

2023 COLLECTION SYSTEMS
CONFERENCE

Adaptive Management Approach

Smart Sewer Program Case Study

Session 17: Local Utilities

Friday, June 30, 2023, 8:30 a.m. - 11:45 a.m.



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Welcome to Kansas City, Missouri (KCMO)

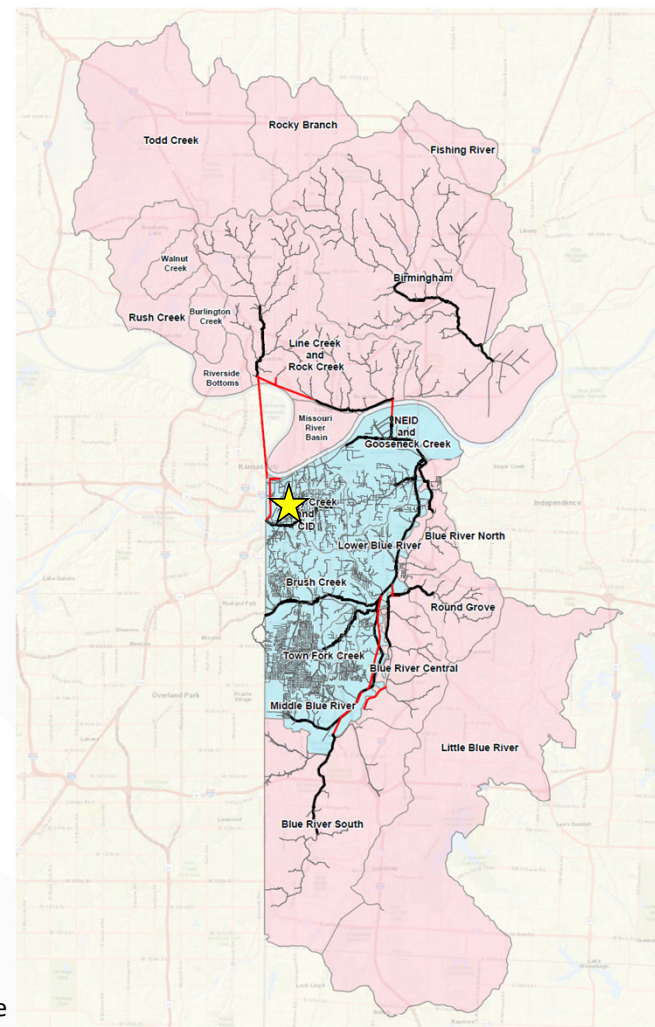
- Population 500,000
- 320 square miles
- The largest city in MO
- Founded in the 1830s
- Incorporated in 1850





- Provides potable water and sewer collection
- Serves
 - 166,000 direct customers
 - 27 satellite communities
- Sewer Infrastructure
 - Combined and Separate Sewer Systems
 - 2,800 miles of sewer pipe
 - 40 pump stations
 - 3 effluent pump stations

★ You are here



Kansas City's Sewer System

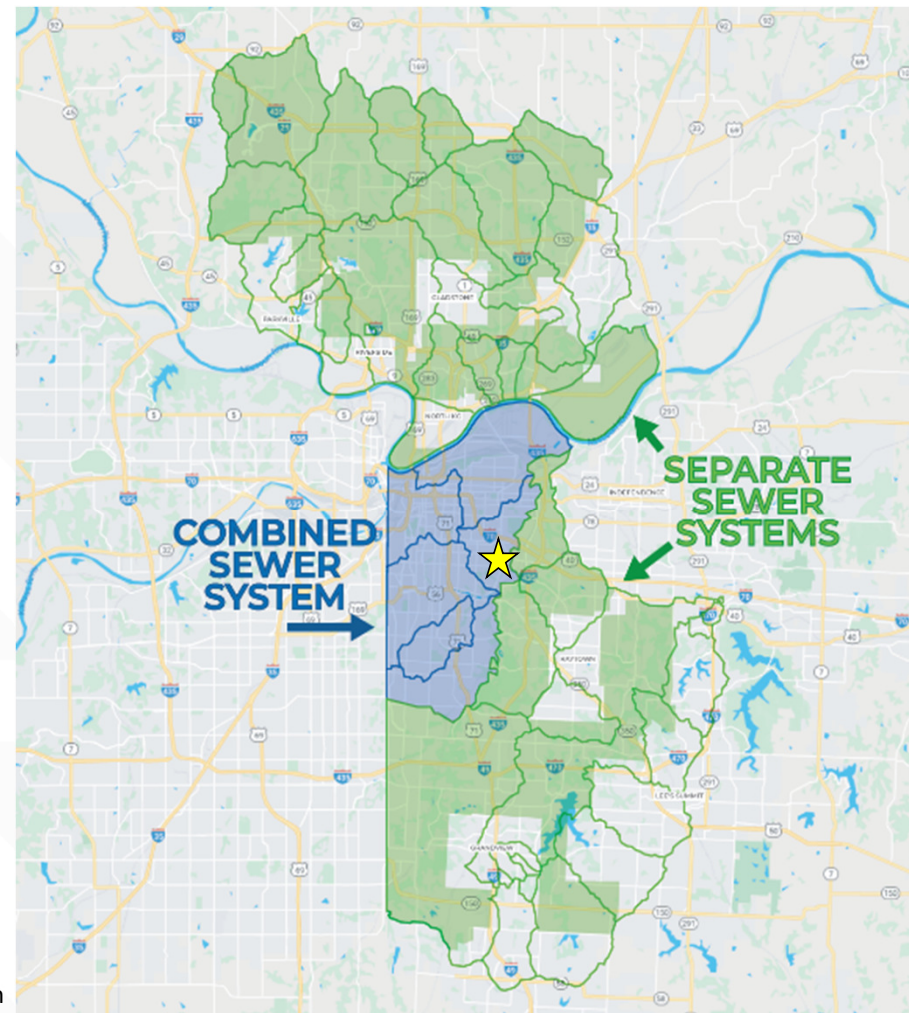
Combined Sewer System:

- 58 square miles
- 1,060 miles of pipe
- Dates back to 1857

Separate Sewer System:

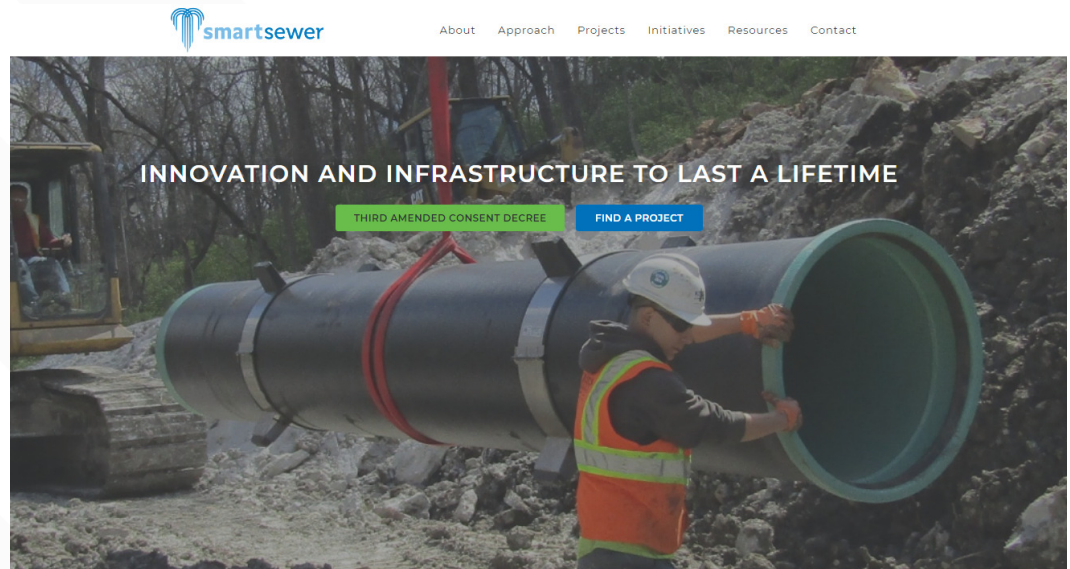
- 260 square miles
- 1,750 miles of pipe
- Dates back to 1960s

★ Project Location



Consent Decree and Smart Sewer Program

- 2009 OCP
- 2010 Consent Decree
- 30-year program to 2040
- \$2.3B (2021 dollars)
- 85% CSO capture
(6.4BG to 1.4BG)

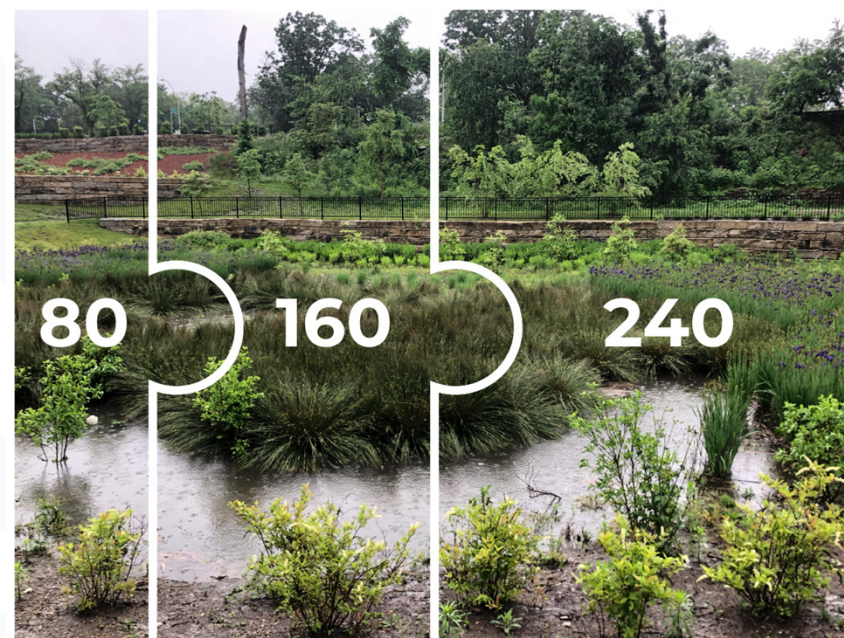


www.kcsmartsewer.us

Green Infrastructure

- Started over ten years ago
- **480 Green Acres** or more required as part of 3rd Amended Consent Decree
- Case Study: 37th and Norton Green Infrastructure Project

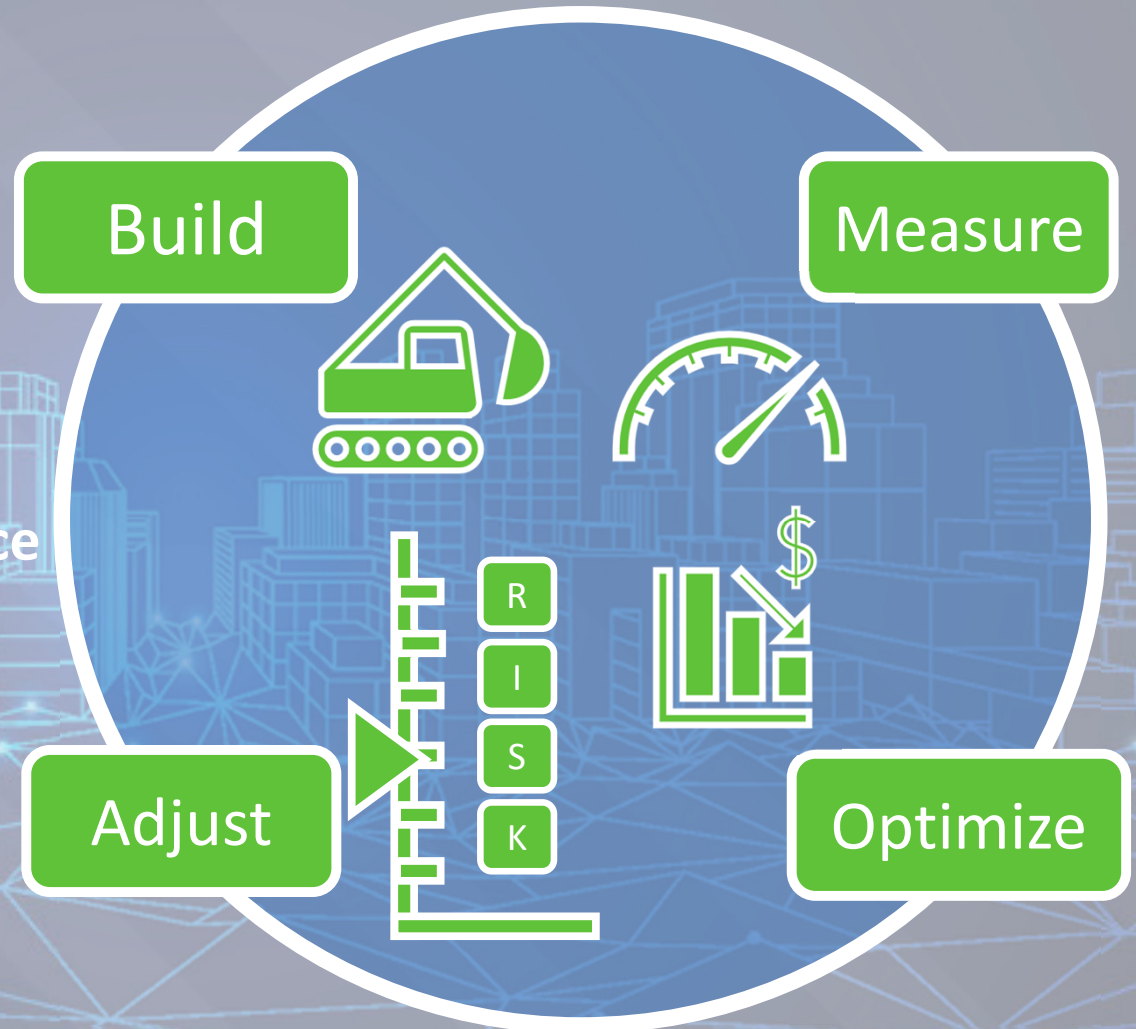
Green Acres



ENHANCED ADAPTIVE MANAGEMENT APPROACH

More Flexibility | Prioritized Investments

- The City can revise projects
- Alternatives must have:
 - EPA approval
 - Sound solutions
 - Equal or greater performance
 - No schedule changes
- Schedule Changes
 - One year or more
 - No negative impacts





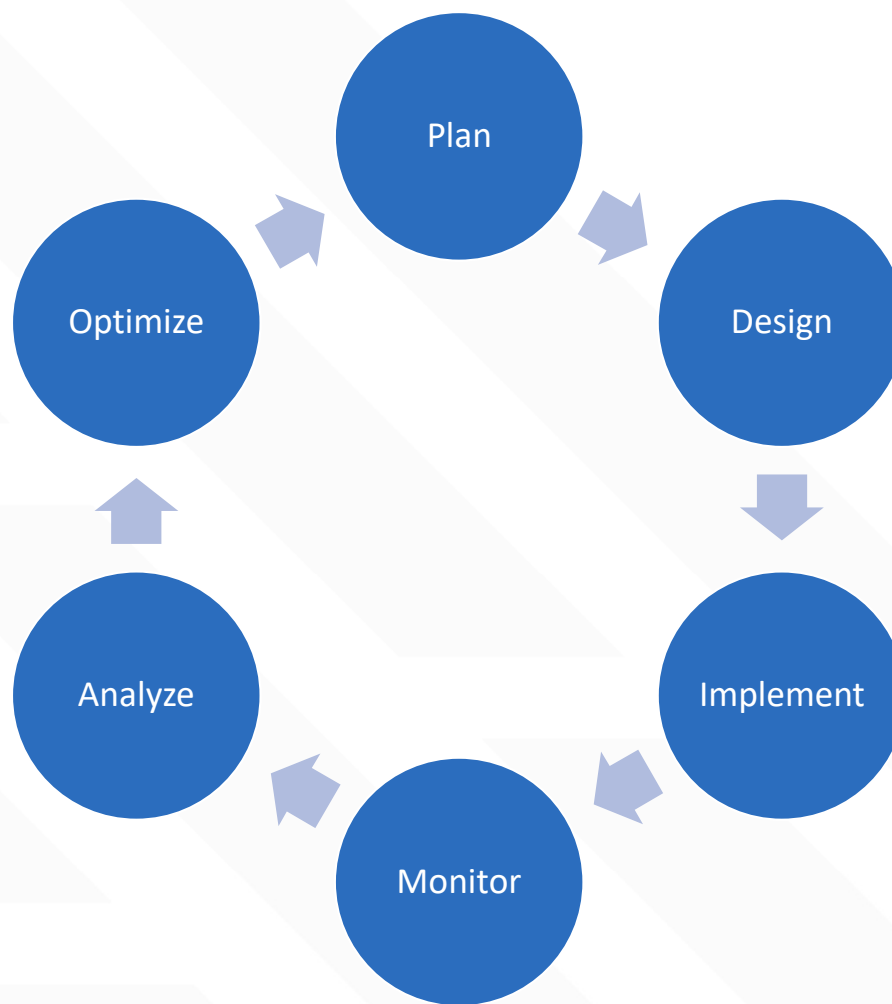
Adaptive Management Approach (AMA)

- A Management Framework
 - Learning by doing
 - Flexibility
 - Feedback
- AMA Characteristics
 - Iterative Solutions
 - Monitoring
 - Optimization
 - Adjusted Solutions

AMA in CSO Management

- CSO Reduction Consent Decree
- Overflow Control Plan
- Long Duration
- Monitoring

AMA



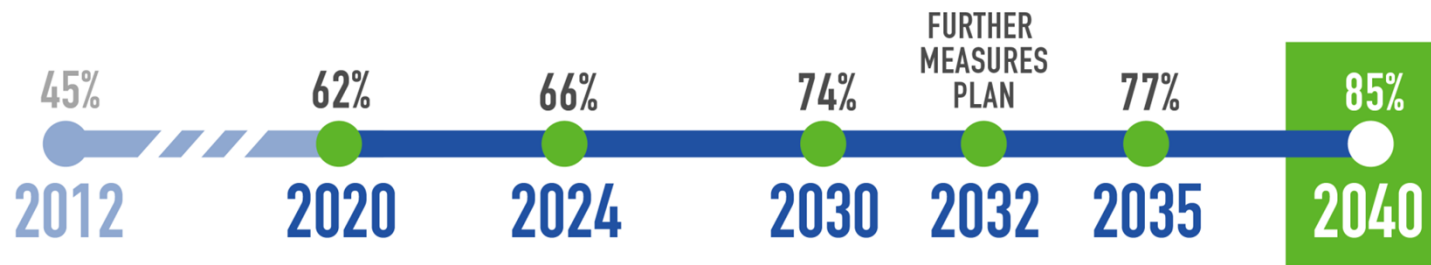
CSO Consent Decree & Enhanced AMA

- CSO CD Requirements

- Performance Targets
- Flexibility
- Monitoring
- Predictive Model
- Phased Program

- KCMO CD

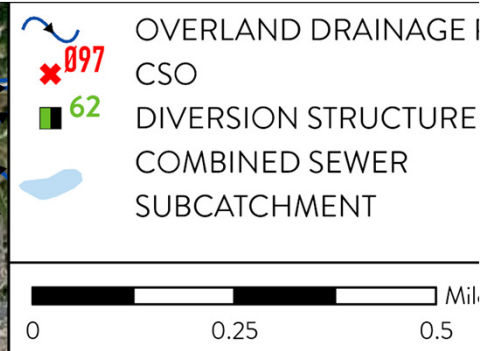
- 85% CSO Capture
- AMA Added to Mod 3
- Monitoring Included
- Modeling Included
- CD Milestones





- Lower Blue River Basin
- Vineyard Creek
- Diversion Structure DS40
- CSO 152
- Blue River Interceptor Sewer (BRIS)

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CSO 040

- 72" arch inflow pipe
- Dry weather:
 - 18" pipe
 - encased in concrete
- Wet weather:
 - DS weir
 - to Vineyard Creek



Outfall 040

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Education
& Training
Events

Original CD Project Vineyard Relief Sewer

- Basin-wide Study
- Relief Sewer: Vineyard & Lawn Project
 - 3,400 linear ft
 - 42-inch diameter
 - Convey more flows to the BRIS & WWTP
 - Constructability Issues
- 18 MG Typical Year CSO Reduction
 - From 28 MG to 10 MG



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Project Challenges

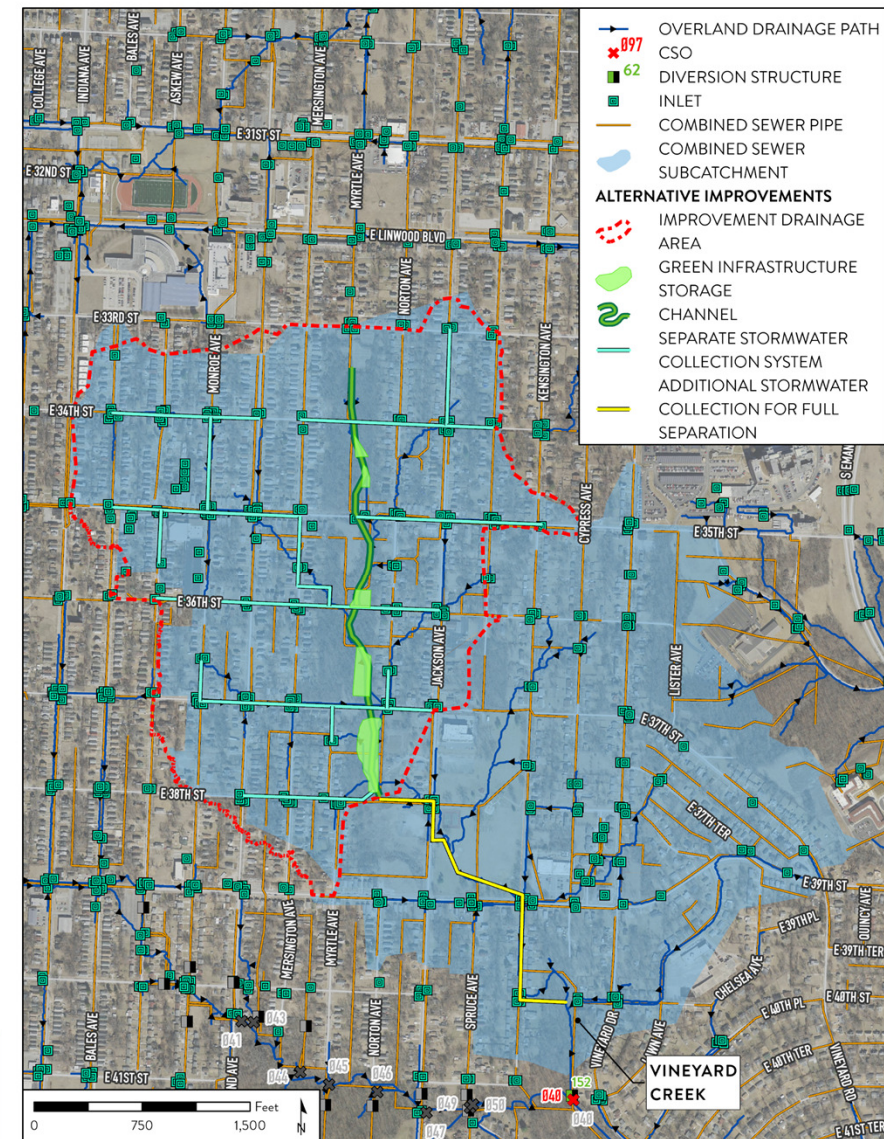
- Challenges of constructability
 - Very rugged and rocky terrain
 - Forested
 - Up to 50 feet deep
 - Bolted manholes
- Bids Exceeded Project Budget
 - \$8.5 – 13.6M
 - 30% increase
- BRIS / WWTP Capacity
 - System-wide CSO reduction < 1MG
 - Future reduction ~4MG



Steep and rocky terrain

37th & Norton Green Infrastructure

- 37th and Norton Street Project
 - ~195 acres of drainage
 - 76 Green Acres
 - Series of green infrastructure basins
 - ~1.8 MG of storage
- Dedicated storm line downstream
 - Additional Separation Opportunities



CSO Reduction Benefits

Immediate Conditions

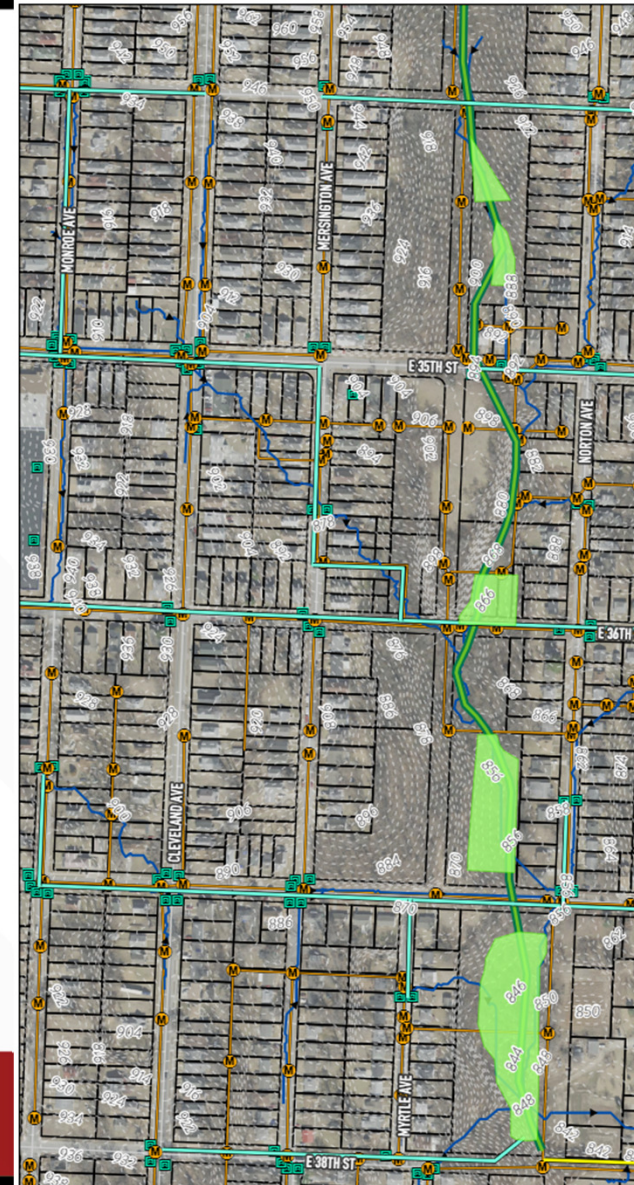
- 14 MG CSO Reduction Locally
- 8 MG CSO Reduction along BRIS
- 22 MG CSO Reduction Systemwide

Ultimate Conditions

- 16 MG CSO Reduction Systemwide

Cost

- \$17M (\$1/CSO gallon removed vs. >\$3/gallon)



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Green Infrastructure Benefits

- Water Quality Benefits:
 - CSO reduction improves receiving waterbody water quality
 - **And** stormwater treatment
- Community Benefits:
 - Neighborhood revitalization
 - Reduced localized flood risk
 - Improved air quality
 - Improved habitats and connectivity
 - Green jobs
 - Improved quality of life
- Social Equity Benefits



West Bottoms



VA Hospital

Overlapping Project: Palestine East, Heartland Conservation Alliance

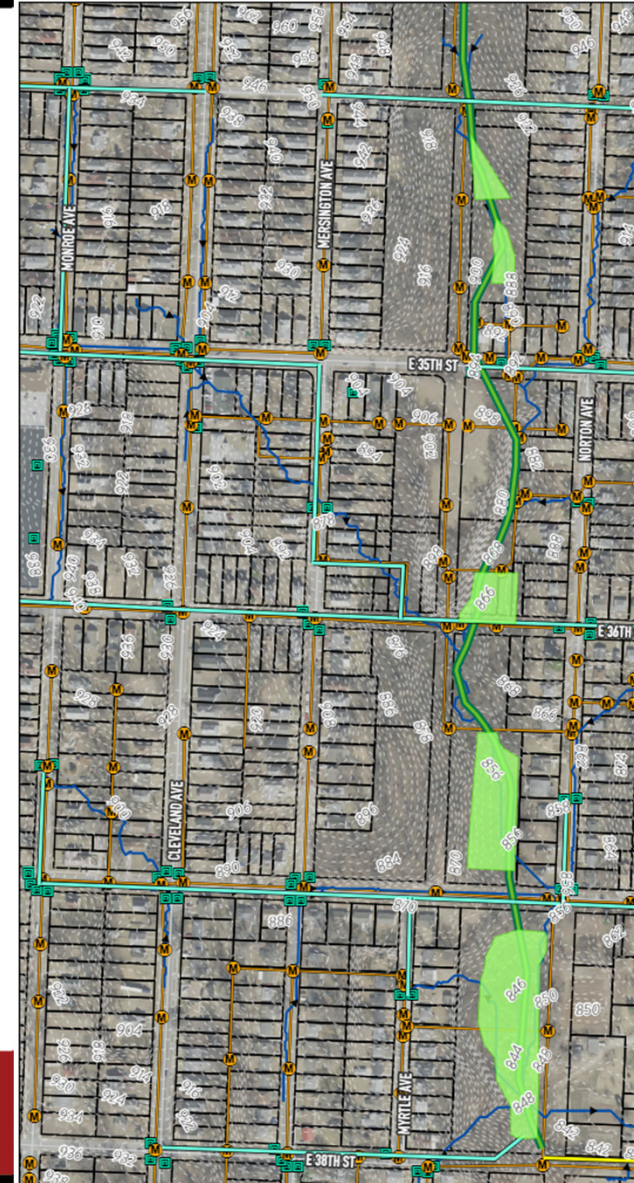
- EPA Grant-Funded effort led by Heartland Conservation Alliance
- Same project area
- Exploring opportunities to reduce illegal dumping, improve home values, build pride and beautify the neighborhood
- MOU to collaborate with KC Water





Summary 37th & Norton GI

- Meets & Exceeds Consent Decree requirements
- Provides about 70 Green Acres
- Good for the neighborhood
- Multiple benefits
- Approved by EPA and going into design





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Questions
Thank You Very Much

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