainage problems at intersection of 2nd Ave So & Lindsley Ave
- Originally combined storm and sanitary sewer system
- Pioneer project for Low Impact Development (LID) practices
- Metro wanted lot to be used as demonstration site
- Metro Stormwater Management Manual update in 2006 to include LID

- Project presentation June 2008 to Cumberland River Compact, Building Outside the Box, Local Officials Community Water Curriculum- Green Parking Workshop
- To be featured on segment of WNPT’s Volunteer Gardner summer of 2009
Cost Implications:

- LID costs less than conventional stormwater management systems to construct and maintain, in part, because of fewer pipes, fewer below-ground infrastructure requirements, and less impervious surface.
- Costs are site-specific due to site’s conditions.
- Asphalt or conventional concrete stormwater management paving system costs between $9.50 and $11.50 per square foot, compared to a permeable paving stormwater management system at $4.50 to $6.50 a square foot.

Bioretention- $3 to $4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs- $10 to $40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Permeable Paving-
- Porous Concrete- $2.00 to $6.50/s.f.
- Grass/Gravel Pavers- $1.50 to $5.75/s.f.
- Interlocking Concrete Pavers- $5.00 to $10.00/s.f.
- Porous Asphalt- approx. $4.00/s.f.

Site Specific Cost Implications

- Paid premium on asphalt due to limited contractor experience in the area.
- Equipment availability caused scheduling problems.
- Relatively small size of lot.
- Underdrain system due to bedrock.
Landscape Design Considerations

- Naturalized –vs- Manicured look

- Use native plants suited to moisture, light and soil conditions

- Mulch options are rock, wood chips or shredded hardwood depending on site specific need

- Biosoil- 10% native soil, 30% composted material and 60% gravelly sand

| Plant List for RHPC Parking
<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Common Name</th>
</tr>
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<tbody>
<tr>
<td>Acer saccharum</td>
<td>Sugar Maple</td>
</tr>
<tr>
<td>Acer Rubrum 'Armstrong'</td>
<td>Armstrong Maple</td>
</tr>
<tr>
<td>Cnidaria lutea</td>
<td>Yellowwood</td>
</tr>
<tr>
<td>Potentilla acerifolia</td>
<td>London Planetree</td>
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<tr>
<td>Quercus phellos</td>
<td>Willow Oak</td>
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<tr>
<td>Shrub</td>
<td></td>
</tr>
<tr>
<td>Buddlea davi</td>
<td>Butterfly bush</td>
</tr>
<tr>
<td>Cephalanthus occidentalis</td>
<td>Button Bush</td>
</tr>
<tr>
<td>Hibiscus moscheutos</td>
<td>Swamp Mallow</td>
</tr>
<tr>
<td>Hydrangea Paniculata</td>
<td>Giant St. John's Wort</td>
</tr>
<tr>
<td>Ilex cornuta 'Green Luster'</td>
<td>Green Luster Holly</td>
</tr>
<tr>
<td>Ilex glabra 'Denton'</td>
<td>Dwarf Inkberry</td>
</tr>
<tr>
<td>Hea virginica</td>
<td>Virginia Swoothspire</td>
</tr>
<tr>
<td>Prunus laurocerasus 'Otto Luyken'</td>
<td>Otto Luyken Laurel</td>
</tr>
<tr>
<td>Viburnum rhytidophyllum</td>
<td>Leatherleaf Viburnum</td>
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<tr>
<td>HACKBERRY</td>
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<tr>
<td>Bohinca purpurea</td>
<td>Purple coneflower</td>
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<tr>
<td>Iris pseudacorus</td>
<td>Yellowflag Iris</td>
</tr>
<tr>
<td>Rudbeckia fulgida 'Goldsturm'</td>
<td>Black-eyed Susan</td>
</tr>
<tr>
<td>Grasses &amp; Sedges</td>
<td></td>
</tr>
<tr>
<td>Chaenomeles japonica</td>
<td>Upland Sea Oats</td>
</tr>
</tbody>
</table>
Lessons Learned
- Correct placement of asphalt is critical to the overall success of the system
- ‘End-cap’ curbs or curb with cuts around islands
- Quality, weed-free topsoil must be used
- Landscape fabric between soil and mulch
- Budget and plan for maintenance
- Missed opportunity for monitoring
Fulton Municipal Parking Plaza
Demonstrations-Performance

McKay Bookstore

Neighborhood Redevelopment
Maintained Access to Office Building
LID Preserved
A Demonstration of the Effectiveness of Permeable Pavers installed at the Fulton Campus. August 24, 2012 -produced by Metro 3
http://www.youtube.com/watch?v=Ih_O8Xey08M

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Investment in your Future
• Hydrologic Design
• Structural Design
• Static/Dynamic
• ESALS
• 50 year Pavement Design
1-2 times per year
Post-structural Inspection Report

Normal Maintenance
Snow Maintenance
Sediment Build-up
Stains-Oils – Food - Tire
Estimated 15-20 year cycles

Vacuum Type Sweeper

Remedial Maintenance
Forensic Documentation

Morton Arboretum Workshop
Dr. Wm. Hunt-NCSU 2009

Sediment travel limited to 1”-1½”

Sedimentation Travel
BASS Multi-Tasking Eco-Machine

- Water Quality
- Recharge
- Water Reuse
- HEAT/LIGHT
- RAINFALL

Components:
- Curb
- Permeable interlocking concrete pavement
- Leveling course
- Open-grid subbase
- Mitigation (optional)
- ET (optional)
You Can make a Difference
This concludes the presentation!

What questions do you have?

For more information contact:

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