Envisioning a Sustainable Approach to Municipal Infrastructure

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Freese and Nichols
Growth, Progress & Infrastructure
Sustainable Infrastructure

• Environmentally friendly
• Improves air or water quality
• Leads to safer neighborhood or community
• Promotes economic development
• Meets the needs of today without negatively impacting future needs
• Involves stakeholders
• Improves life cycle costs
Planning Tools

• Rating Systems
  • LEED – Facility
  • Envision – Infrastructure

• Benefits
  • Best Practices
  • Standard for planning/design
  • Measurable results
  • Public relations

<table>
<thead>
<tr>
<th>Credit Category</th>
<th>Applicable Points</th>
<th>Points</th>
<th>Innovation Points</th>
<th>Total Points Pursued</th>
<th>Percentage of Available Points</th>
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<tbody>
<tr>
<td>QUALITY OF LIFE</td>
<td>165</td>
<td>45</td>
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<tr>
<td>LEADERSHIP</td>
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<td>RESOURCE ALLOCATION</td>
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<tr>
<td>NATURAL WORLD</td>
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<td>114</td>
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<td>CLIMATE AND RISK</td>
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<td>Total Workbook Points</td>
<td>758</td>
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<td>11</td>
<td>296</td>
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Envision™ Scores
- Unachieved Points
- Total Points Earned

Credit Category: QL, LD, RA, NW, CR
Purpose
Why Sustainable Infrastructure?

- Stewardship of resources
- Entities’ core values
- Resilient infrastructure systems
- Reliable service
- Lower lifecycle cost and extended design life

Reliable and Sustainable
Case Study

City of Atlanta, Georgia
Background
City of Atlanta

• City’s Department of Watershed Management
  • Serves 1.2 million (450,000 night)

• Consent Decree
  • CSO – completed 2008
  • SSO – extension granted 2027

• 2nd Highest W&S rates in the country

• Stormwater Utility Fee
  • Adopted in 1999
  • Overturned - $7 million refunded
Contributing Conditions

Point of Surface Flooding July 2012 (Peoplestown)

<table>
<thead>
<tr>
<th>Drainage Basin</th>
<th>Total Area (acres)</th>
<th>% Impervious</th>
<th>Impervious Area (acres)</th>
<th>Roadway Area (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanicsville / Peoplestown</td>
<td>900</td>
<td>65%</td>
<td>582</td>
<td>220</td>
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<tr>
<td>Summerhill</td>
<td>505</td>
<td>58%</td>
<td>293</td>
<td>110</td>
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<tr>
<td>Grant Park</td>
<td>380</td>
<td>42%</td>
<td>162</td>
<td>55</td>
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<td>Englewood Manor</td>
<td>715</td>
<td>42%</td>
<td>301</td>
<td>62</td>
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## Back to Back Rain Events

<table>
<thead>
<tr>
<th>Rank</th>
<th>Date</th>
<th>Recurrence Level</th>
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<tbody>
<tr>
<td>1</td>
<td>7/9/2012</td>
<td>10-25 year</td>
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<tr>
<td>2</td>
<td>8/31/2006</td>
<td>5-10 year</td>
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<td>3</td>
<td>7/11/2012</td>
<td>2-5 year</td>
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<tr>
<td>4</td>
<td>9/29/2009</td>
<td>2-5 year</td>
</tr>
<tr>
<td>5</td>
<td>7/3/2012</td>
<td>2-5 year</td>
</tr>
<tr>
<td>6</td>
<td>5/5/2003</td>
<td>2-5 year</td>
</tr>
<tr>
<td>7</td>
<td>7/20/2011</td>
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<td>8</td>
<td>8/20/2000</td>
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<td>9</td>
<td>6/3/2001</td>
<td>2 year</td>
</tr>
<tr>
<td>10</td>
<td>8/28/2009</td>
<td>2 year</td>
</tr>
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</table>
Peoplestown Flooding – July 2012
Community Engagement
Phase 1 Projects - Completed

Southeast Atlanta Green Infrastructure Initiative
Phase 1 - Peoplestown, Mechanicsville and Summerhill

1. Crumley Street between Windsor Street and Ira Street at Rosa Burney Park (removed impervious pavement and installed vegetative bioswale)

2. Whitehall Terrace near Dunbar Elementary School (converted parking spaces into rain gardens)

3. Ira Street near Fulton Street and Windsor Street at Rosa Burney Park (rain garden installation to capture runoff from tennis courts)

4. Rosa Burney Park (expansion of the existing detention pond to divert stormwater runoff from parking lots and surrounding streets)

5. Sydney Street between Fulton Street and Connaught Street (rain garden installation to divert and treat Fulton Street runoff)

6. Kelly Street at Cherokee Street (construction of a biodetention pond to capture runoff from Hill Street and parking lots)
Phase 1 Projects - Completed
Phase 2 Project - Completed
Phase 2 Project

- 4+ miles of Permeable Pavers
Construction Sequence
Completed Streets
Historic 4th Ward Park
Site Conditions - 2008
Today
Spurring Economic Development

- Apartments
- Condos
- Ponce City Market

$500M in Redevelopment
April 16, 2017 – 4” rain event
3 days later
April 16, 2017 – 4” rain event
3 days later
Which would you prefer?
Upper Proctor Creek Capacity Relief

History

- 2002 storm event caused catastrophic flooding in the Vine City neighborhood
- Over 60 homes were purchased by the City as a result
- Combined sewer basin
- Opportunity for multiple partnerships to resolve flooding concerns and restore community health
Pre- and Post-2002 Flood Event
Neighborhoods

English Avenue and Vine City

- Steep decline in population over past 30 yrs
- Highest crime rates (twice the City of Atlanta average)
- Repeated flooding
- Fewest acres of planned greenspace
- Lowest occupancy rates
- 41% of households living below the poverty line
- 20% houses vacant
- 40% foreclosure rate
Pre-Construction Conditions
Rodney Cook, Sr. Park in Historic Vine City

16 acre site

- Provides 9+ million gallons of capacity relief, preventing localized flooding throughout the community
- Redirects surface runoff away from the combined sewer system
- Innovative stormwater management practices
The Georgia Dome, left, and the new Mercedes-Benz Stadium, right, tower over the Vine City neighborhood in Atlanta.

Kevin D. Liles for The New York Times
Partnerships

Department of Watershed Management (DWM)
- Pond design and construction, limited combined sewer separation, green infrastructure, soil remediation

Trust for Public Land (TPL)
- Park design and construction in coordination w/ Department of Parks and Recreation and DWM

National Monuments Foundation (NMF)
- Design and construct 16 statues of historical and civil rights leaders throughout the park

Adjacent projects
- Boone Blvd Green Street (DWM), PATH, Boone Park West
Cook Park is Being Shaped with Four Criteria in Mind

- stormwater storage
- historic mims park
- site conditions
- public input

These criteria focus on water management.
Public meetings, community workshops, online surveys, and stakeholder interviews were performed to gain an understanding of public needs and desires.
Rodney Cook, Sr. Park in Historic Vine City

DWM Components of the Project

- Wet pond w/littoral shelf
- Created wetlands
- Stormwater planters
- Rerouted combined sewer trunkline (96”)
- Aerating water features
- New sidewalks/roadway improvements
- Separated storm drain pipelines
Site Challenges

- Transmission Lines
- Combined Sewer Trunklines
- Property Acquisitions
- Lead Impacted Soils
Phased Combined Sewer Separation

- **Phase A:** 73 acres drainage
- **Phase B:** 36 acres drainage
- **Phase C:** 41 acres drainage
- **Ultimate:** 150 acres drainage

- Eliminates combined sewer overflows for up to the 100-year storm event
Phase A

2,194 LF of Storm Drain

<table>
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<th>Size</th>
<th>LF</th>
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<tbody>
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<td>18” RCP</td>
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<td>30” RCP</td>
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<tr>
<td>42” RCP</td>
<td>37</td>
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<td>48” RCP</td>
<td>483</td>
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<tr>
<td>51”x32” arch pipe</td>
<td>418</td>
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<tr>
<td>58.5”x36” arch pipe</td>
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<tr>
<td>60” RCP</td>
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<td>65”x40” arch pipe</td>
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Phase B

2,469 LF of Storm Drain

<table>
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<th>LF</th>
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<tr>
<td>42” RCP</td>
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<td>54” RCP</td>
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# Phase C

### 3,604 LF of Storm Drain

<table>
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<th>Size</th>
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<td>30” RCP</td>
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<tr>
<td>36” RCP</td>
<td>735</td>
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<tr>
<td>42” RCP</td>
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</table>
Normal Pool
2-year Storm
25-year Storm
100-year Storm
Green Infrastructure

- Bioretention cells
- Created wetlands
- Stormwater planters
- Rainwater harvesting cisterns
- Soil restoration

Other Design Elements

- Raised roadways above 100-yr flood elevation
- Narrowed driving lanes
- Added on street parking and stormwater planters
- New ADA compliant sidewalks
Water Quality Benefits

Phase A total treatment volume: 135,700 cf
- Wet pond: 126,000 cf
- Bioretention cells: 5,330 cf
- Stormwater planters: 4,370 cf

Pollutant removal:
- 80% TSS, 50% phosphorus, 70% fecal coliform, 50% metals

Rainfall treated:
- GSMM target: 1.2”
- Phase A: 1.52”
- Ultimate: 0.66” (from Phase A BMPs alone)
In Summary...

- Utilizing innovative stormwater management practices including green infrastructure as a tool to address historic drainage and water quality issues is possible, practical, and can spur neighborhood revitalization

- Developing partnerships is vital

- Engaging the community early and often is key