TOWN OF MONTAGUE

TURNERS FALLS MAIN DRAIN AND SIPHON REHABILITATION

Ryan Graham, EIT
Jonathan Kunay, PE, LEED®AP

January 22nd, 2018

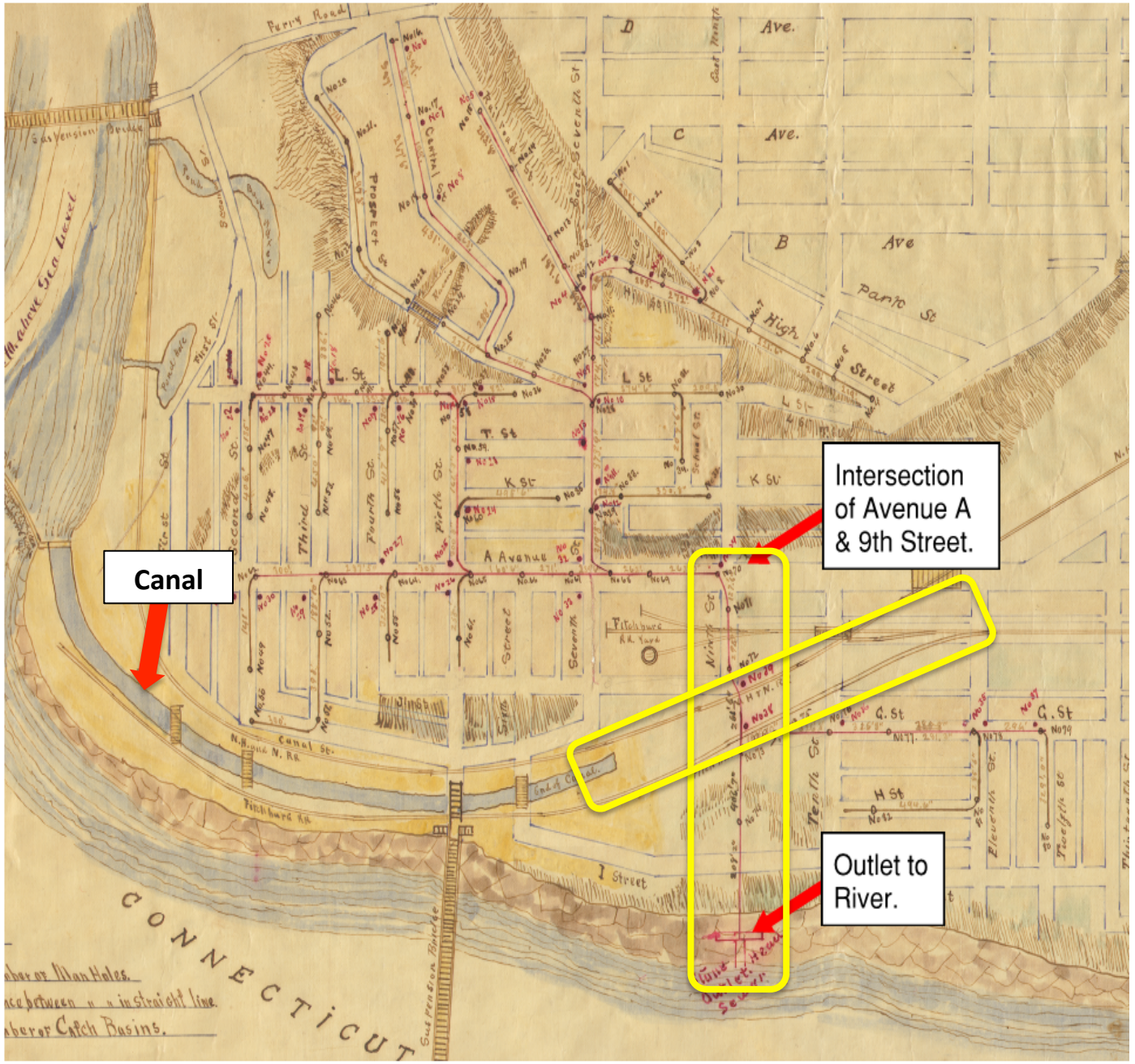
CDM Smith

NEWEA – 2018 Annual Conference & Exhibit

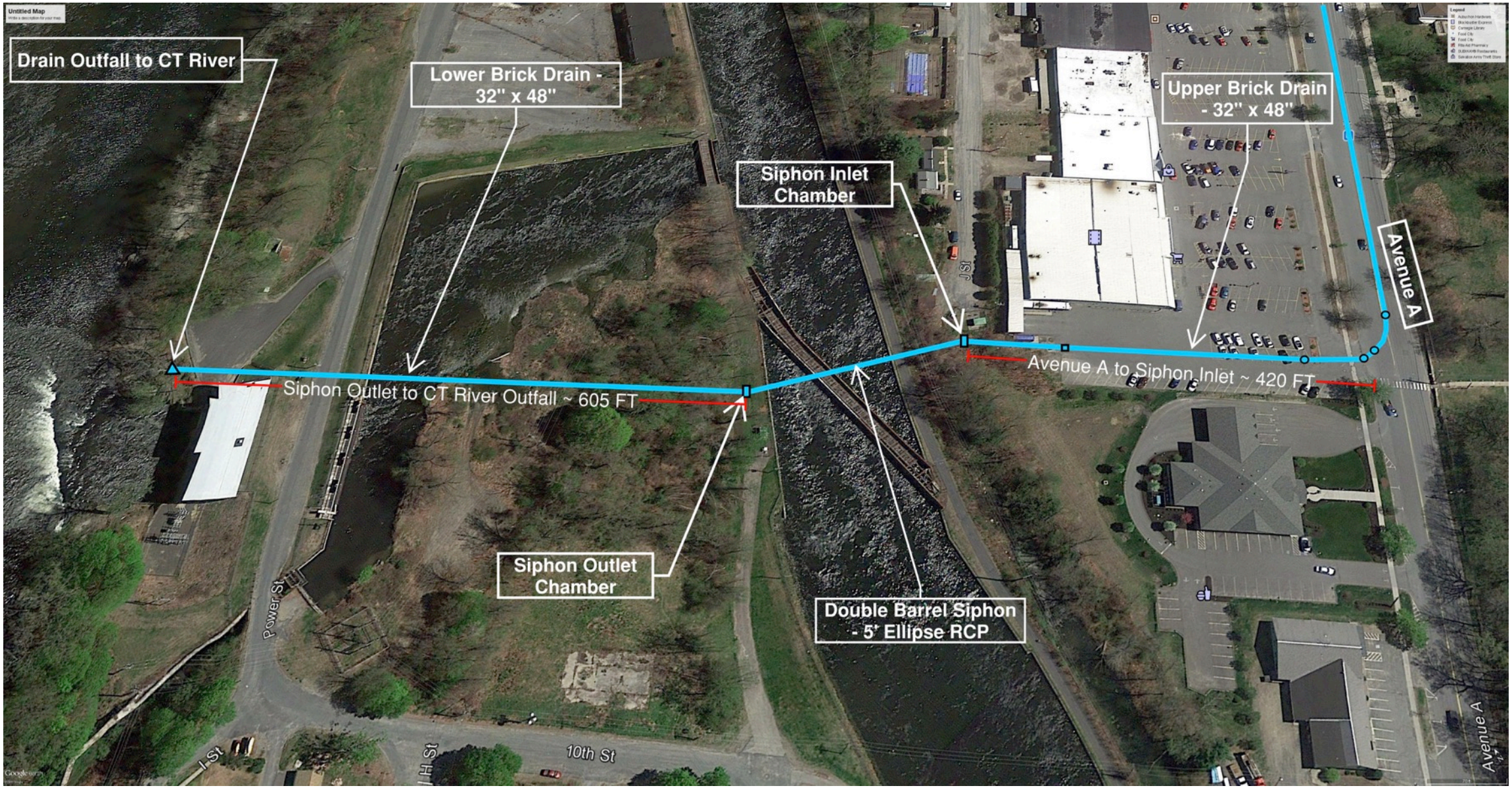
NEWEA
WORKING FOR WATER QUALITY

Background

- Town of Montague was a booming and industrious “Mill Town” in the 1800’s.
- Canal used for industries, such as papermills.
- Collection system built c. 1886.
- All flows conveyed to CT River via “Main Drain” (Avenue A to River Outlet).
- Canal expanded in 1914 – Installed Double Barrel Siphon, Spur Canal, & Power Station.



Main Drain – Imminent Failure of Lower Drain Beneath Spur Canal!



CDM Smith

Project Goals – Tasks

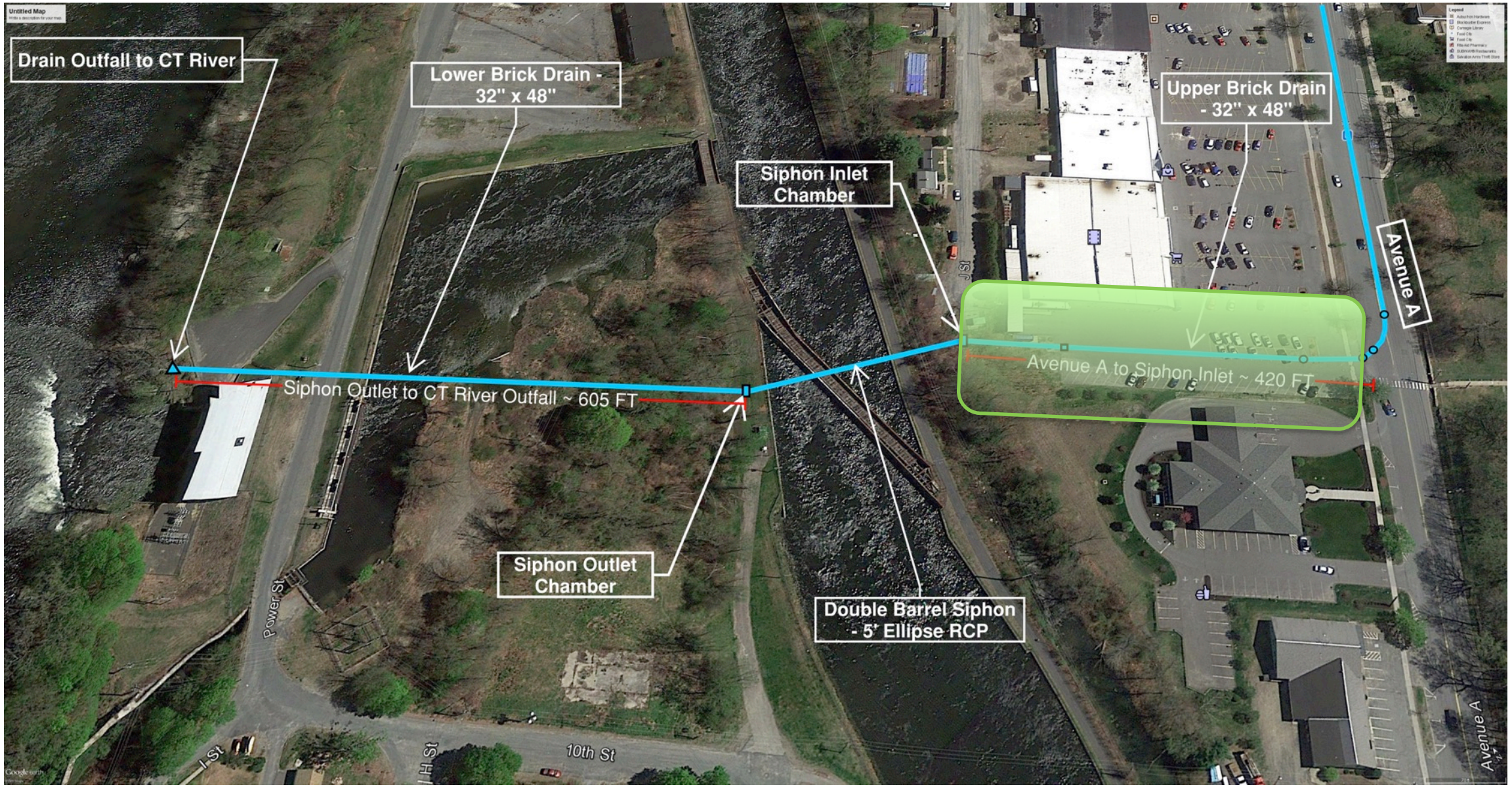
1. Rehabilitate the Upper Drain from Avenue A to the Siphon Inlet Chamber.

2. Clean the two Siphon Barrels and install stop logs to divert flow through one barrel.

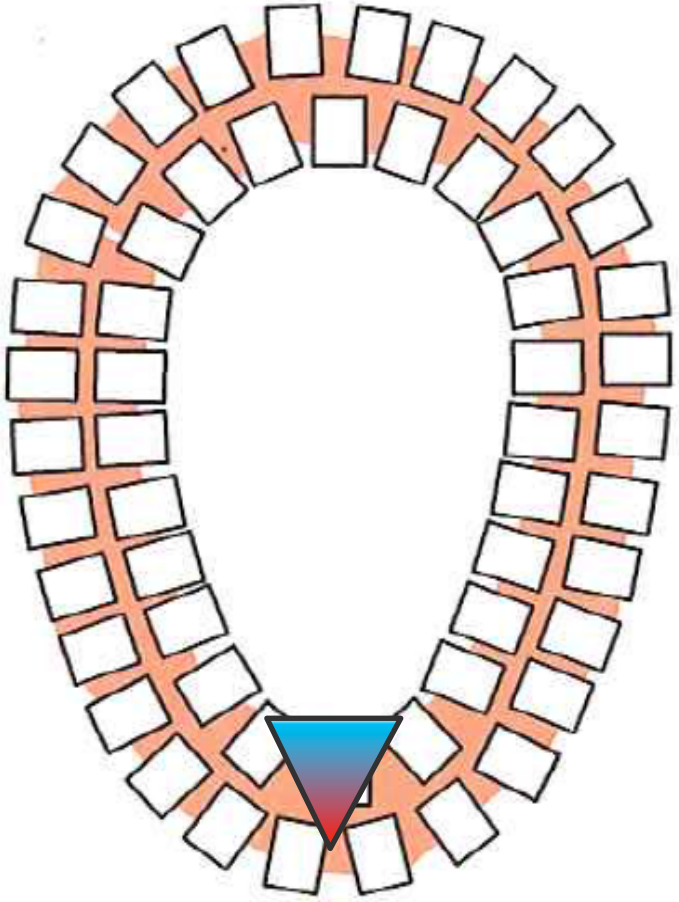
3. Install a custom Cured-In-Place-Pipe (CIPP) Liner inside the Lower Drain from the Siphon Outlet Chamber to the River Outfall.

Task 1 – Upper Drain Rehabilitation

Task 1 – Upper Drain Rehabilitation (Avenue A to Siphon Inlet Chamber)



Cross Sectional View of Original 48”x32” Egg-Shaped Double Brick Wall Main Drain



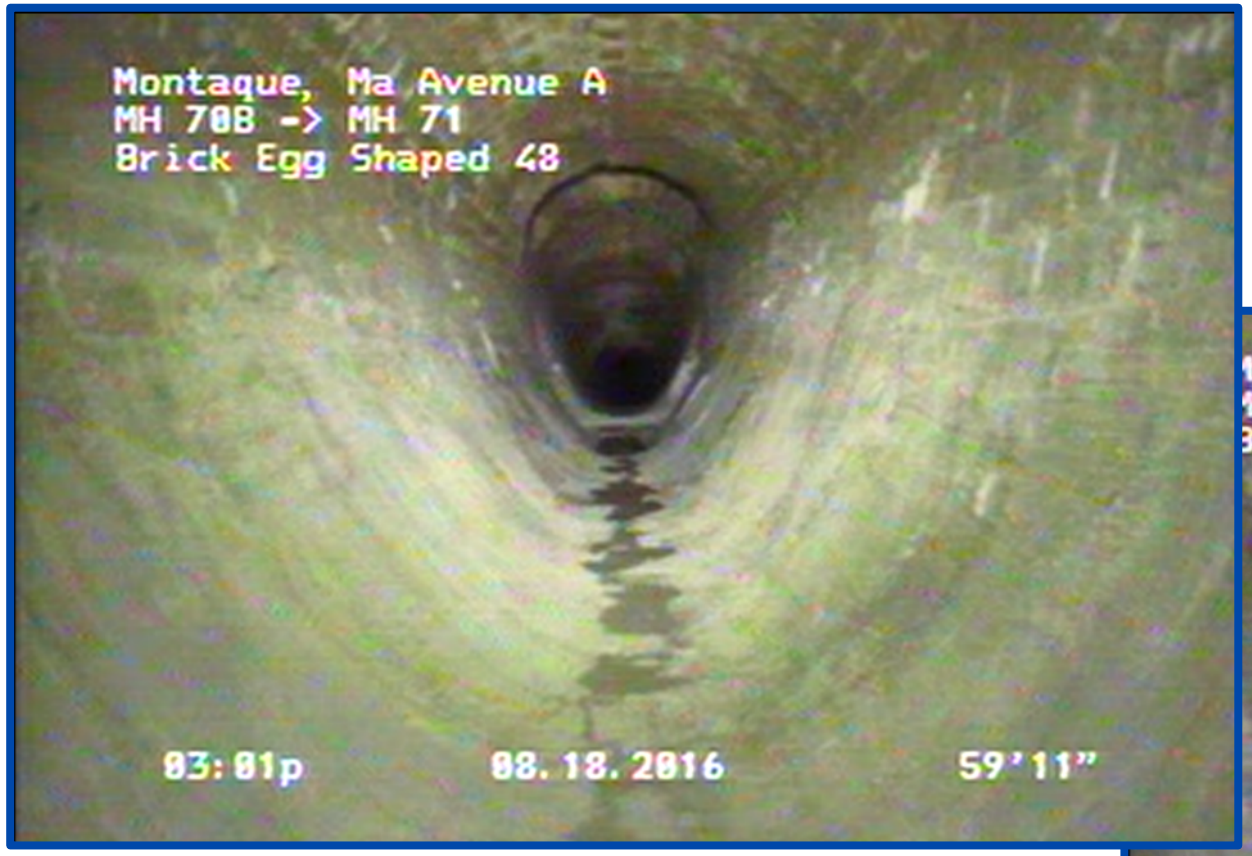
Upper Drain Invert Deterioration

Bypass Setup – Avenue A to Canal

Abrasion Resistant Cementitious Flowable Fill

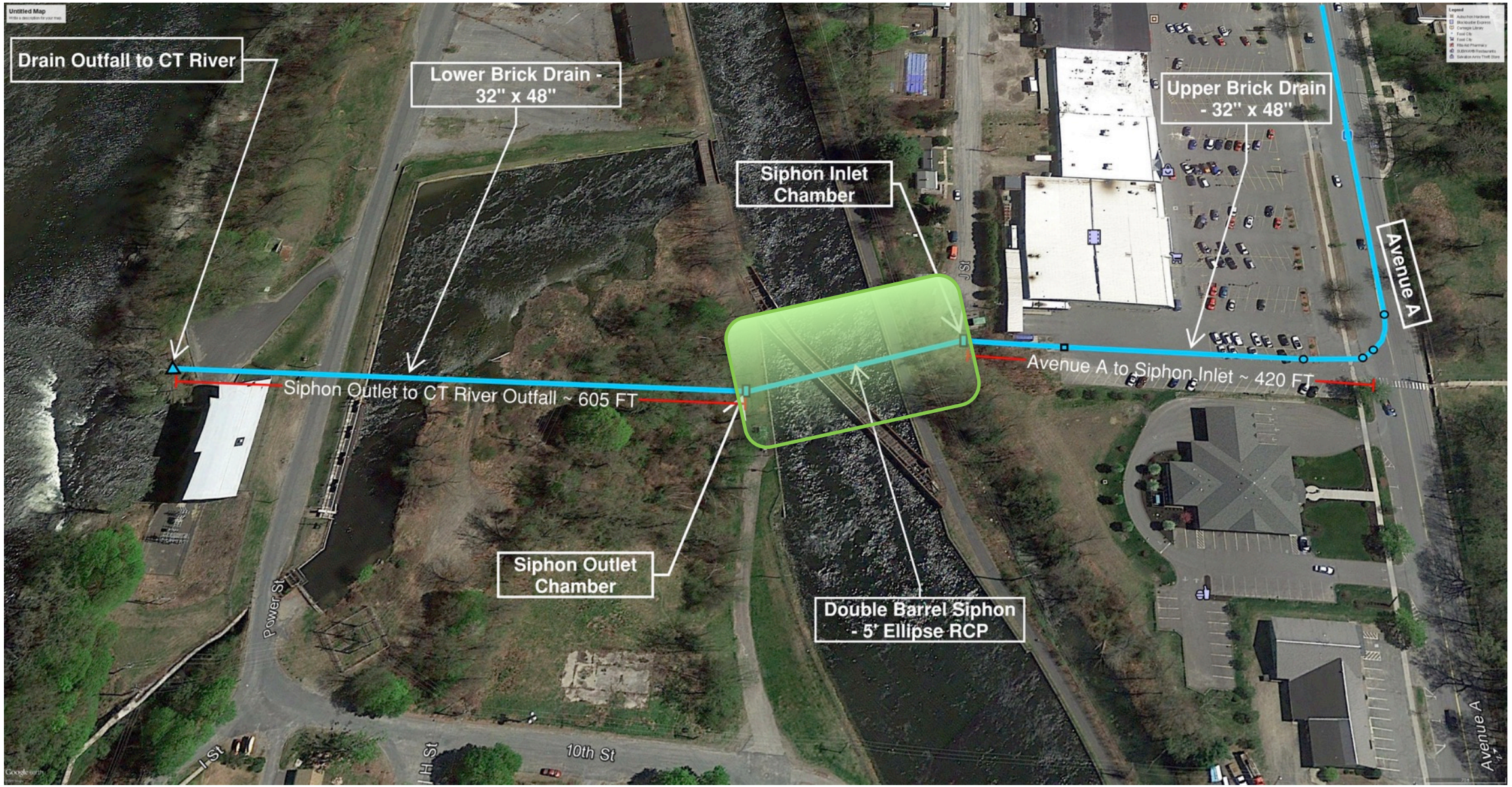
Application of Abrasion Resistant Cementitious Flowable Fill

Completed Rehabilitation of Upper Drain – Invert Strengthened and Restored to Original Shape

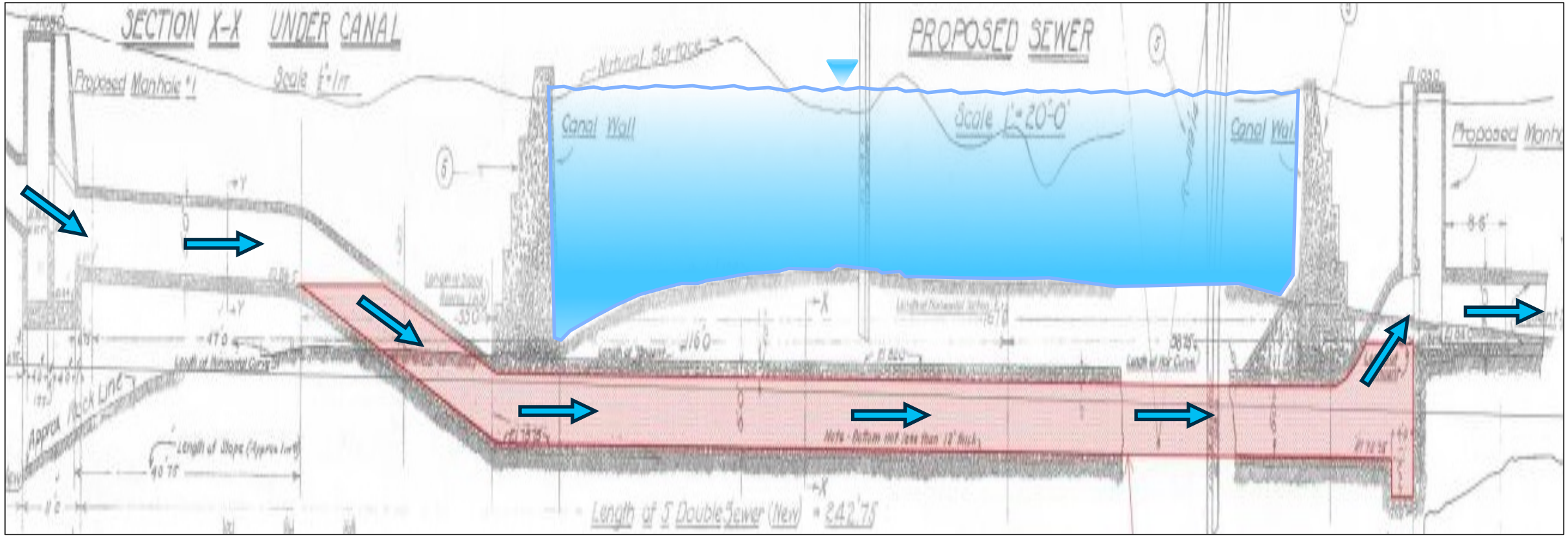


Task 2 – Siphon Cleaning

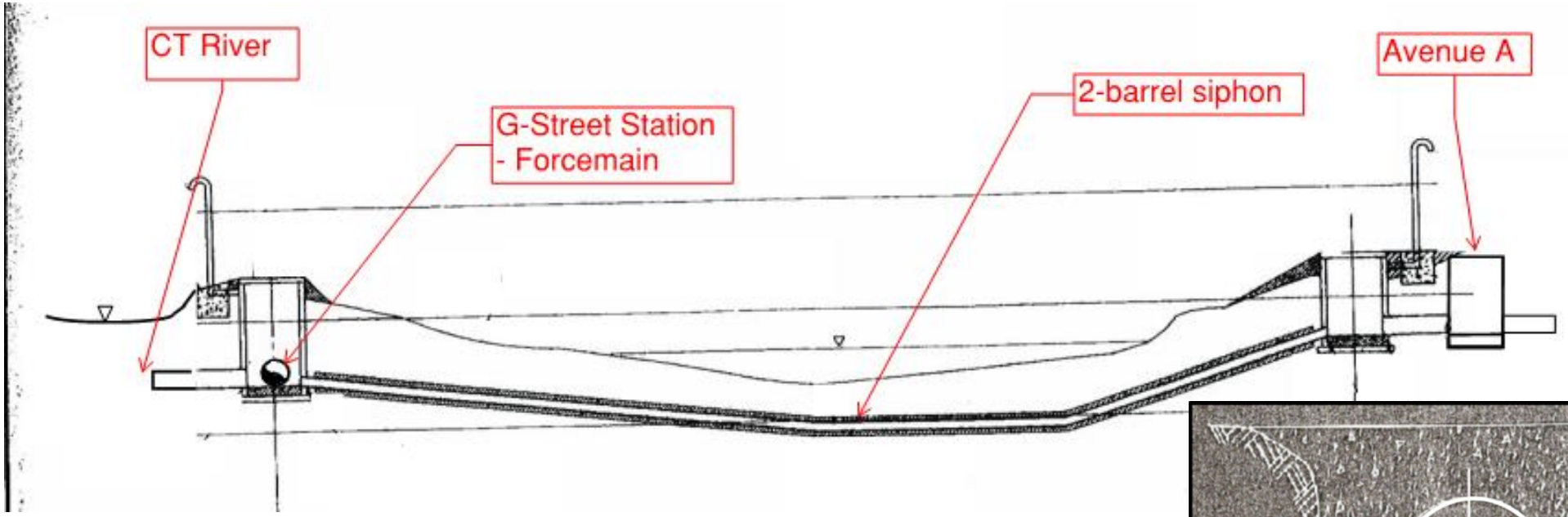
Task 2 – Siphon Cleaning of Both Siphon Barrels

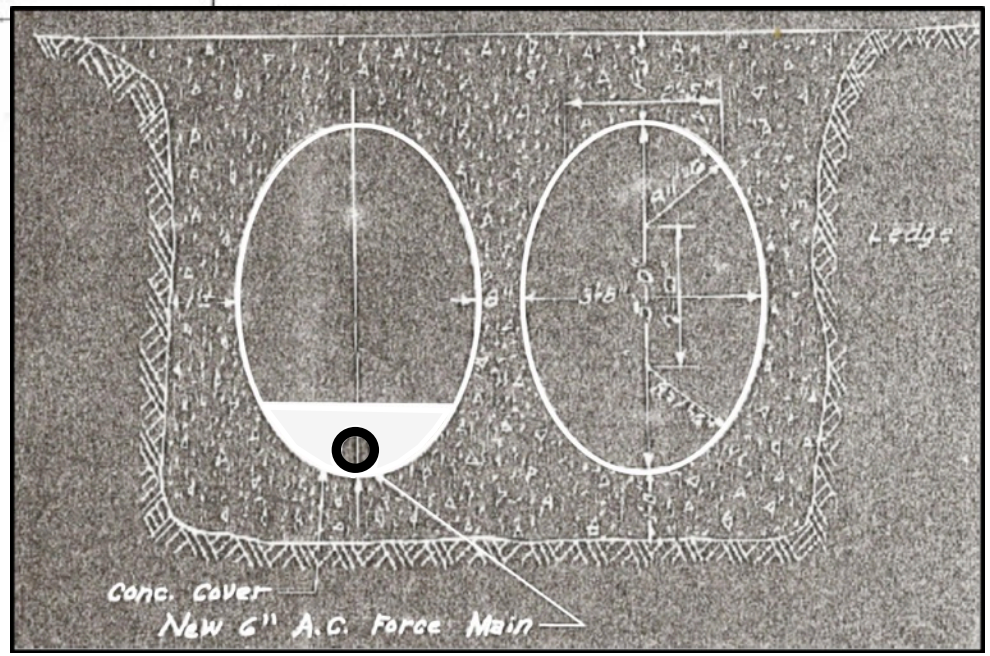


Profile of Double Barrel Siphon – Extent of Debris



G-Street Force Main

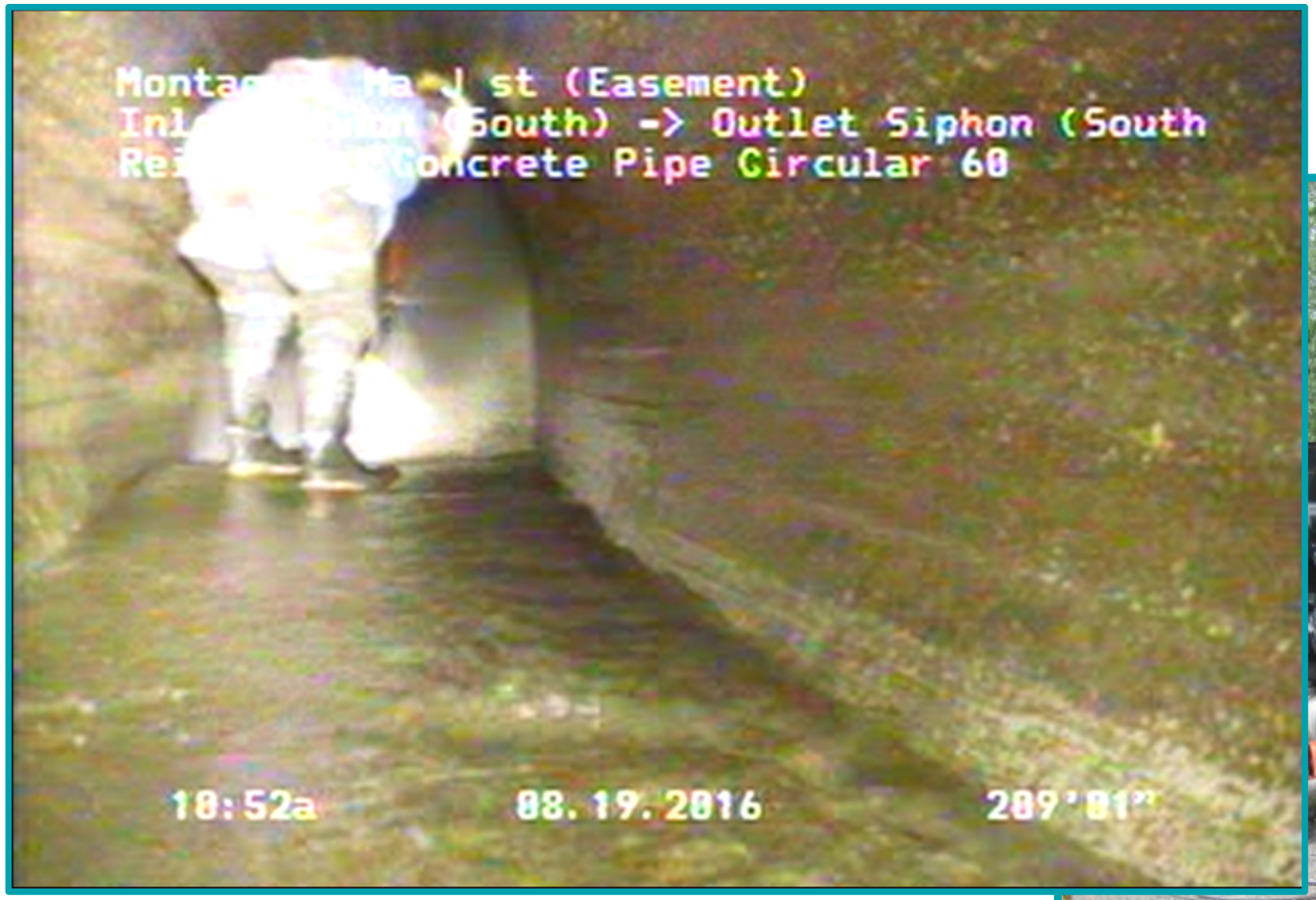




Topside View of Siphon Under Canal

Siphon Inlet Chamber – Temporary Stop Logs at South Barrel to Divert Flow to North Barrel

Siphon Cleaning Process



Siphon Cleaning – Extent of Debris Removed (~ 83 Cubic Yards)

Siphon Barrel – Cleaned

South Barrel Condition

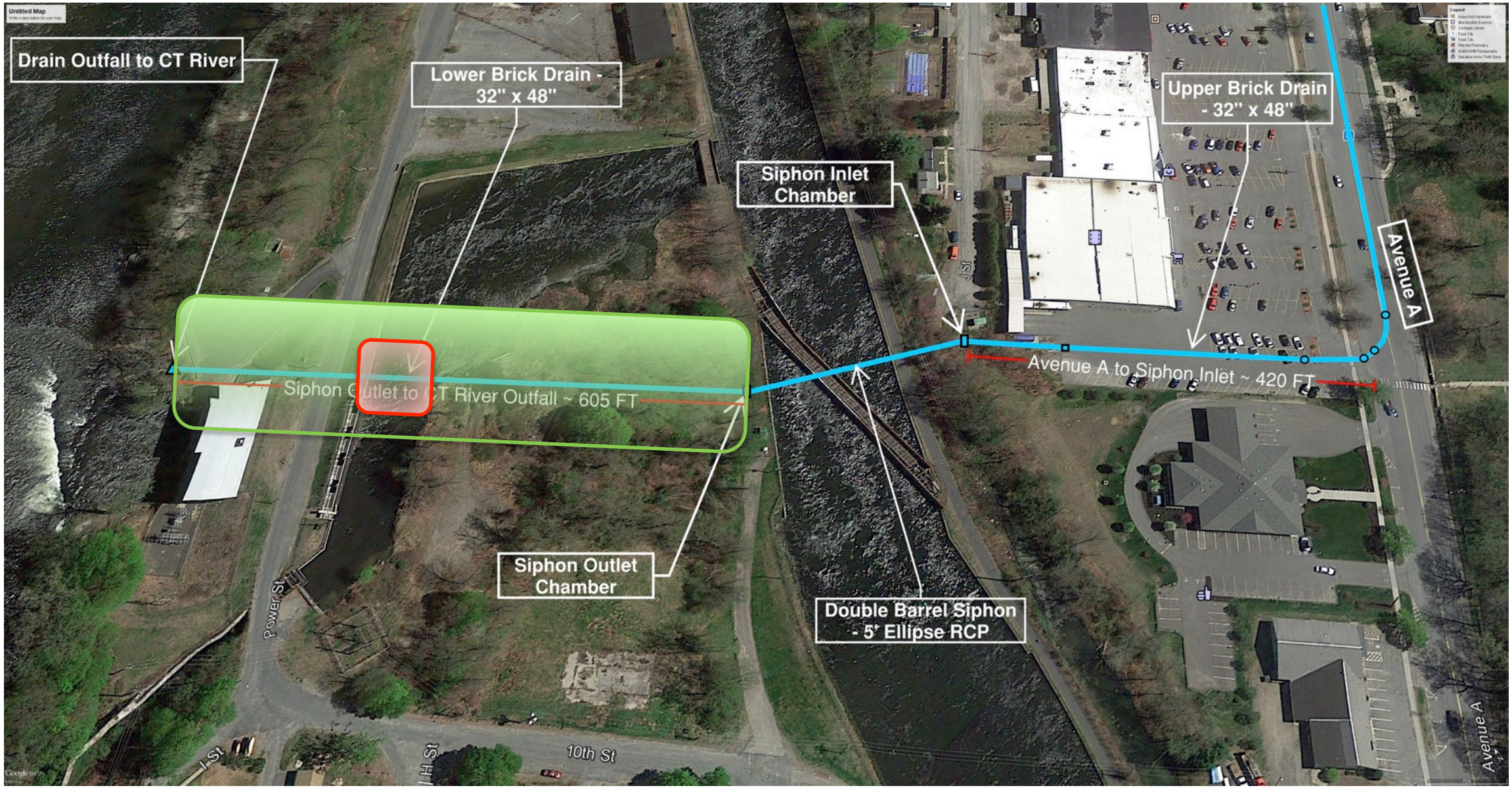
- 60 foot longitudinal crack from cold/construction joints discovered in South Barrel.
- Significant running/gushing infiltration via crack.
- Concrete encasement for 6” AC force main from G-St Pumping Station considerably eroded.

South Barrel Rehabilitation

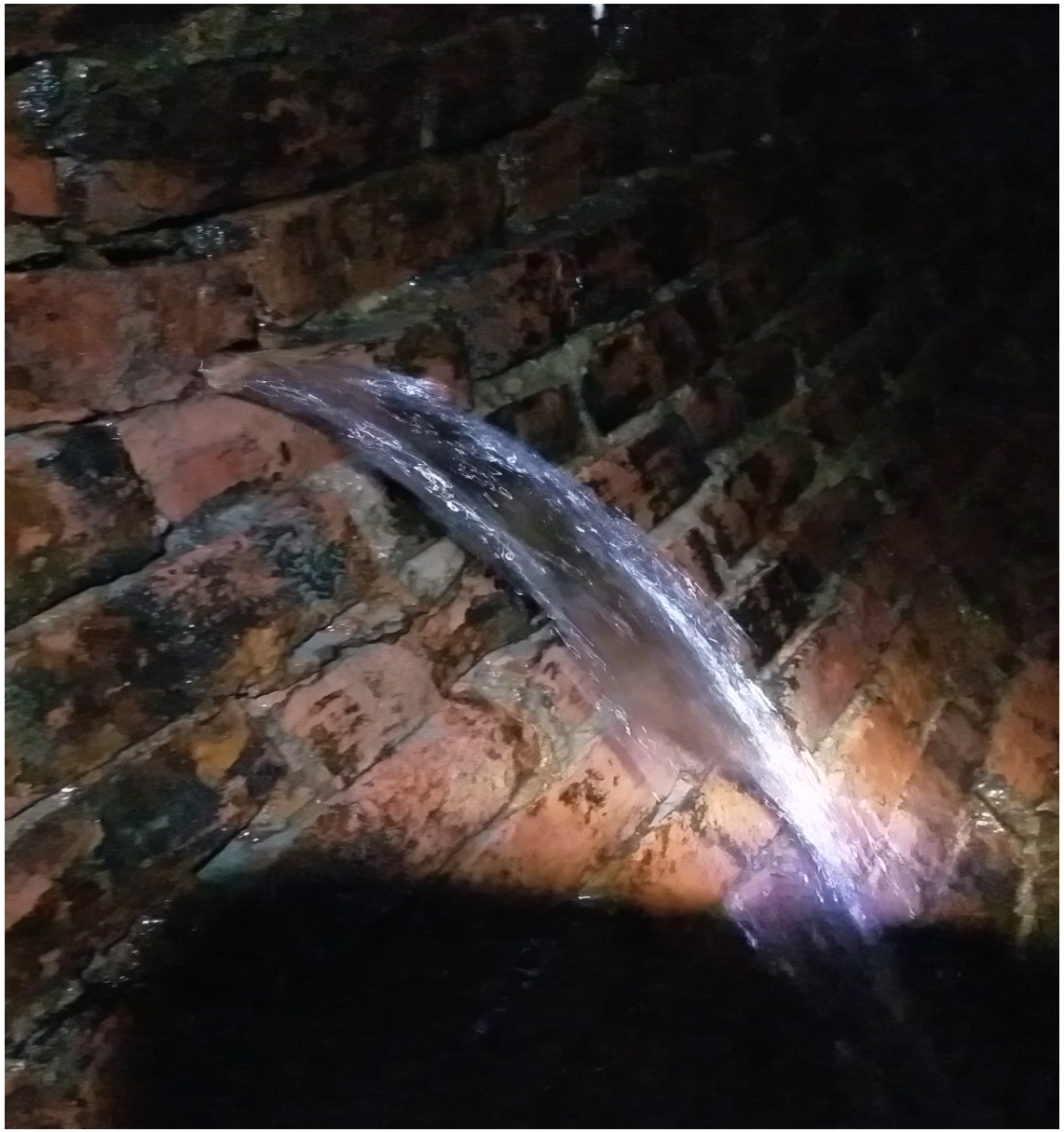
- Dual component time sensitive chemical grout.
- Chemical grout injected via nozzle through drilled holes.
- Hydrophilic concrete patching material hand applied.
- G-Street concrete encasement strengthened with abrasion resistant cementitious flowable fill.

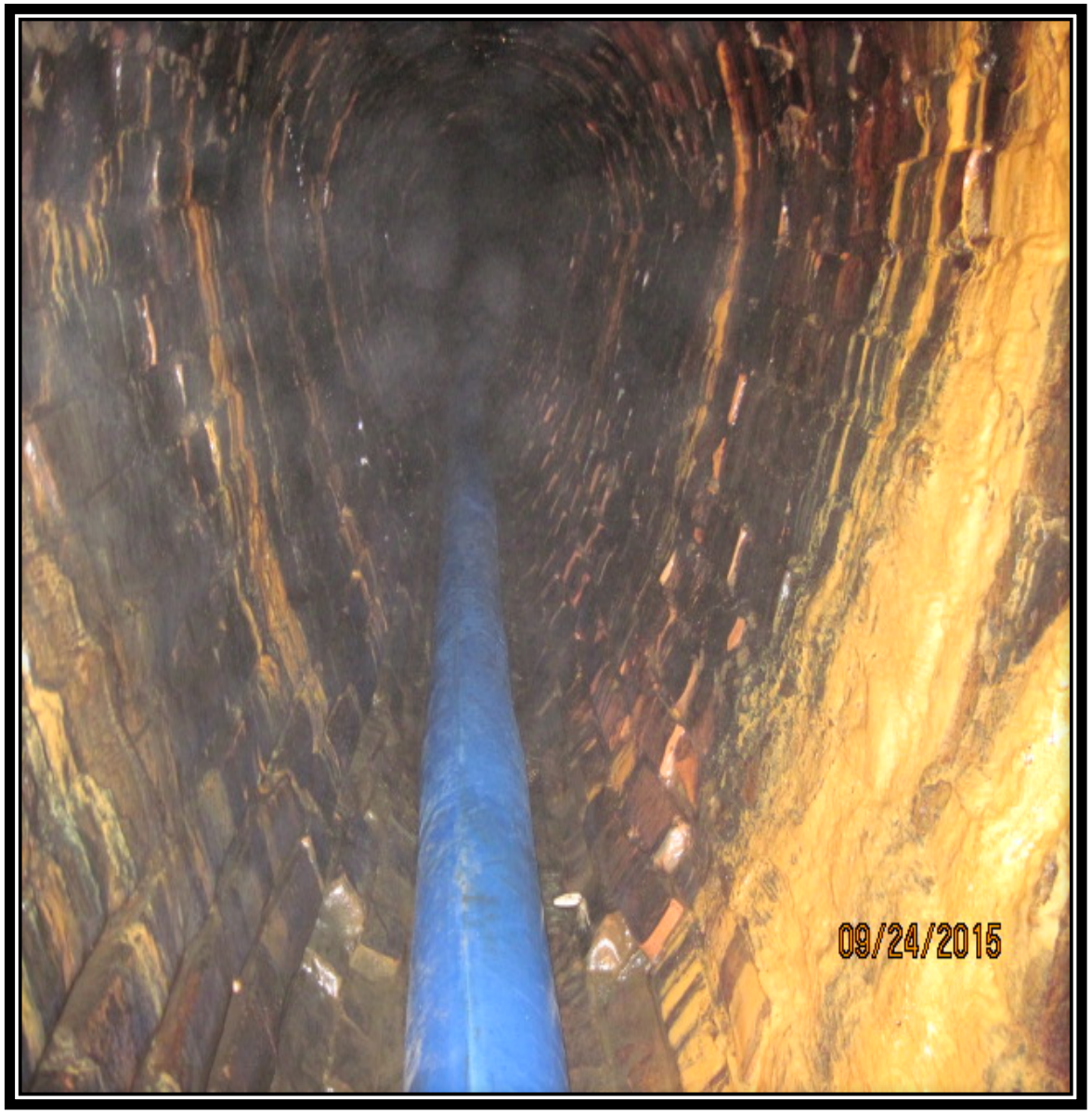
Task 3 – Lower Drain Rehabilitation

Task 3 – Rehabilitation of Lower Drain – Canal Drained and Taken Offline.



Lower Drain – Pre-Rehabilitation Condition





Pipeline Preparation for Custom CIPP Liner

- Bypass system setup.
- Large mineral deposits removed by hand via chisel and hammer.
- Running & gushing infiltration stopped via chemical grout injection.

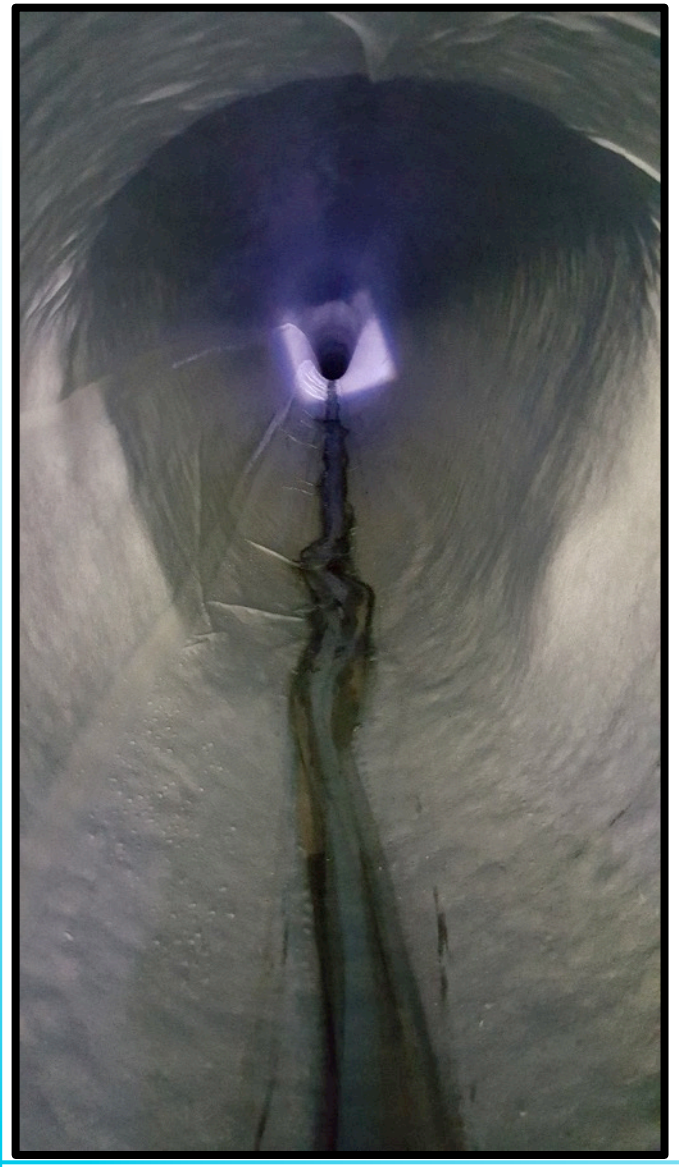
Heavy Infiltration Stopped via Chemical Grouting

Installation of Pre-Liner, End Seals, and Temperature Sensors

Custom CIPP Liner Installation

Custom CIPP Liner Curing

Cured/Completed Liner – Siphon Outlet Chamber to River Outfall



Modification of CIPP Liner – Transition of Siphon Outlet Chamber to Lower Drain

Turners Falls – Main Drain Rehabilitation and Siphon Cleaning - Summary

- Project successfully completed.
- Completed before scheduled refill of canal.
- Came in below $ 1M budget.

Contact us!

Water Partnership with CDM Smith

Ryan Graham, EIT

CDM Smith

860-808-2306

grahamrj@cdmsmith.com

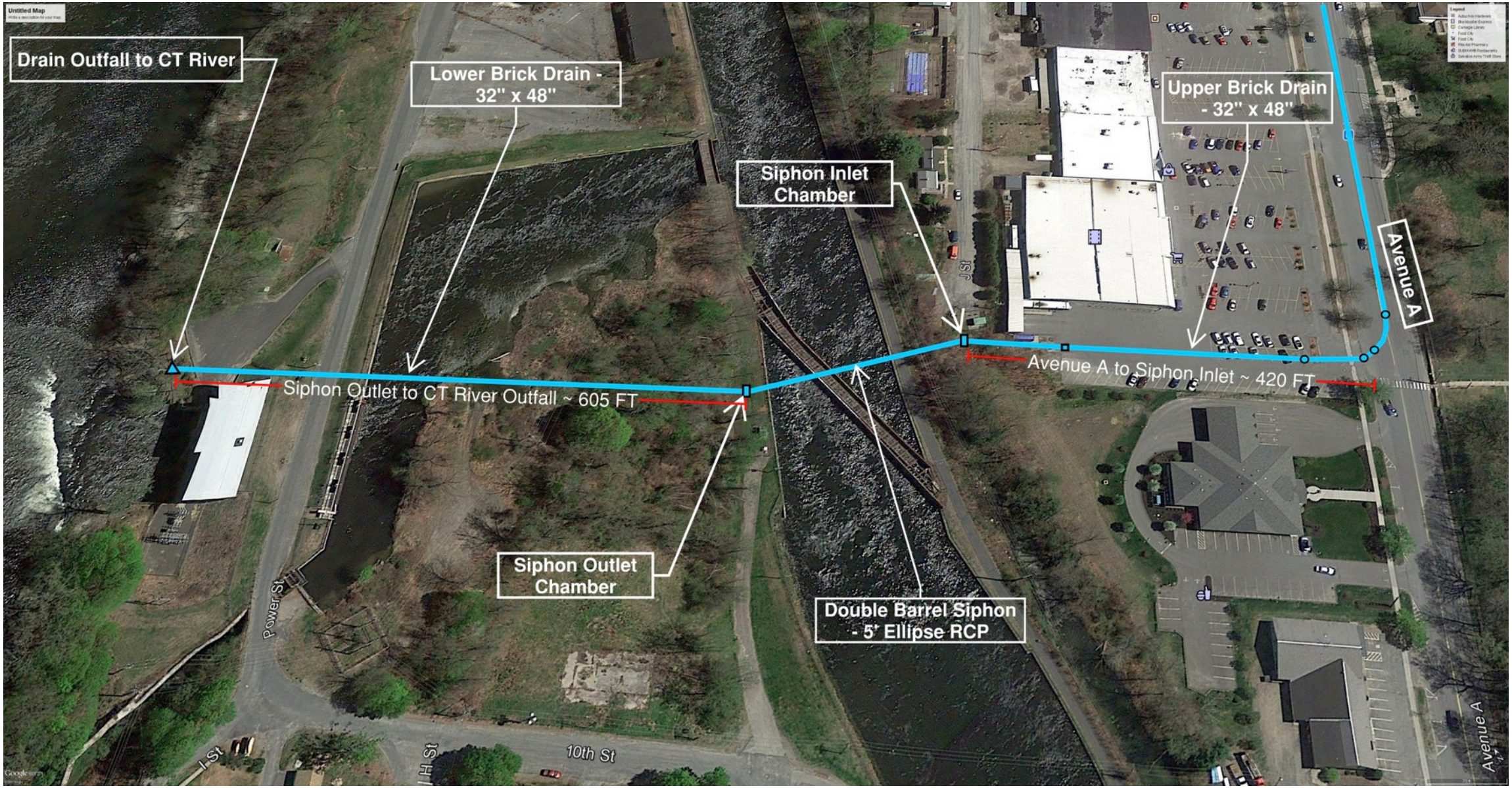
Jonathan Kunay, LEED ®AP

CDM Smith

617-452-6583

KunayJE@cdmsmith.com

Find more insights through our water partnership at cdmsmith.com/water and @CDMSmith


Drain Outfall to CT River
Lower Brick Drain - 32" x 48"
Upper Brick Drain - 32" x 48"
Siphon Inlet Chamber
Avenue A
Siphon Outlet to CT River Outfall ~ 605 FT
Avenue A to Siphon Inlet ~ 420 FT
Siphon Outlet Chamber
Double Barrel Siphon - 5' Ellipse RCP
J St
Power St
I St
10th St
Avenue A