



All Over Over-Unders!

Addressing I/I, Water Quality, and CSO Abatement with an Over-Under Manhole Program



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0°55'32", -13.0m, 64°
2019 11:12:11



Presentation Outline

- Overview of City System
- Over-Under Manhole Types
- Study Overview
- Example Area – Outfall 026
- Next Steps

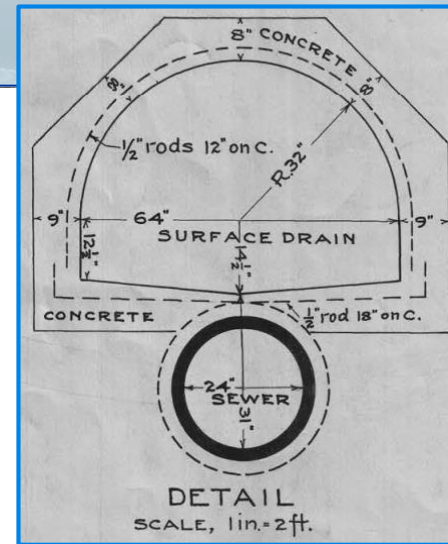
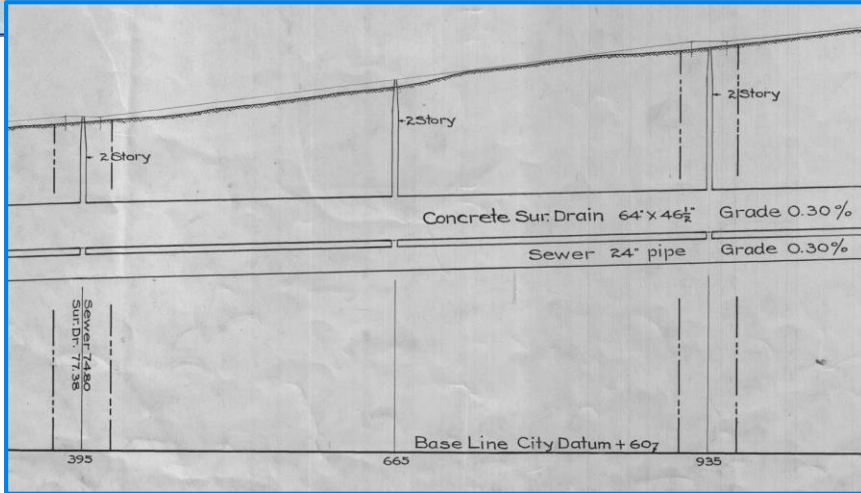


New Bedford Collection System 101

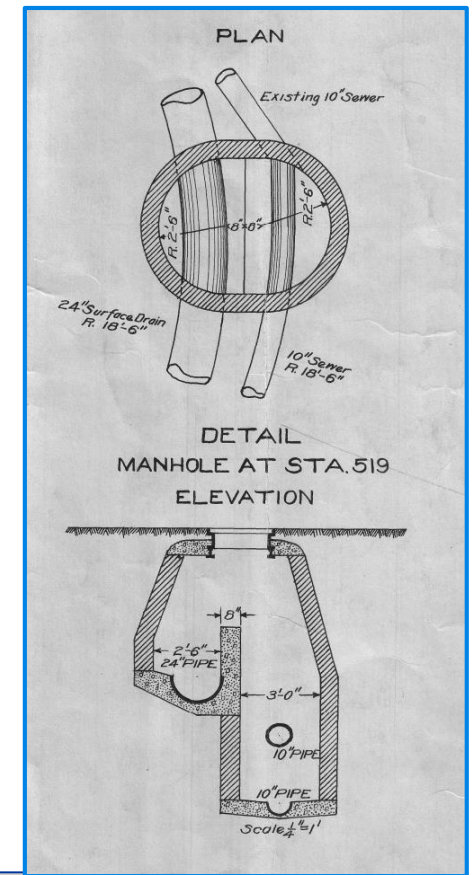
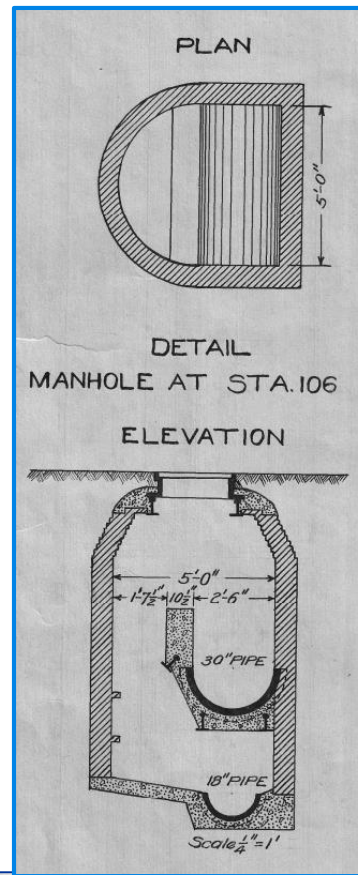
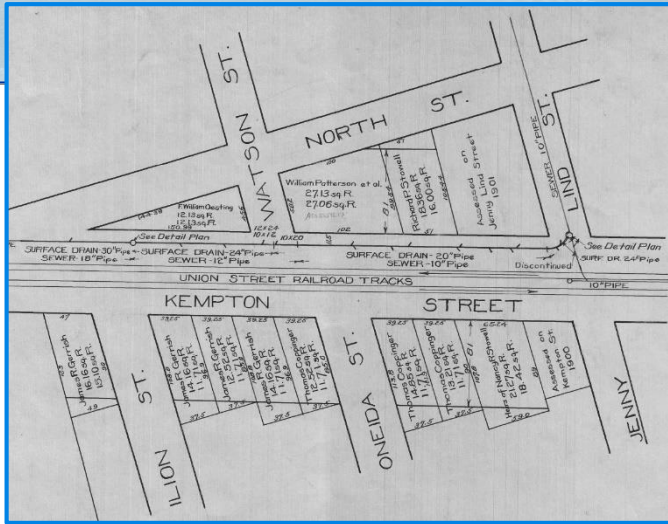
- System constructed primarily between 1880s and 1960s
- 350 miles of pipe ranging in size from 6-in to 96-in serving approximately 100,000 people in three communities
- 29 pumping stations
- 11.5 miles of force/pressure mains
- 71 regulators flowing to 27 outfalls
- Intertwined network of interceptors, weirs, and pumping stations configured to maximize flow capture and conveyance to City's WWTP



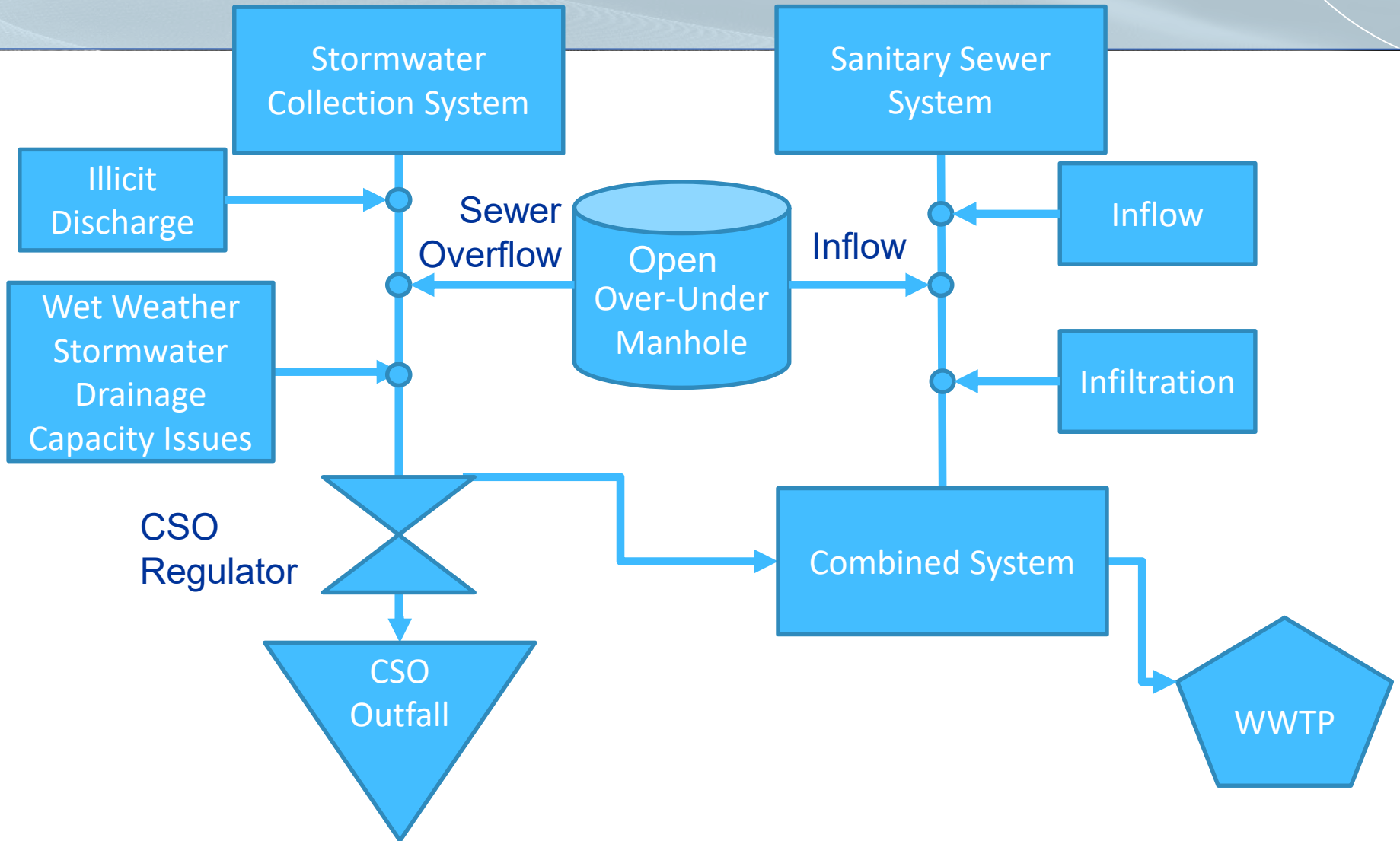
What is an Over-Under Manhole?



What is an Over-Under Manhole?



General Collection System Layout for Over-Under Manhole Areas

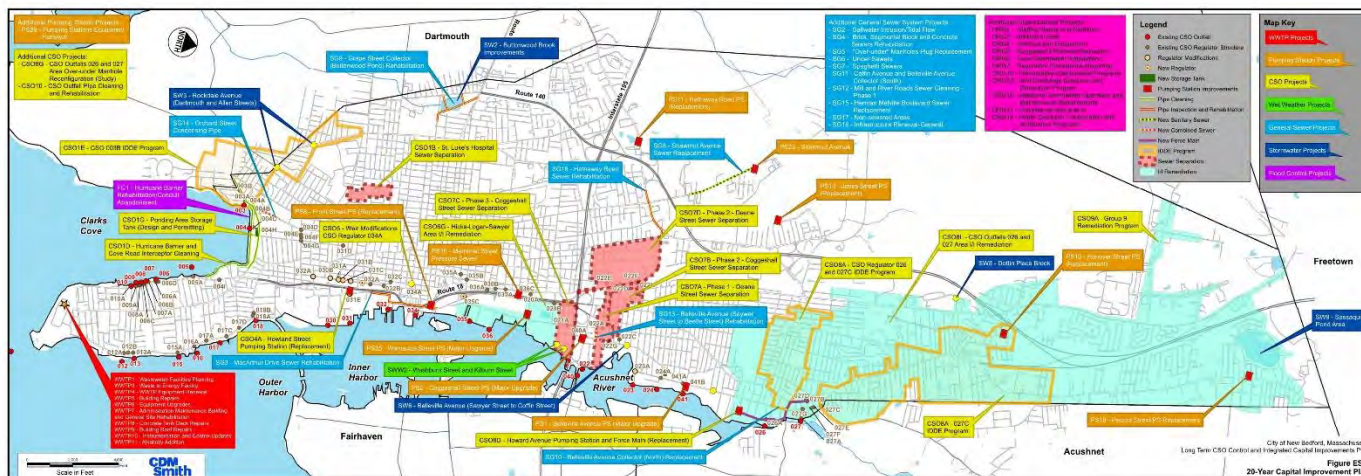


Why is New Bedford “All Over” Over Unders?

- CSO Abatement

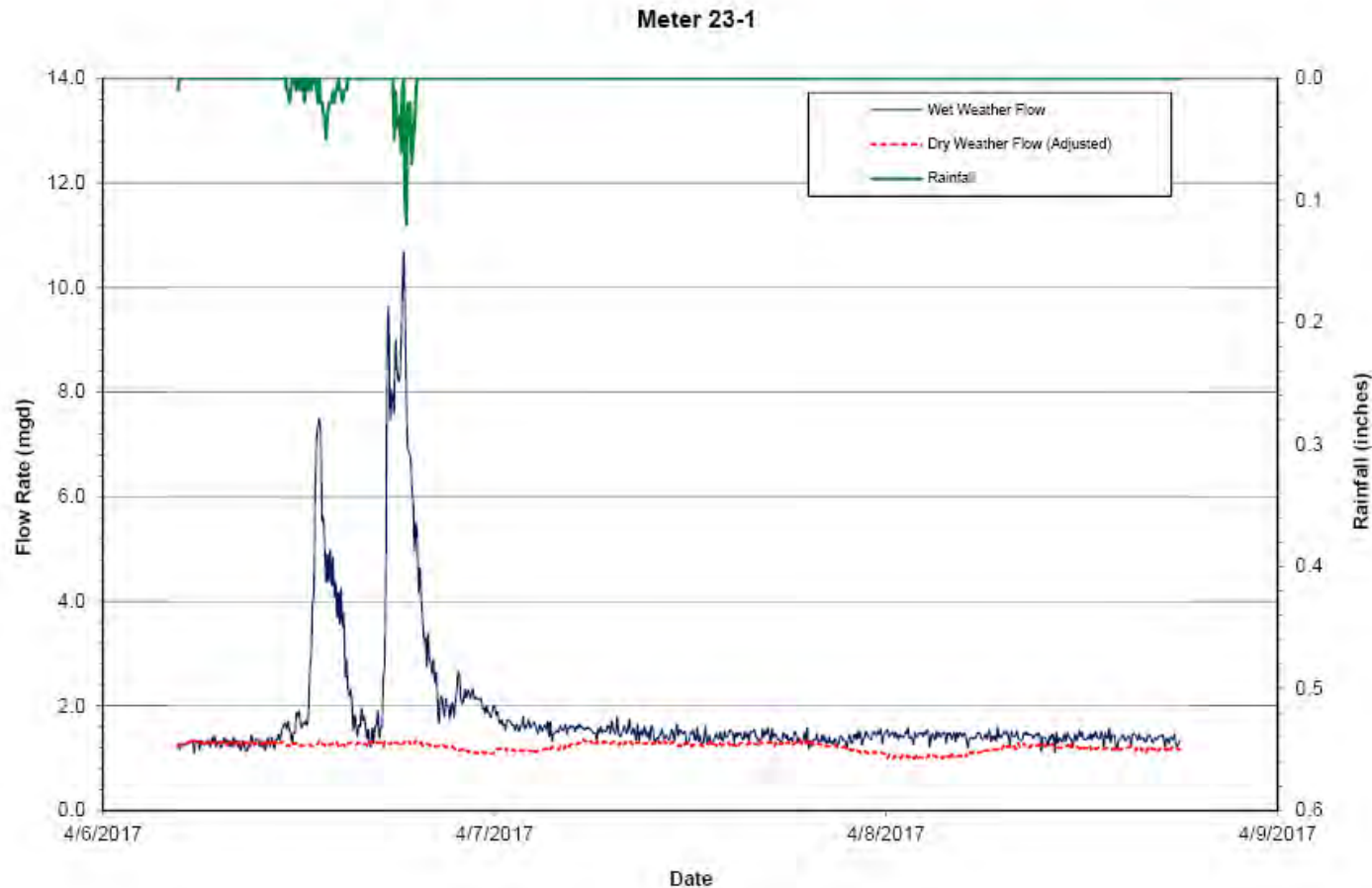
- Long Term CSO Control and Integrated Capital Improvements Plan – 2017
- Recommended 20-year Plan
- 17 MG from CSO 026 alone!!

Table ES-3: Recommended Long-Term Control Plan




Why is New Bedford “All Over” Over Unders? (Cont.)

- Significant Source of Inflow



Why is New Bedford “All Over” Over Unders? (Cont.)

- Maintenance Issues
 - Lack of access for cleaning and inspection
 - Broken pipes
 - Prone to blockages

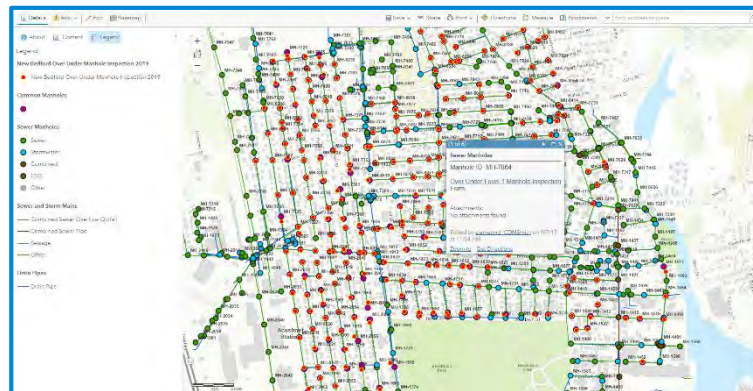


OVER-UNDER MANHOLE STUDY



Manhole Inspection Program

- 596 manholes identified in six areas of the City's sewer system
- NASSCO MACP Version 7.0
- Level 1 inspection of 596 manholes with 24 partial inspections
- Three months of field work



New Bedford Over Under Manhole Inspection 2019

Step Number

Step Material

Common Manhole *

Rim to Drain Invert (nearest tenth of a foot)

Depth to Interconnection (nearest tenth of a foot)

Approximate Depth of Flow in Drain (inches)

Plug is Open

Yes

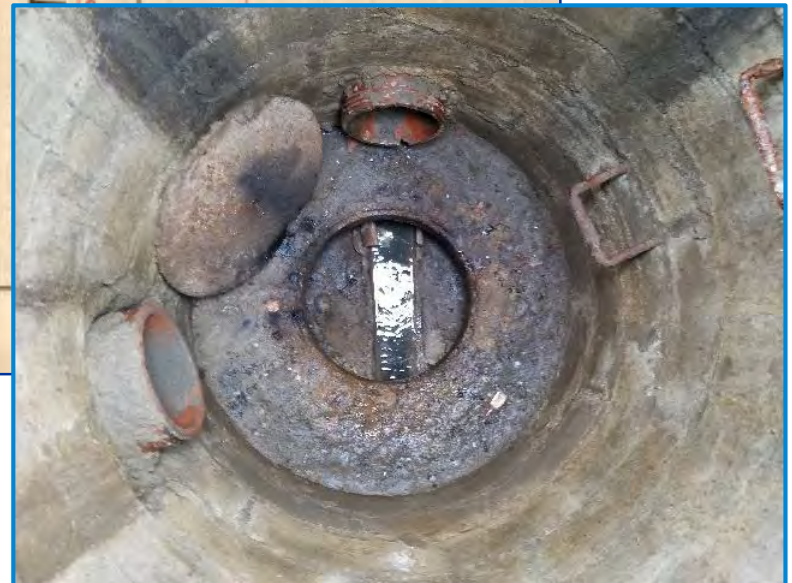
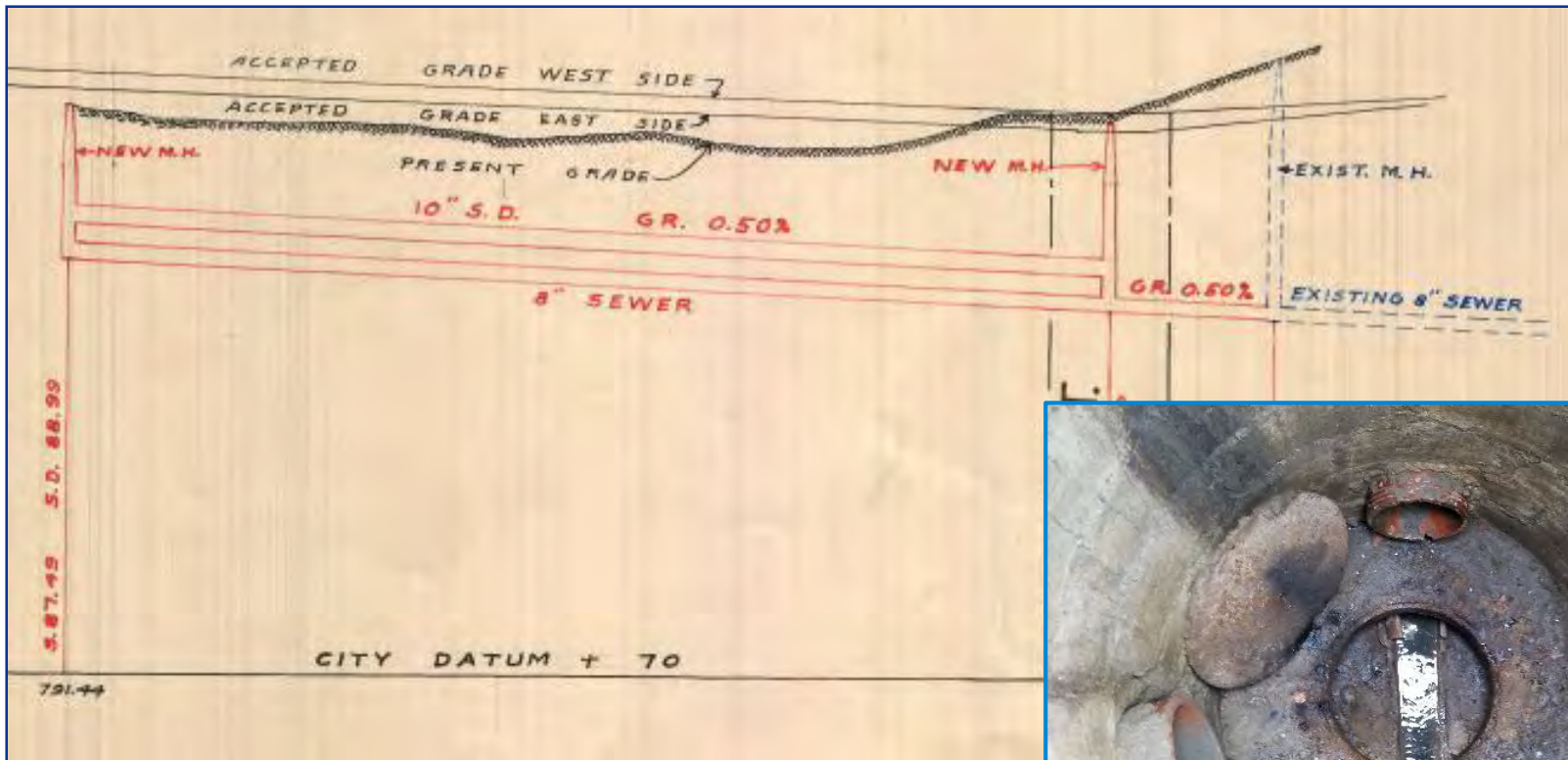
No

Unknown

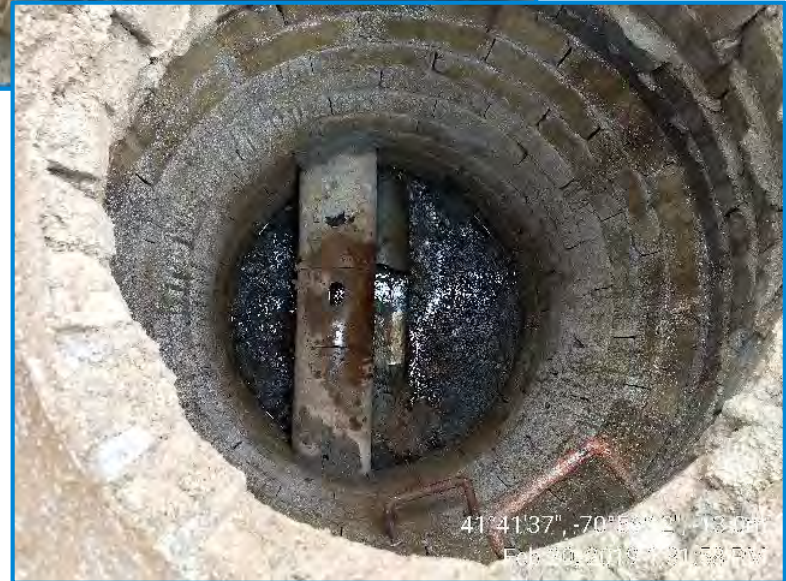
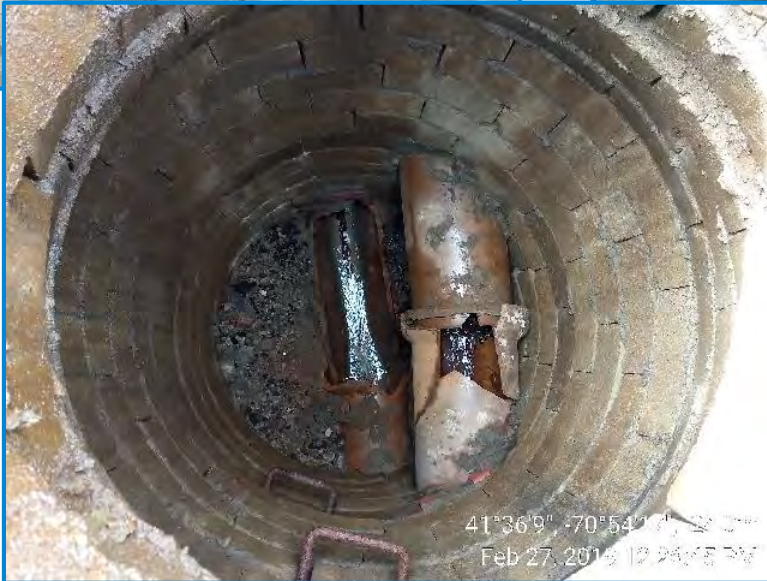
Interesting Finds – Incorrect Connections



Interesting Finds - Unconnected Drains



Interesting Finds – Missing Covers/Broken Pipes



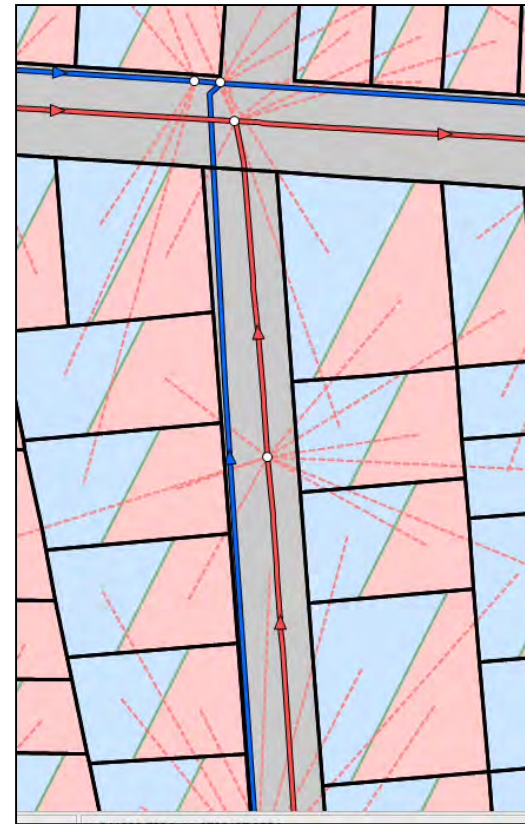
Metering

- Pairs of meters in the sanitary and storm system
- Area-velocity measurements
- Spring 2019
 - March to May
- No direct evidence of cross-flow

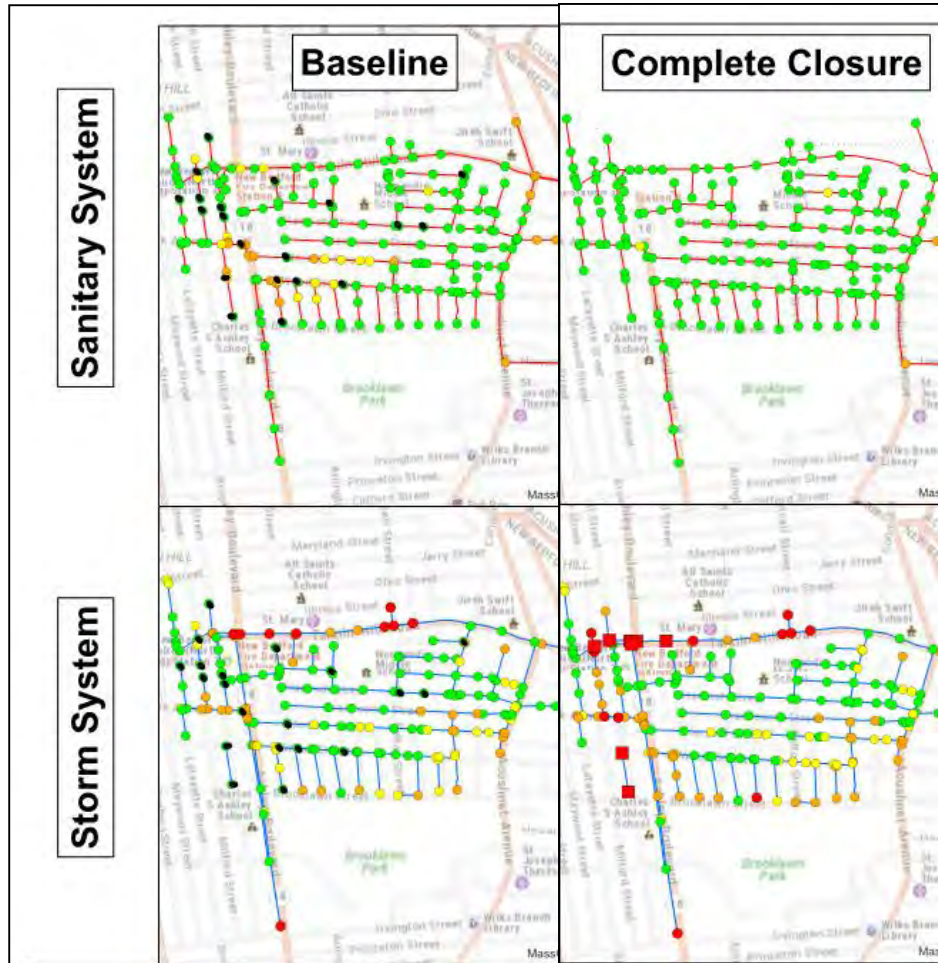


SWMM Model Development

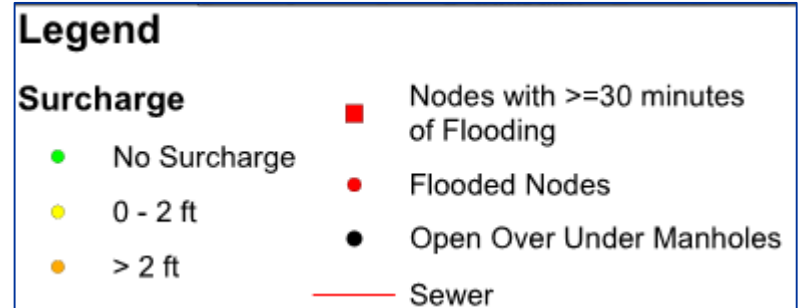
- Detailed GIS System data
- Catchments from city parcels
- Impervious coverage
- Six local models
 - 3 models calibrated to meter data
 - Extrapolated input parameters to other models
- City-wide SWMM model used for downstream boundary conditions



Model Simulations and Findings



- Design Storms
 - 2-year
 - 6-month
 - 3-month
- Stormwater Flooding and Surcharge
- Sanitary System Capacity





EXAMPLE AREA – OUTFALL 026

Goals and Issues in Outfall 026

- Goal: Convert 026 CSO outfall into MS4 outfall
 - Will reduce CSO by at least 17 MG in a typical year



- Issues
 - Illicit Connections
 - 20 Open over-under manholes
 - Storm drain capacity

Steps to Conversion to MS4 Outfall

Integrated Plan
(Combined and Stormwater Systems)

Illicit Discharge Detection
and Elimination (IDDE)

Over-Under Manhole
Study

Capacity, Management,
Operation and
Maintenance (CMOM)

Goal: Remove Regulator Structure

- Convert Outfall from CSO to Stormwater
- Eliminate CSO volume
- Reduce I/I to WWTP
- Improve water quality

Outfall Regulated per the
Municipal Separate Storm
Sewer System (MS4)



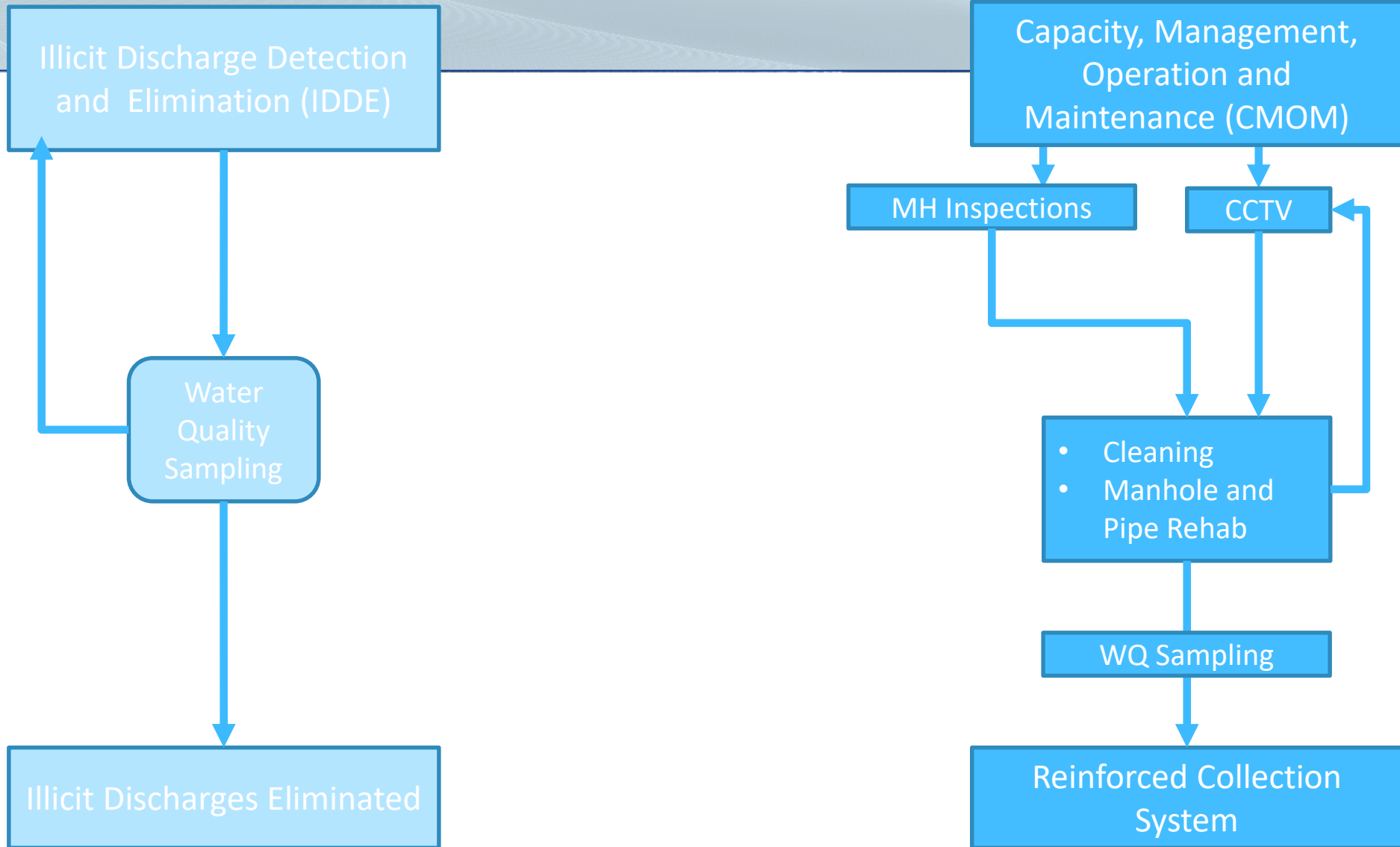
Steps to Conversion to MS4 Outfall

Illicit Discharge Detection and Elimination (IDDE)

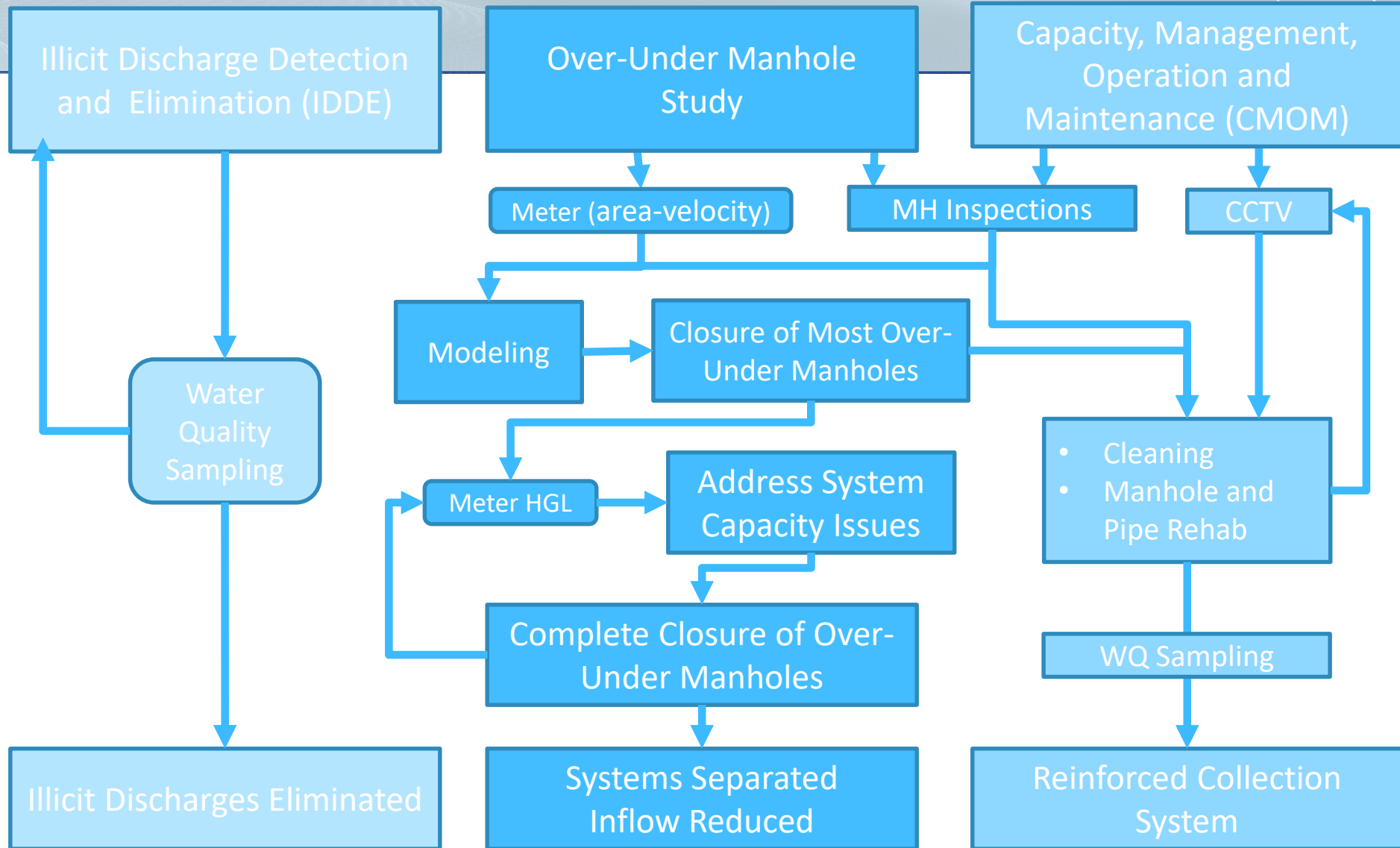
Water Quality Sampling

Illicit Discharges Eliminated

Steps to Conversion to MS4 Outfall



Steps to Conversion to MS4 Outfall



Validation and Final Conversion

- ✓ No Illicit Connections
- ✓ Sufficient Stormwater Capacity (Green Infrastructure?)
- ✓ Over-Under Manholes Closed
- ✓ All Manholes Inspected
- ✓ Repairs made to prevent future issues
- ✓ Validation through Water Quality Sampling

- ❖ Remove Regulator/Convert to MS4 Outfall
 - ❖ Eliminate CSO
 - ❖ Reduce I/I to WWTP
 - ❖ Improve Water Quality

Next Steps

- Evaluate impacts to the entire system
- Complete IDDE inspections
- Begin CCTV inspections
- Stormwater capacity analysis
- Clean, repair and close open over-under manholes
- Assess maintenance access needs and construct improvements



Acknowledgements



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MassDEP

Massachusetts Department of Environmental Protection

Questions?

