Roofwater Redirection & Lateral Lining Pilot: Lessons Learned
PROBLEM: SANITARY SEWER OVERFLOWS (SSOs)

• Excessive I/I in Columbus’ sanitary system

• 2002 SSO Consent Order; 2004 CSO (Combined Sewer Overflow) Order

• Original plan was to build overflow tunnels for SSOs which are a fraction of the total volume compared to CSOs
  – Allow problem (infiltration) to continue
  – SSO tunnels do little for water quality as they do not improve stormwater
  – SSO tunnels do not create local jobs or much investment in local economy
SOLUTION: BLUEPRINT COLUMBUS

• Instead of building more infrastructure, invest in fixing our infrastructure
  – Invest in sanitary system, public and private to keep rainwater out
  – Focus on residential areas

• Create opportunities to improve stormwater discharges
  – Route water away from houses to streets
  – Treat with green infrastructure before discharging
BLUEPRINT COLUMBUS: A NEW APPROACH

- Lateral Lining
- Roofwater Redirection
- Sump Pumps
- Green Infrastructure

Sanitary Sewer Overflows mitigated to no more than 1x in a 10-year period (10 year level of service)

Improved Stormwater Discharges into Rivers & Streams

Local Economic Benefits for our businesses and community!
BLUEPRINT PROJECT AREAS

17 Project Areas
18,404 acres
~56,000 homes
Columbus City Council Found a Public Nuisance

• On December 16, 2015 – Ordinance 2015-2905
  – City Council found excessive inflow and infiltration entering the sanitary sewer system was a public health nuisance and created the I/I reduction program.

• Council created the I/I reduction program.
  – Columbus City Code Sections 1145.87-89
Public Nuisance → Designation Order
Designation Findings and Order

Code Section 1145.87 states in part:

- The director may designate areas within the sanitary sewer system where excessive I/I is causing SSOs and/or WIB events. The areas so designated shall be subject to the I/I reduction program on a schedule to be determined by the director. The director may designate more than one area at a time, and if so, the designation may include a prioritization of the areas for implementation of the I/I reduction program. The prioritization may be made on the basis of the number, frequency and duration of the SSOs and WIB events, the likelihood of human exposure and the priority, if any, assigned by Ohio EPA or other relevant factors.

Right to comment on the designation order and right to appeal (if the person lives in or owns property within a designated area) – Code 1145.94 governs appeal process
Public Nuisance → Designation Order → Implementation
Implementation of I/I Reduction Program

• After an area is designated DPU has the authority under Code 1145.88 to enter property private and complete the following tasks:
  – Investigate (survey work – dye testing, smoke testing, videography)
  – Take Corrective Measures (lateral lining and roof redirection)
  – Post-Implementation Inspection

• DPU has the authority to enter the property for these purposes and entry is not a trespass under Code 1145.89.
  – DPU is required to provide the owner five days written notice of the requested entry.
Clintonville 1 Project

- Approximately 997 acres and 2875 homes
- Divided area into six sub sewer sheds
- GI Construction began 2017
Schreyer-Springs Private Property Pilot

- 80 homes received lateral lining
- 34/50 homes received Roofwater Redirection
- Did not need to “test” the Legal Authority
  - Some homes unresponsive, but design provided flexibility to meet the goals
  - Some pushback from residents, but contractors were mostly able to find compromises in the field
  - ~6 houses non-performed due to access issues that could not be resolved with the resident
Communication Process

2 week Notice – Project Commencement

5-day notice – entering private property

1-on-1 Resident Site Review

1 wk private property work Summary

48-hr Notice of Private Property Work

Notification of Work Completion
Implementation Challenges – The Public

• “Customers” of this project determined by geography, NOT interest
  – People don’t think about sewers until it affects them directly
• Not all residents impacted equally
  – Not all downspouts are equal in the eyes of the city
• Educate the inspector and contractor
  – Purposes of the project
  – Project sequencing and resident communications
Implementation Challenges – The Work

• Project sequencing for minimum customer disruptions
  – Construction of GI prior to redirection efforts
  – Combining lateral lining and roof redirection

• Restoration
  – Required contractors to use sod for restoration → significant impacts to schedule/work flow

• Contractor Capacity
  – Availability of a (ideally local!) workforce
LESSONS LEARNED
Roofwater Redirection Considerations

- Fence removal
- Invisible fence
- Private underground wire
- Irrigation system
- Existing pop-up emitter
- Rain barrels
- Curb
- Outlet to rain gardens
  - GI design phase to consider downspout outlets
Lateral Lining Specs Highlights

• “Full-wrap” at service connection to mainline
• Hydrophilic seal at both ends
• Liner Thickness
  – Ranges 5’ – 67’; Average 44’
• Pre and post lining video reviewed by Engineer
• 20% air test for liner performance
• Clean-out is optional
Lateral Lining Lessons Learned

• Understand the difference between mainline lining and lateral lining
  – City PM and inspectors
  – Working hours in private property
  – Resident notification process
  – Purpose of hydrophilic seal

• Frequent communication with contractor and inspector
  – CMIS

• Line laterals on both sides of mainline
  – Map out the locations instead of using a list of addresses
Lateral Cleaning

- Significant mineral deposits, roots, debris
- Will shorter length reduce time and cost?
Lateral Lining Air Test

- Air plugs inside the liner – essentially test liner only, not connection seal
- Requires clean-outs
- 14 laterals tested, 1 failed
- Maintain ~4 psi for minimum 2 minutes
Cost Summary

• Downspout redirection
  – Range $3,000 -$7,700
  – Average $6,500

• Lateral lining
  – Base cost including full-wrap and 25’ liner
  – Additional cost $ per foot
  – Average $ 7,300
Improvements in Specs

• Air test to include testing both liner and connection seal

• How to reduce cost while maintaining quality?
  – Reduce length? What is the perfect length?
  – Measure groundwater table?
  – Attract more bidders?
Next Steps - Quality and Effectiveness Assurance

- CCTV and dye testing during rain events
- Flow monitoring of pre- and post- lining and roof redirection
QUESTIONS?

Blueprint Hotline
(614) 645-1253

Blueprintneighborhoods.com
blueprint@columbus.gov

Website
E-mail

@BlueprintCbus

Fang Cheng, PhD, PE
Project Manager
FACheng@columbus.gov

Leslie Westerfelt
Communications Coordinator
LRWesterfelt@columbus.gov