

Stacey's Brook Phase 1 Sewer Rehabilitation Project

A Phased Approach to Reduce Collection System Exfiltration
and Improve Surface Water Quality



Swampscott, MA

Introductions

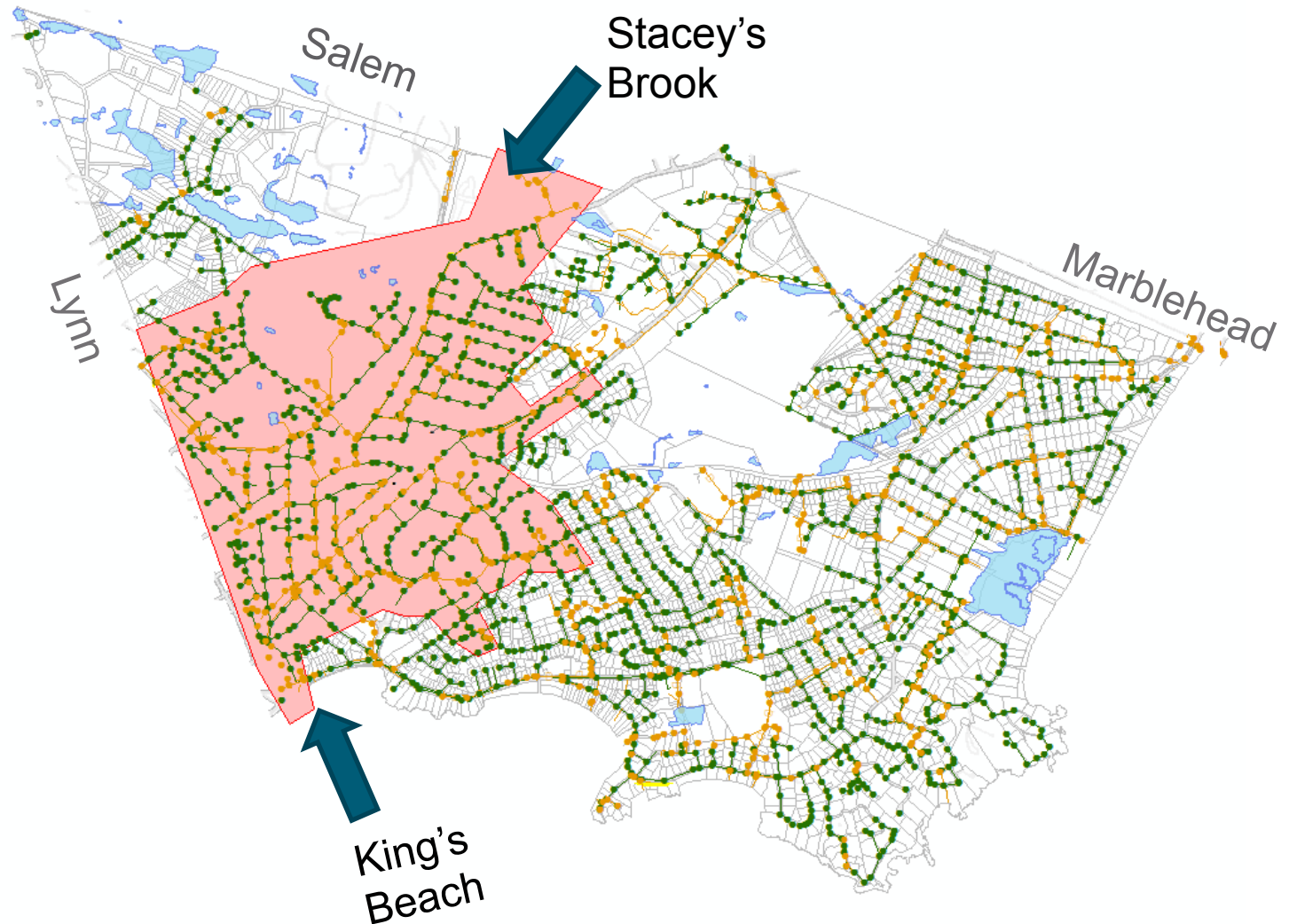
- Cecilia Carrion-Carmona – Project Manager
- Dan Scott, P.E. – Project Engineer

Project Location

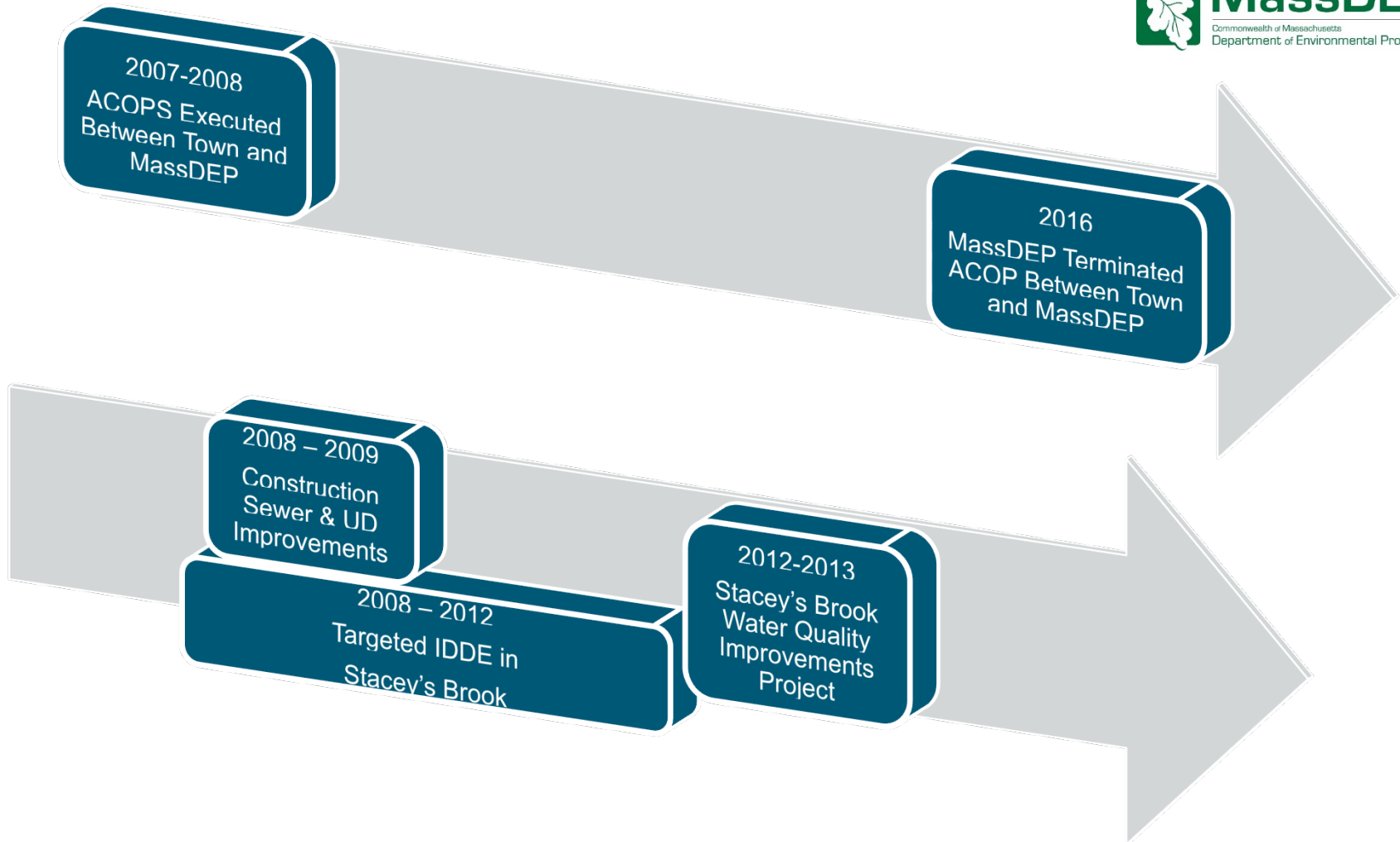
- Swampscott, MA – Coastal Community 12 Miles North of Boston
- Settled in 1829
- Population of 14,800
- Fun Fact - The Town Hall is the former home of Elihu Thomson who founded the Thomson-Houston Electric Company which is now General Electric.



Collection Systems Overview

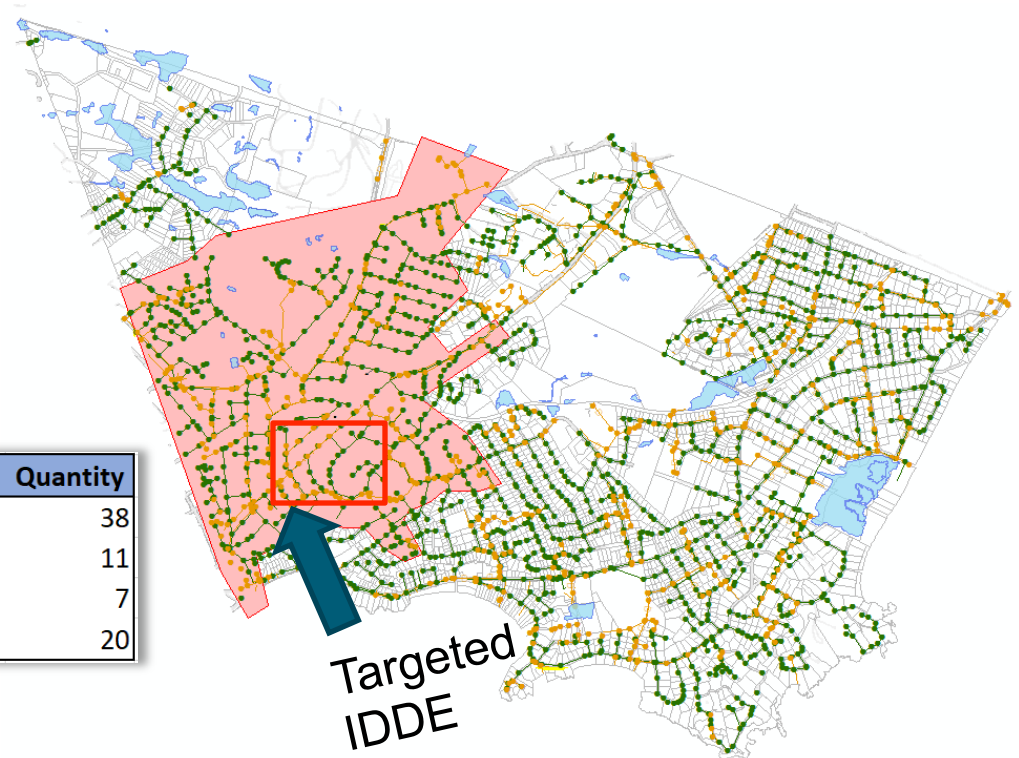


Administrative Consent Order with Penalty (ACOP) History



Targeted Investigations for Stacey's Brook Culvert Contamination (2008-2012)

Investigations identified indirect illicit connections between the sewer and drain on **Banks Road, Essex Ave and Columbia Street**



Activity	Unit	Quantity
House Inspections/Dye Tests	EA	38
Water Quality Grab Sampling	EA	11
CCTV - Mainlines	EA	7
CCTV - Laterals	EA	20

Rehabilitation Following Culvert Contamination Investigation Work

2008-2009 - Sewer and Underdrain Improvements

Activity	Unit	Quantity
Sewer Pipe Joint Tests	EA	2,450
Sewer Pipe Joint Seals	EA	528
Sectional Mainline CIPP	LF	20
8" PVC Sewer Mainline	LF	185
Service Lateral Grouting	EA	32
Sewer Manhole Cementitious Lining	EA	1

Total Construction Cost: \$388,000

2013 - Stacey's Brook Water Quality Improvements Project - Essex and Banks

Activity	Unit	Quantity
6"-10" CIPP	LF	1,487
Sewer Service Replacement Across Storm Drain	EA	15
Underdrain Pipe Repair	EA	1
Precast Manhole	EA	1

Total Construction Cost: \$143,000

Grand Total: \$531,000

Stacey's Brook Water Quality Improvements Project removed indirect illicit connections between the sewer and drain on **Banks Road, Essex Ave and Columbia Street**

EPA Consent Decree History



- King's Beach Outfall Contamination
- Receiving waters from of the **Stacey's Brook** drainage area
 - 2015 Issuance of C.D. for noncompliance with CWA
 - Testing at Outfall Performed Routinely
 - Kleinfelder Contracted to Perform Upstream IDDE



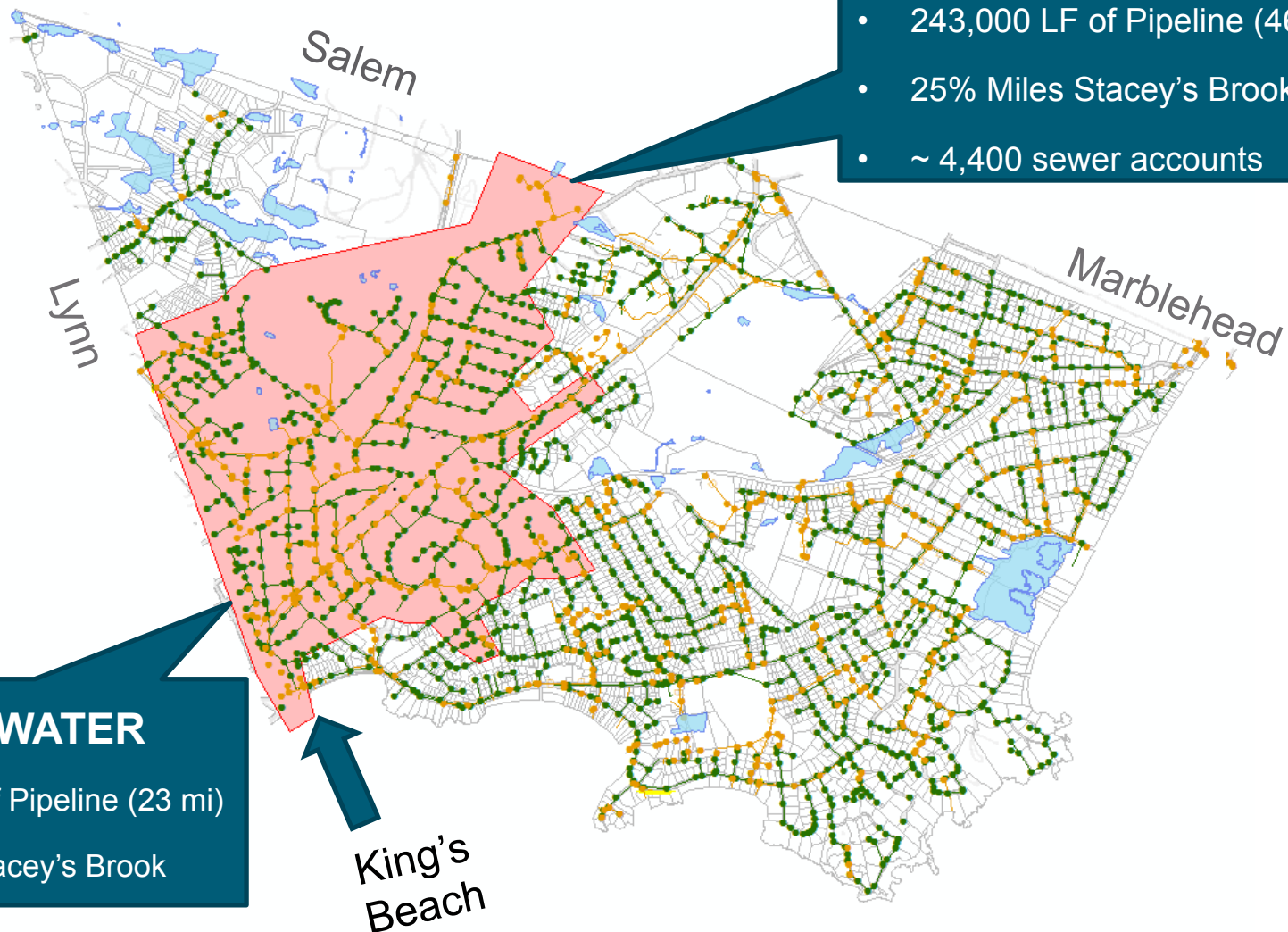
Stacey's Brook Collection Systems

WASTEWATER

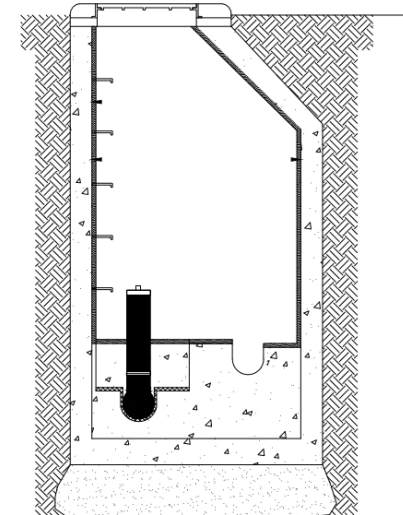
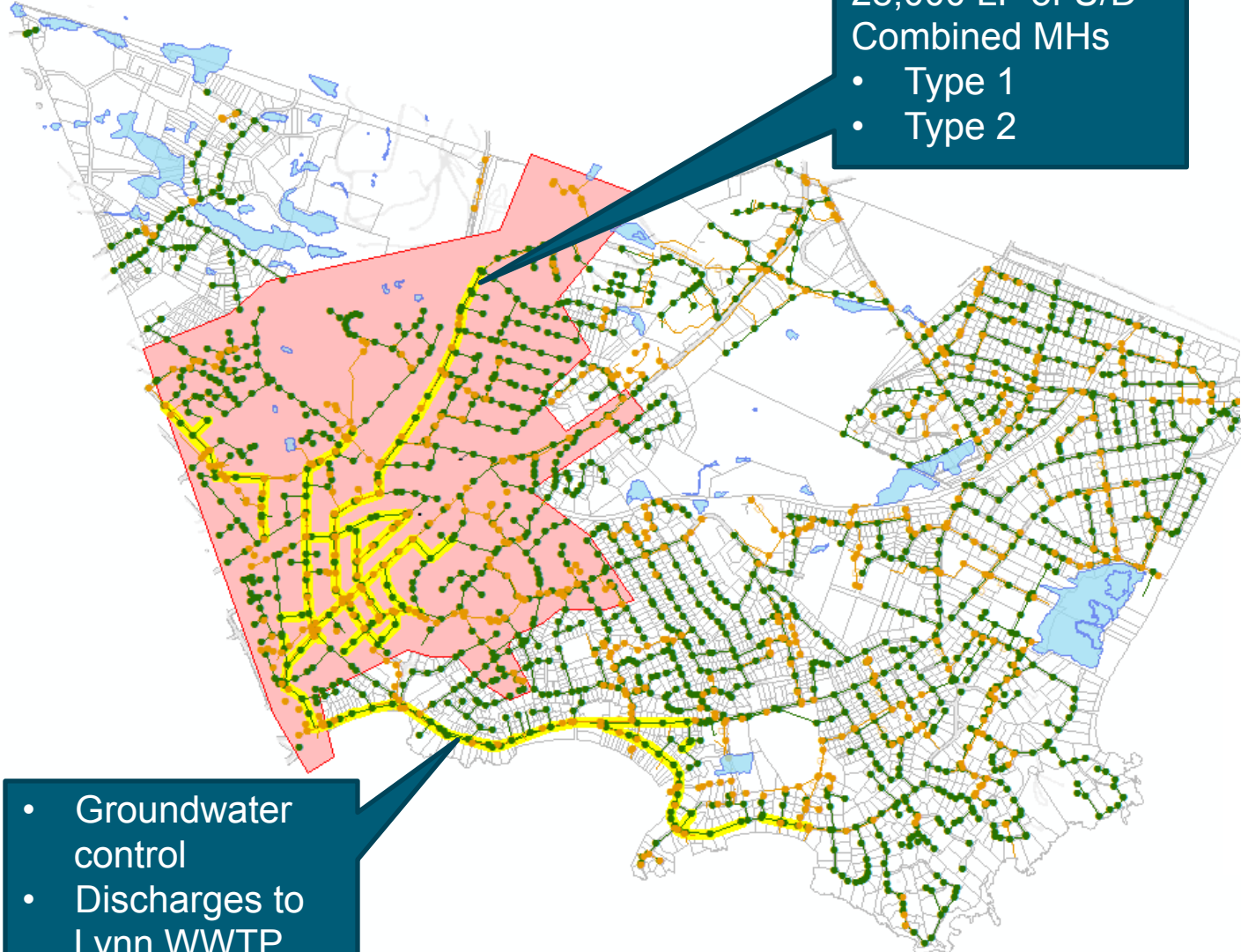
- 243,000 LF of Pipeline (46 mi)
- 25% Miles Stacey's Brook
- ~ 4,400 sewer accounts

STORMWATER

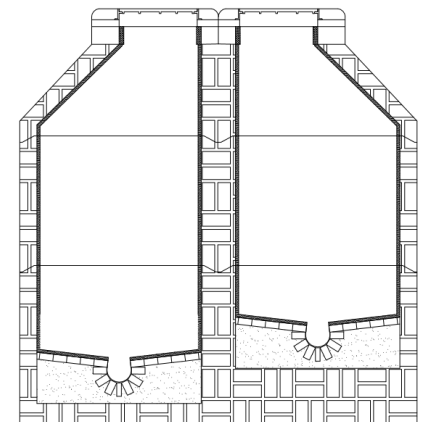
- 123,000 LF of Pipeline (23 mi)
- 27% Miles Stacey's Brook



Underdrain Overview



Type 1 U/D MH



Type 2 U/D MH

Comprehensive IDDE in Stacey's Brook (2015/2016)

Targeted
2008-2012
IDDE ➡

Activity	Unit	Quantity
House Inspections/Dye Tests	EA	38
Dry/Wet Weather Water Sampling	EA	11
Wastewater Mainline CCTV	EA	7
Wastewater Lateral CCTV	EA	20

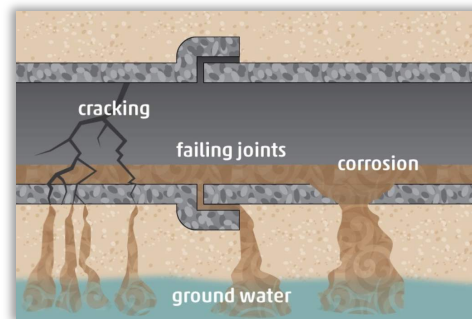
Comprehensive
2015-2016
IDDE ➡

Activity	Unit	Quantity
Underdrain Dye Testing	EA	11
Dry/Wet Weather Water Sampling	EA	58
Stormwater Smoke Testing	LF	28,000
Wastewater Mainline CCTV	LF	54,000
Wastewater Manhole Inspection	EA	279



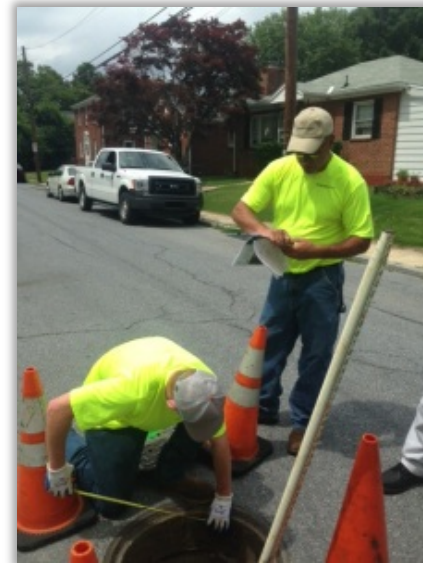
Hypothesis

- Wastewater is exfiltrating from the sewer infrastructure and entering the drainage system, underdrains and groundwater
- Instances where the wastewater collection system and the drainage system and underdrain overlap or are in close proximity are frequent in the Stacey's Brook area
- A sealed wastewater collection system eliminates does not exfiltrate
- CIPP rehabilitation of pipelines has the added benefits of extending the pipeline life by 50+ years and removing infiltration

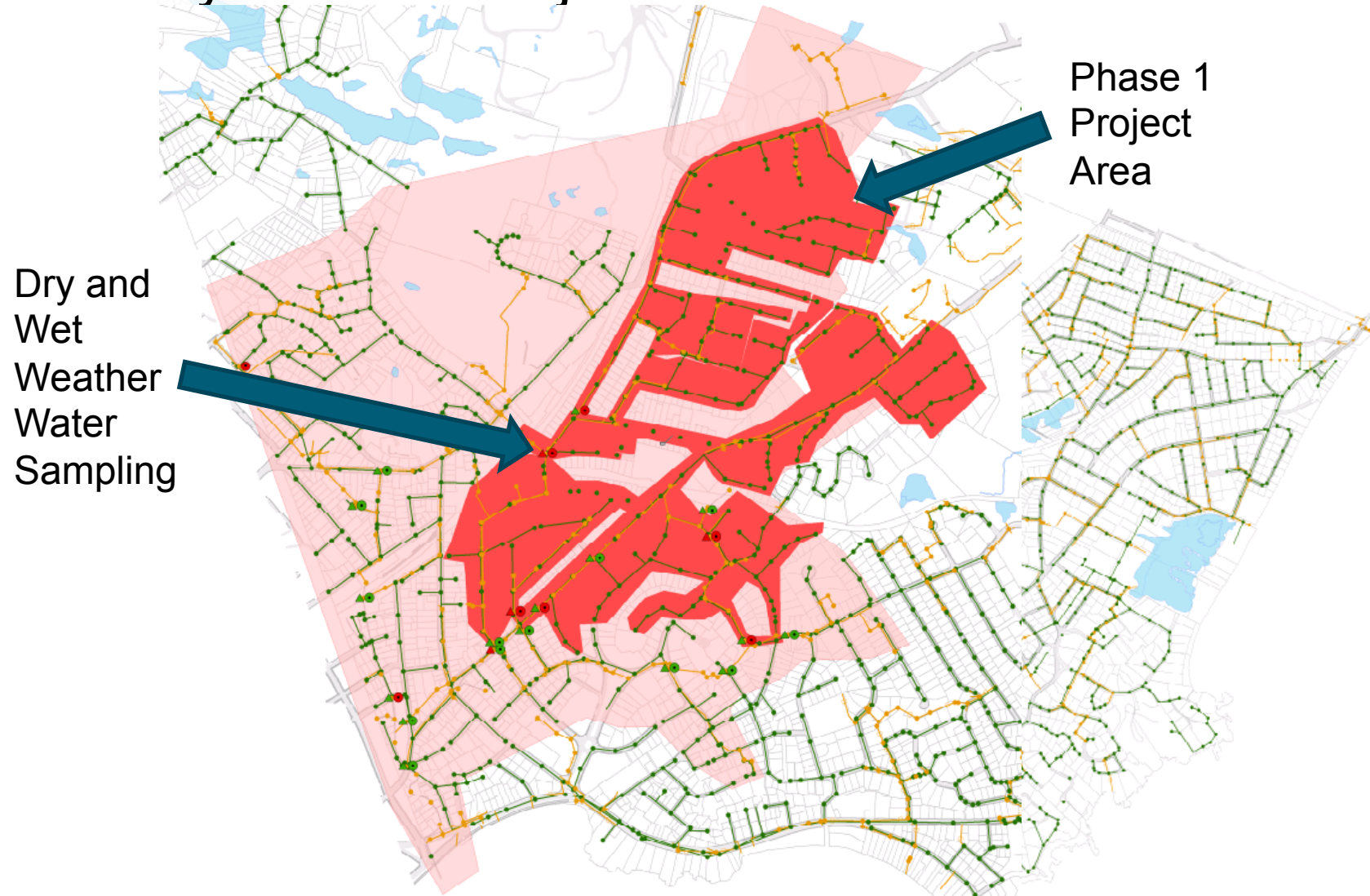


Stacey's Brook Wastewater System Assessment (2015/2016)

- CCTV PACP inspection of over 54,000 LF of pipeline and MACP inspection of 279 manholes in Stacey's Brook area
- Inspection work confirmed poor condition of sewer mainlines and informed the rehabilitation design



Stacey's Brook Project Area



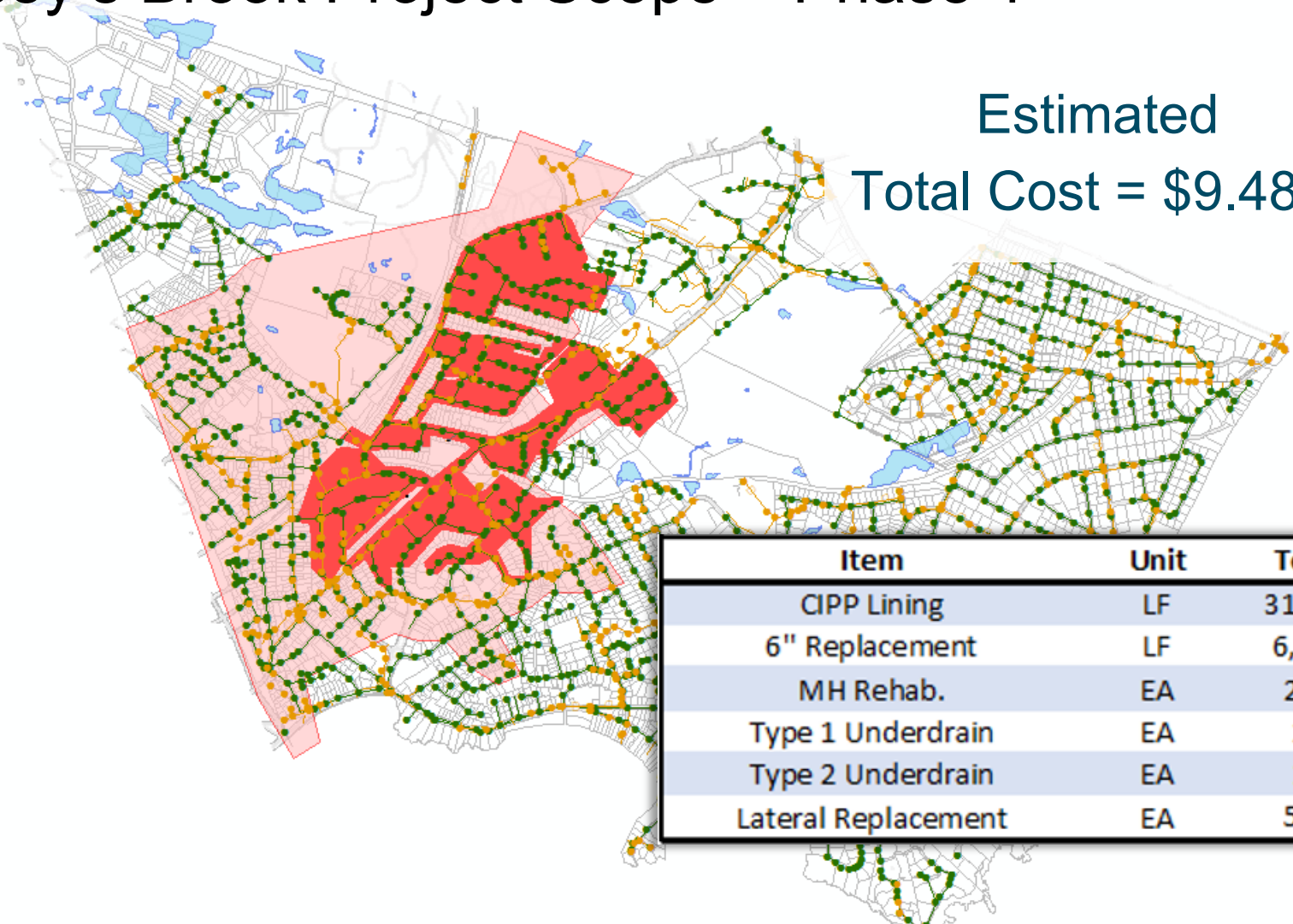
Eliminating Cross-Contamination in Stacey's Brook Watershed

- CIPP Sewer Mainlines
- Lining Manholes
- Replacing Laterals
- Capping Underdrains



Stacey's Brook Project Scope – Phase 1

Estimated
Total Cost = \$9.48 M



Item	Unit	Total
CIPP Lining	LF	31,900
6" Replacement	LF	6,150
MH Rehab.	EA	239
Type 1 Underdrain	EA	25
Type 2 Underdrain	EA	16
Lateral Replacement	EA	505

Stacey's Brook Phase 1 Approach



PHASE	Original Scope
1A	<ul style="list-style-type: none">• 6" Gravity Sewer Replacements (3,300 LF)• Sewer Service Lateral Replacements (130)
1B	<ul style="list-style-type: none">• 6" Gravity Sewer Replacements (2,100 LF)• Sewer Service Lateral Replacements (280)
1C	<ul style="list-style-type: none">• Sewer Service Lateral Replacements (210)• Cured-in-Place Pipelining (10,000 LF)• Spot Repairs (2)
1D	<ul style="list-style-type: none">• Cured-in-Place Pipelining (22,000 LF)• Spot Repairs (17)• MH Rehabilitation (260)• Underdrain Repairs (25)

EPA Feedback – After Phase 1A Bid Advertisement

- Preferred lateral rehabilitation beyond the Town's ROW
- Seals lateral to the home's foundation
- Lateral lining enables rehabilitation of lateral to foundation and minimizes disruption to private property



Scope Revision #1 – December 2016

Disciplined
Based Sub-
Phases

PHASE	Original Scope	Scope Revision 1
1A	<ul style="list-style-type: none"> 6" Gravity Sewer Replacements (3,300 LF) Sewer Service Lateral Replacements (130) 	<ul style="list-style-type: none"> 6" Gravity Sewer Replacements (5,600 LF) Type 1 Underdrain Manhole Repairs
1B	<ul style="list-style-type: none"> 6" Gravity Sewer Replacements (2,100 LF) Sewer Service Lateral Replacements (280) 	<ul style="list-style-type: none"> Cured-in-Place Pipelining (32,000 LF) Spot Repairs (19)
1C	<ul style="list-style-type: none"> Sewer Service Lateral Replacements (210) Cured-in-Place Pipelining (10,000 LF) Spot Repairs (2) 	<ul style="list-style-type: none"> Sewer Service Lateral Lining (270)
1D	<ul style="list-style-type: none"> Cured-in-Place Pipelining (22,000 LF) Spot Repairs (17) MH Rehabilitation (260) Underdrain Repairs (25) 	<ul style="list-style-type: none"> Sewer Service Lateral Lining (235) Remaining Manhole Rehabilitation



Lateral Lining
Incorporated
1C/1D

Nimble Design – GIS Based



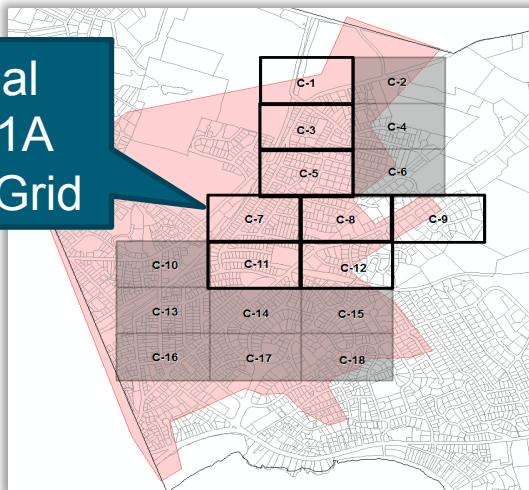
From:

- Replace 6" VC (3,300 LF) + Service Lateral Replacement (130)

To:

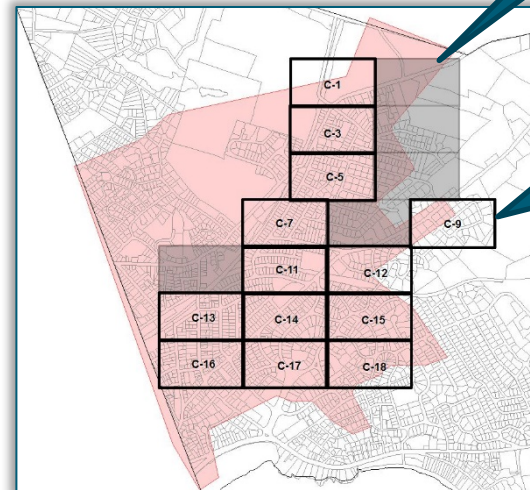
- Replace 6" VC (5,600 LF) + Type 1 Underdrain Manholes

Original
Phase1A
Project Grid



Fixed
Dynamic
View Ports

Revised
Phase1A
Project Grid



Nimble Design – Reassigning Phases

FacilityID	Material	Diameter	Street	Length	PHASE
			BANKS RD	148.999777	2
			BANKS RD	47.000266	2
			NORFOLK AVE	199.489647	2
			SUFFOLK AVE	159.066494	1
			BANKS TE	172.510286	2
			BANKS TE	156.53829	2

Layer Properties

General Source Selection Display Symbology Fields Definition Query

Definition Query:

sGravityMains.CCTV = 'Phase 1' |

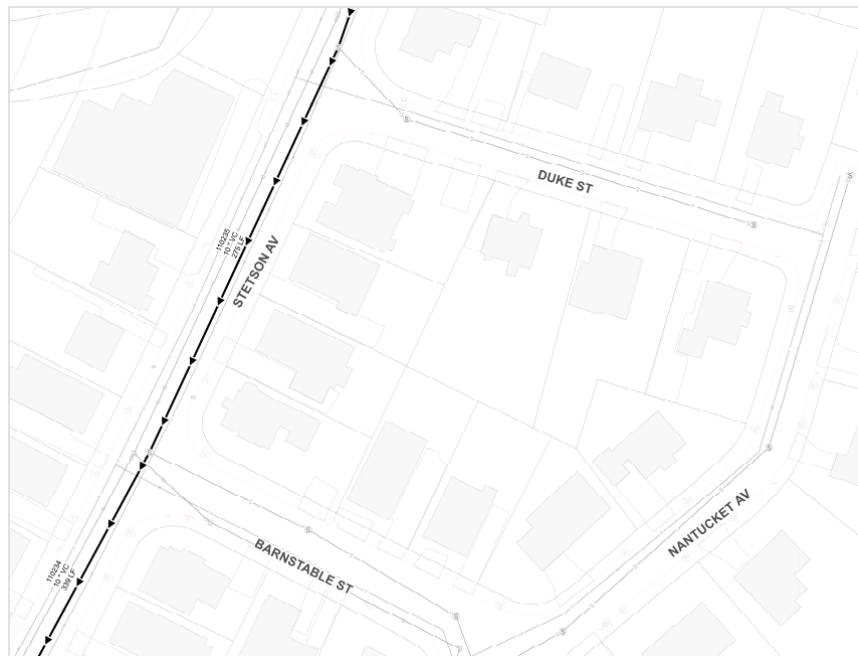
Query Builder...

Using GIS asset attributes to assign phases

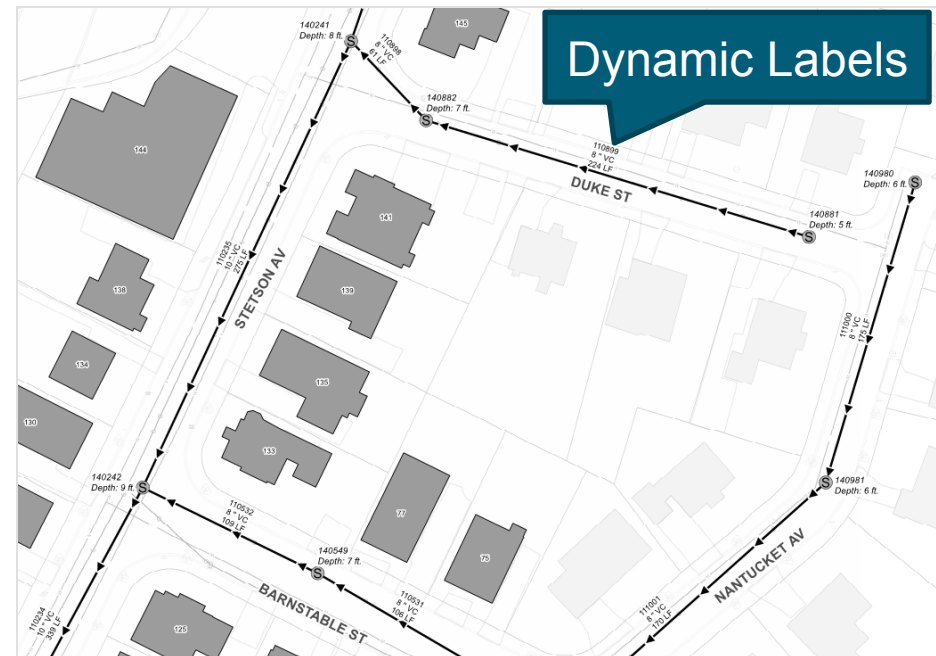
Nimble Design - GIS Based



Existing Drawing



Updated Drawing




Changes would have to be manually performed in CAD

Phase 1A Construction Overview

- Construction cost of \$908K
- Installation of 5,900 LF of 8" PVC, 2 manholes and repair of 25 underdrain manholes
- Completed over \$14k underbudget despite the removal of **590 CY of ledge**
- Town reporting lower I/I



Remaining Sub-phases

PHASE	Original Scope	Scope Revision 1
1A	<ul style="list-style-type: none"> • 6" Gravity Sewer Replacements (3,300 LF) • Sewer Service Lateral Replacements (130) 	<ul style="list-style-type: none"> • 6" Gravity Sewer Replacements (5,600 LF) • Type 1 Underdrain Manhole Repairs
1B	<ul style="list-style-type: none"> • 6" Gravity Sewer Replacements (2,100 LF) • Sewer Service Lateral Replacements (280) 	
1C	<ul style="list-style-type: none"> • Sewer Service Lateral Replacements (210) • Cured-in-Place Pipelining (10,000 LF) • Spot Repairs (2) 	
1D	<ul style="list-style-type: none"> • Cured-in-Place Pipelining (22,000 LF) • Spot Repairs (17) • MH Rehabilitation (260) • Underdrain Repairs (25) 	

Scope Revision #2 – Winter 2018

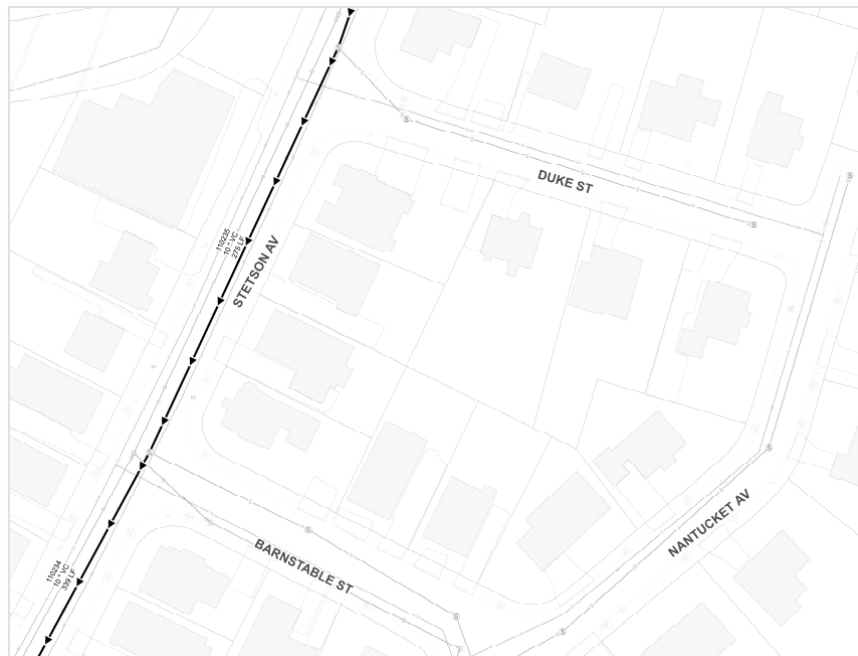
PHASE	Original Scope	Scope Revision 1	Scope Revision 2
1A	<ul style="list-style-type: none"> • 6" Gravity Sewer Replacements (3,300 LF) • Sewer Service Lateral Replacements (130) 	<ul style="list-style-type: none"> • 6" Gravity Sewer Replacements (5,600 LF) • Type 1 Underdrain Manhole Repairs 	N/A
1B	<ul style="list-style-type: none"> • 6" Gravity Sewer Replacements (2,100 LF) • Sewer Service Lateral Replacements (280) 	<ul style="list-style-type: none"> • Cured-in-Place Pipelining (32,000 LF) • Spot Repairs (19) 	<ul style="list-style-type: none"> • Cured-in-Place Pipelining (11,000 LF) • Spot Repairs (7) • Sewer Service Lateral Lining (170) • Type 1 Underdrain Manhole Repairs
1C	<ul style="list-style-type: none"> • Sewer Service Lateral Replacements (210) • Cured-in-Place Pipelining (10,000 LF) • Spot Repairs (2) 	<ul style="list-style-type: none"> • Sewer Service Lateral Lining (270) 	<ul style="list-style-type: none"> • Cured-in-Place Pipelining (11,000 LF) • Spot Repairs (6) • Sewer Service Lateral Lining (170)
1D	<ul style="list-style-type: none"> • Cured-in-Place Pipelining (22,000 LF) • Spot Repairs (17) • MH Rehabilitation (260) • Underdrain Repairs (25) 	<ul style="list-style-type: none"> • Sewer Service Lateral Lining (235) • Remaining Manhole Rehabilitation 	<ul style="list-style-type: none"> • Cured-in-Place Pipelining (10,000 LF) • Spot Repairs (6) • Sewer Service Lateral Lining (165)



Nimble Design - GIS Based



Phase 1B – Rev 1



Phase 1B – Rev 2



Phase 1B Current Status

Award of Contract

AUGUST 2018

Preconstruction Meeting

SEPTEMBER 2018

Start Construction

FALL 2018

Substantial Completion

WINTER/SPRING 2018

Scheduling

- Phase 1B construction between Fall 2018 - Spring 2019
- Phase 1C is scheduled to be designed and constructed in 2019-2020
- Phase 1D is scheduled to be designed and constructed in 2020-2021
- Water quality testing will be performed at the end of each sub-phase to evaluate effectiveness of rehabilitation
- The results will drive the need and/or scope of future phases of work



Questions?



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