North Street Reconstruction & Integrated Stormwater Management System

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North Street: A Case Study for High Performance Infrastructure

*What happens when a community goes “ALL IN” with Green Infrastructure?*
Lafayette GI Feasibility and Prioritization Study

Capital Improvement Project Integration
- Right of Way
- Open Space
- Neighborhood revitalization

Result:
- **North Street** (9th to Erie) best capital investment per annual gallon removed and **overall #1 ranking** (TBL Analysis)
Why North Street?
Deteriorated Pavement Conditions
Interesting Drainage Conditions
Right of Way / Utility Issues
North Street Reconstruction: High Performance Infrastructure

Project Goals and Opportunities

• Improve approximately .60 mile existing street
• Maintain & enhance historic neighborhood character
• Increase Tree Canopy within corridor
• Eliminate raw sewage overflows at regulator
• Potential to remove 6.6 Million gallons of stormwater from the combined system annually
• Replace existing water services and update meters
• Improve handicap accessibility
• Enhance existing parking
• Complete design work for summer 2012 initial phase
North Street Reconstruction
Construction Documents

Material selection

- "Historic" aesthetic - Community desire to maintain look and feel of street
- Paver qualities – porous, durability, warranty, color & texture options
North Street Chosen Final Design Option

“Full” cross section for pavers with intermittent “deep” storage sections
North Street Reconstruction Design Development

SWMM Modeling - Hydrology

- Microwatersheds delineated by inlet
- Topography from GIS
- Connectivity refined during field recon
- Both continuous annual storm and individual events modeled

Soil infiltration characteristics taken from existing city combined sewer SWMM model for areas with similar SCS soil types
North Street Reconstruction
Design Development

SWMM Modeling - Storage

- Full street permeable paver section
- Standard 11 inch paver section with washed subgrade
- App. 24 “deep section” storage cells
- Supplemental rain gardens where practicable
- Utilities located, surveyed, mapped, and potholed
- Deep storage zones and underdrains placed to minimize conflicts
## North Street Reconstruction Design Development

### SWMM RESULTS

<table>
<thead>
<tr>
<th>Volume Removal (MGAL)</th>
<th>Existing</th>
<th>Proposed</th>
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</thead>
<tbody>
<tr>
<td>Annual Runoff</td>
<td>8.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Annual Storm</td>
<td>5.5</td>
<td>4.5</td>
</tr>
<tr>
<td>10yr, 24-hr Huff</td>
<td>4.1</td>
<td>3.2</td>
</tr>
</tbody>
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**SWMM Modeling – Results**

Peak Rate reductions up to 40% in some areas, less than 10% in others.

Avg Rate Reduction app. 30%
North Street Reconstruction Construction Documents

“Landscape architecture” level of custom details and specifications

- Reuse of historic bricks between street and walk
- Non-standard (lack of) subgrade compaction
- Seat walls with rain gardens with roof drain connections
- New Brick to Old Asphalt/Concrete/Brick intersection transitions
Post Construction - Streetscape Water Quality Element with Historic Brick and Permeable Pavers
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Water Quality Element with Historic Brick and Permeable Pavers
Community Outreach and Education
North Street Reconstruction: High Performance Infrastructure

- Project Estimate = $3.2M
- Phase 1 (~ 2000 lf) = $1.7M
- 76% of runoff removed from combined system equivalent to 6.6M gallons annually
- 30% Peak Flow Reduction
- $0.50 per gallon treated capital investment
- Net Annual Cost of Treatment Reduction = $44K

Additional Benefits:
1. Reuse of existing materials
2. Improved pedestrian connectivity
3. Increased traffic and vehicular control
4. Restorative impact on regional water quality
5. Positive capital return on investment
6. Reduced energy usage at publically owned wastewater treatment plant
7. Improved community corridor and streetscape
8. Enhance public health and safety
North Street Reconstruction: High Performance Infrastructure

Lessons Learned:

1. Stakeholder outreach opportunities are a premium

2. Integrate utility upgrades wherever possible

3. Additional detail in construction documents needed to keep bids in line with engineering estimates and change orders to a minimum during construction
North Street Reconstruction
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