This presentation premiered at WaterSmart Innovations

watersmartinnovations.com
North Street Reconstruction & Integrated Stormwater Management System
Value Statement

For growing municipalities to be perceived as world class communities, each must move past the era of single objective spending and invest in programs and policies with multiple benefits. Learn how Green Infrastructure (GI) approaches to wet weather management create a range of benefits for the social, economic, and environmental health of a community.
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, not USA Today Coaches poll).
Why North Street?
Deteriorated Pavement Conditions
Interesting Drainage Conditions
Right of Way / Utility Issues
North Street Reconstruction:
High Performance Infrastructure

Project Goals

• Improve approximately .60 mile existing street
• Maintain & enhance historic neighborhood character
• Replace trees identified for removal in City Tree Survey
• Eliminate raw sewage overflows at regulator
• Replace existing water services and update meters
• Improve handicap accessibility
• Enhance existing parking
• Complete design work for summer 2012 initial phase
• Plan for multiple phase construction

Project Opportunities

• Potential to remove 6.6 Million gallons of stormwater from the combined system annually
• Reduce pumping and treatment costs
• Provide data for inclusion of GI in future LTCP
• Use the Wells Community Cultural Center for outreach opportunities
• Connect to multi-modal transportation nodes
• Improved community connectivity
• Improve streetscape to support revitalization
• Increase Tree Canopy within corridor
North Street Reconstruction
Concept Development
Community Outreach and Education
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
Existing Condition North Street at 3rd Street
Streetscape Water Quality and Permeable Pavers
Existing Condition
Between 4th St. and 5th St.
Streetscape Water Quality Element with Historic Brick and Permeable Pavers
Existing Condition at 6th St.
Streetscape Water Quality Element and Permeable Pavers
Existing Condition at 8th Street
Streetscape Water Quality Element with Historic Brick and Permeable Pavers
Existing Condition at 9th St.
Streetscape Water Quality Element and Permeable Pavers
Existing Condition of St. Boniface Church
Streetscape Water Quality Element with Historic Brick and Permeable Pavers
Existing Condition at 10th St. Intersection
Streetscape Water Quality Element and Permeable Pavers
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>
</tr>
</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>
</table>

### 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

Deconstruction Plan

- “Everything Must Go” (Almost everything)
- Bricks to be saved from landfill
- Trees to keep/to remove designated by city ecologist (ash borer, disease, or general unhealthiness)
North Street Reconstruction Construction Documents

“Transportation” engineering set, not just stormwater design
North Street Reconstruction
Construction Documents

Maintenance of traffic and property access

- Alley loading
- Temporary drives
- Unique commercial (glass) delivery issues
- Pedestrian wayfinding
North Street Reconstruction
Construction Documents

Resolve utility conflicts and improve existing connections

Unknown condition and exact number of existing services
North Street Reconstruction
Construction Documents
Meet ADA 2012 requirements
North Street Reconstruction
Construction Documents

Generate plan, profile, cross-section, perspective, and rendering of many features for “instructional” level CDs
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
North Street Reconstruction
Construction Phase 1

Very few poorly drained areas, but here’s one! (needs to be cleaned out prior to stone backfilling)
North Street Reconstruction
Construction Phase 1
Unknown Conditions (even after excavating?)
North Street Reconstruction
Construction Phase 1
Manhole replacement
North Street Reconstruction
Construction Phase 1
Downspout disconnection clean-out
North Street Reconstruction
Construction Phase 1
Flow through rain garden design
North Street Reconstruction
Construction Phase 1
Filter fabric installation
North Street Reconstruction
Construction Phase 1
Almost ready for pavers
North Street Reconstruction
Construction Phase 1
Paver Installation
Post Construction - Streetscape Water Quality Element and Permeable Pavers
Post Construction - Streetscape
Water Quality Element with Historic
Brick and Permeable Pavers
Post Construction - Streetscape Water Quality Element with Historic Brick and Permeable Pavers
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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
9. Goodwill establishment within neighborhood
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
Online Information

www.lafayettenorthstreet.com

Neil B. Myers
+1.317.423.0690
nmyers@williams creek.net

John Hazlett
+1.317.423.0690
j hazlett@williams creek.net