Retrofitting Commercial Shopping Centers

Making an impact with LID
Overview

• Commercial Development LID Retrofit Issues
• Tips and techniques
• Costs and O&M issues
Commercial Development LID
Retrofit Issues

- Costs for retrofits are higher if the site is not undergoing major renovation
- Electrical / other utility interference may be significant
- Soil conditions may be highly variable; may encounter asbestos etc.
- Plans often not correct, if available at all
- Lack of space, lack of space, lack of space
- Multiple redevelopments over time
- Mixed, inconsistent, underground issues
- Construction interference with retail operations
- Can be much more expensive than LID on new developments
- Rarely voluntary: must be mandated via site plan requirements
- So why bother?
Why Bother?

- Typical is 80-100% imperviousness
- Typically high pollutant loads of hot, flashy water that often promotes flooding
- Few if any controls in place on most existing developments over 20 years old
- May be mandated in future
- If done during redevelopment (repaving), may be cost-effective
- May benefit the site’s owner and tenants by reducing flooding and improving aesthetics
- Often a significant component of total loading to rivers, lakes and streams
Case Study:
Dale Carlia Corner, South Kingstown, RI
Tips and Techniques
Regulatory Considerations

- Require parking lot landscaping and allow it to be used for BMPs
- Allow flexibility in number of parking spaces by business type
- Use islands for bioretention or biofiltration
- Allow flexibility in overflow parking
Use Drywells for roof leaders
Leaching catch basins provide storage for areas that puddle during intense storms
Porous pavers

Porous asphalt
Level spreader with reverse granite curbing
Parking Lot Divider
Small biofilter
Pocket raingarden after construction
After (with biofilter)
Large biofilter during intense storm
Use Total Annual Runoff to Measure Success

EFFECTS OF LID AT PENNICHUCK SQUARE

Pre Runoff Conditions

Post Runoff Conditions

Notes:
1. Precipitation data obtained from http://www.nps.gov/nr/planning/rainfallratio.htm for Manchester Airport 1/6/03 7/28/03.
2. BMPs are designed to treat a combined 0.75" of runoff.
3. BMPs are assumed to empty within 12 hours. This assumption was used in the calculation for onsite infiltration.

Comprehensive Environmental Inc.
(800)725-2550 or see www.ceiengineers.com
Typical Costs and O&M Considerations

- Costs for retrofits are higher if the site is not undergoing major renovation
- Grouping projects may bring in better bid prices as projects may be small, contractors unfamiliar with the type of work
- O&M should be similar to typical landscaping spring/fall cleanup for most BMPs, if:
  - Designs incorporate margin of safety for sedimentation
  - Forebays and other pretreatment are used
  - Failure will be visible without specialized equipment/review
  - Require owner to contract for cleanup up front if possible
- Other types of O&M, e.g., porous asphalt, may need specialized equipment that should be purchased up front by the landowner
- O&M tracking process useful, especially for unseen BMPs
Conventional Design: Construction Cost Estimate

New Subdivision

- Manholes $72,000
- Catch Basins $74,000
- Piping $203,000
- Detention Pond $101,000

TOTAL $450,000

Construction Cost Means 2004
LID Design:

Construction Cost Estimate

- Piping $47,000
- Standpipes $3,000
- Manholes $21,000
- Nat. Swales/Basins $135,000
- Check Dams $12,000
- Patio/Deck Areas $15,000
- Bioretention Cells $63,000
- Rain Gardens $102,000

TOTAL $398,000
## Summary of Comparison

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional</th>
<th>LID</th>
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<tbody>
<tr>
<td>Total Capacity in cubic feet</td>
<td>114,400</td>
<td>119,900</td>
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<tr>
<td>Recharge Area in square feet</td>
<td>7,100</td>
<td>30,500</td>
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<tr>
<td>Recharge Volume in cubic feet</td>
<td>3,000</td>
<td>50,200</td>
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<tr>
<td>Total Cost</td>
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<td>$398,000</td>
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<tr>
<td></td>
<td>Unit Cost</td>
<td>Measurement</td>
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<tr>
<td>--------------------------------</td>
<td>-----------</td>
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<tr>
<td>Roof leader wells</td>
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<tr>
<td>Leaching catch basin</td>
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<tr>
<td>Infiltration divider</td>
<td>$15.00</td>
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<td>Permeable pavement</td>
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<td>Biofilter</td>
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<td>Wetland treatment</td>
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<td>Vegetated Swale</td>
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<tr>
<td>Proprietary Infiltration System</td>
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Contact Information

Eileen Pannetier, President & Kevin Read, P.E., Comprehensive Environmental Inc., 64 Dilla Street, Milford, MA 01757
(800)725-2550 X301 and 359
epannetier@ceiengineers.com and kread@ceiengineers.com
www.ceiengineers.com
CEI is a New England based civil and environmental engineering firm