INTEGRATING GREEN & GREY PUBLIC INFRASTRUCTURE WITHIN A FRAMEWORK OF MULTIPLE OWNERSHIP

Leveraging technology that integrates design, analysis, client and community involvement through an accessible GIS framework.

Laura Mwirigi Rightler, PE, CFM
Adonis Tarrell Smith
## Overview | Workflow & Deliverables

### Workflow Process:
- GIS Data Conflation
- Field Data Collection
- Identifying Issues
- Initial Assessment
- Storm Sewer Design
- Linear BMP Design
- Community Outreach
- Easement Acquisition

### Project Deliverables:
- Engineering Reports/Studies
- Engineering Plans/Exhibits
- Cost Estimates
- Specifications
- Easement Plats
Governing Agencies

Metropolitan St. Louis Sewer District
- Design Standards and Criteria
- Easement Acquisition
- Maintenance
- Construction

City of Maryland Heights
- Design Standards and Criteria
- Administration
- Easement Acquisition
- Maintenance
- Construction and Bid

City of Maryland Heights

MSD
Overall Process

Project Assessment:
- Stormwater Management
  - Field Assessment
  - Facility Maps
  - Municipal boundaries
  - Sewer District
  - Design Guidelines
- Integrating GIS
  - Initial Assessment (IA)
  - Alternative Alignments
  - Community Outreach
  - Innovative Design
  - Cost Analysis
City of Maryland Heights

Legend
- City of Maryland Heights

Map of the City of Maryland Heights with a legend indicating the area of interest.
Project Neighborhood

Tributary Creeks:
- Midland Creek
- Fee Fee Creek
Sewer Systems | Assessment

**Challenges:**
- Communicating project goals to the community
- Identifying local stormwater deficiencies versus regional flood mitigation concerns
- Meeting community needs, project scope, and agency regulations simultaneously
- Limitations of approved design applications
- Developed area with an existing network of utilities
- Multiple entity ownership

**Approach:**
- Gain community project buy-in through outreach
- Alternatives analysis
- Easement negotiation
- Reduce frequent overland flooding and erosion
- Evaluate the impact of applying proposed design solutions
- Reduce frequency of system overloads
Sewer Systems | Identifying Issues

- **Project Characteristics**
  - Address local flooding, drainage / erosion problems, and storm sewer system upgrades
  - Preliminary design recommended 1,900 linear feet of storm sewer design

- **Scope**
  - Regional – Floodplain
  - Local - Stormwater
  - Problem Identification: Development in natural flow path of drainage and flooding
Sewer Systems | Identifying Issues

- **Mack Avenue**
  - Two different storm events
  - Overtopping sewers to convey stormwater without inundating properties with flooding issues
Sewer Systems | Assessment

- Initial Assessment (IA)
  - Survey
  - Data
  - Maps
Sewer Systems | Assessment

- Drainage Area Evaluation
  - Where to place Linear BMP’s to reduce flooding in areas of concern
  - Where to use gray infrastructure
Sewer Systems | Assessment

- **Alternative Alignments**
  - Interactive municipal coordination and access to web maps
  - Minimize private easement requirements
  - Evaluate existing system capacity and target field verification
  - Coordination with utility companies
  - Minimize environmental impact and permit requirements
Sewer Systems | Storm Sewer Design Solution

- Western Finalized Alignment

- Gray pipes and Area inlets used to convey to and from BMP’s
Sewer Systems | Storm Sewer Design Solution

- Eastern Finalized Alignment
Sewer Systems | Innovation

- Innovative Design
  - Green-Gray Infrastructure
  - Does the regulatory design requirements address the stormwater issue?
    - overflowing of structures
    - system backup
    - yard ponding
    - turning existing flow paths and streets into temporary rivers
Sewer Systems | Linear BMP Design Solution

Pond No. 7 - East Broadview

Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2016 by Autodesk, Inc. v10.5

Top of pond
Elev. 497.02

CulvA - 12.0 LF of 12.0 in @ 0.00%

Bottom of pond
Elev. 492.62

Inflow hydrograph = 3. SCS Runoff - East Hedda
Sewer Systems | Linear BMP Design Solution

Pond No. 8 - South Hedda

Top of pond
Elev. 495.19

CulvA - 7.5 LF of 15.0 in @ 0.00%

Section
NTS

Bottom of pond
Elev. 490.19

Inflow hydrograph = 1 SCS Runoff - South Hedda

Stage (ft)

25-yr
10-yr
2-yr
1-yr
100-yr
## Community Outreach

### Daley/ Broadview/ Gill/ Hedda Stormwater Project

<table>
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<th>Location</th>
<th>Hedda Ave</th>
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<tr>
<td>ID</td>
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<tr>
<td>Issues</td>
<td>Flooding</td>
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<tr>
<td>HomeOwner Address</td>
<td>MACK AVE</td>
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<tr>
<td>Property Address</td>
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Community Outreach

TRADITIONAL: Grey Infrastructure Did not meet homeowner priorities

- Unclear project goals
- Stalled easement negotiation
- Project push-back
- Community mistrust
- Expensive, ineffective projects

INNOVATION: Alternative analysis, Client & Community Involvement

- Project understanding
- Easement acquisition
- Project buy-In
- Community participation
- Efficient & effective projects

Spent all this $$$!!!
Still Flooding!!
Mosquitoes everywhere!
Talk to my Lawyer!!

All easements signed!!!
Funding approved!!!
# Case Study | ROI Project Coordination

<table>
<thead>
<tr>
<th>Project Tasks</th>
<th>Traditional Project Workflow</th>
<th>GIS-Based Project Workflow</th>
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<tbody>
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<td>Gray Stand-Alone</td>
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Questions & Contact Information

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QUESTIONS???

Thank you for your time.

CDI
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WBE | DBE