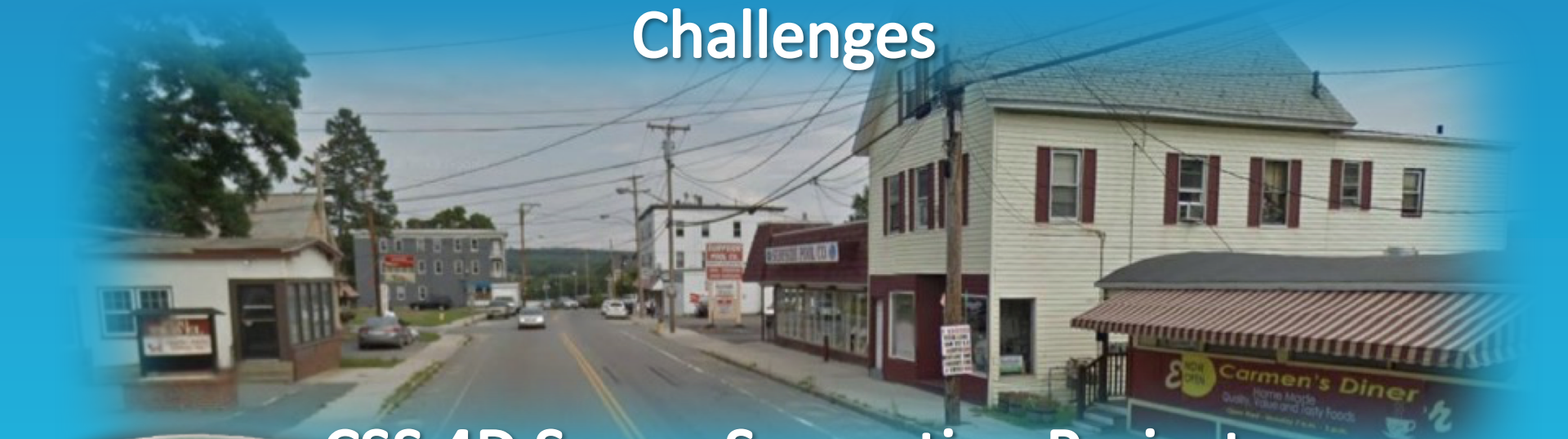
Fitchburg's Largest Sewer Separation Project Provides Relief to the Nashua River: Conquers Urban City Challenges



CSS 4D Sewer Separation Project

Presented by:

WRIGHT-PIERCE
Engineering a Better Environment

NEWEA Annual Conference
January 2017

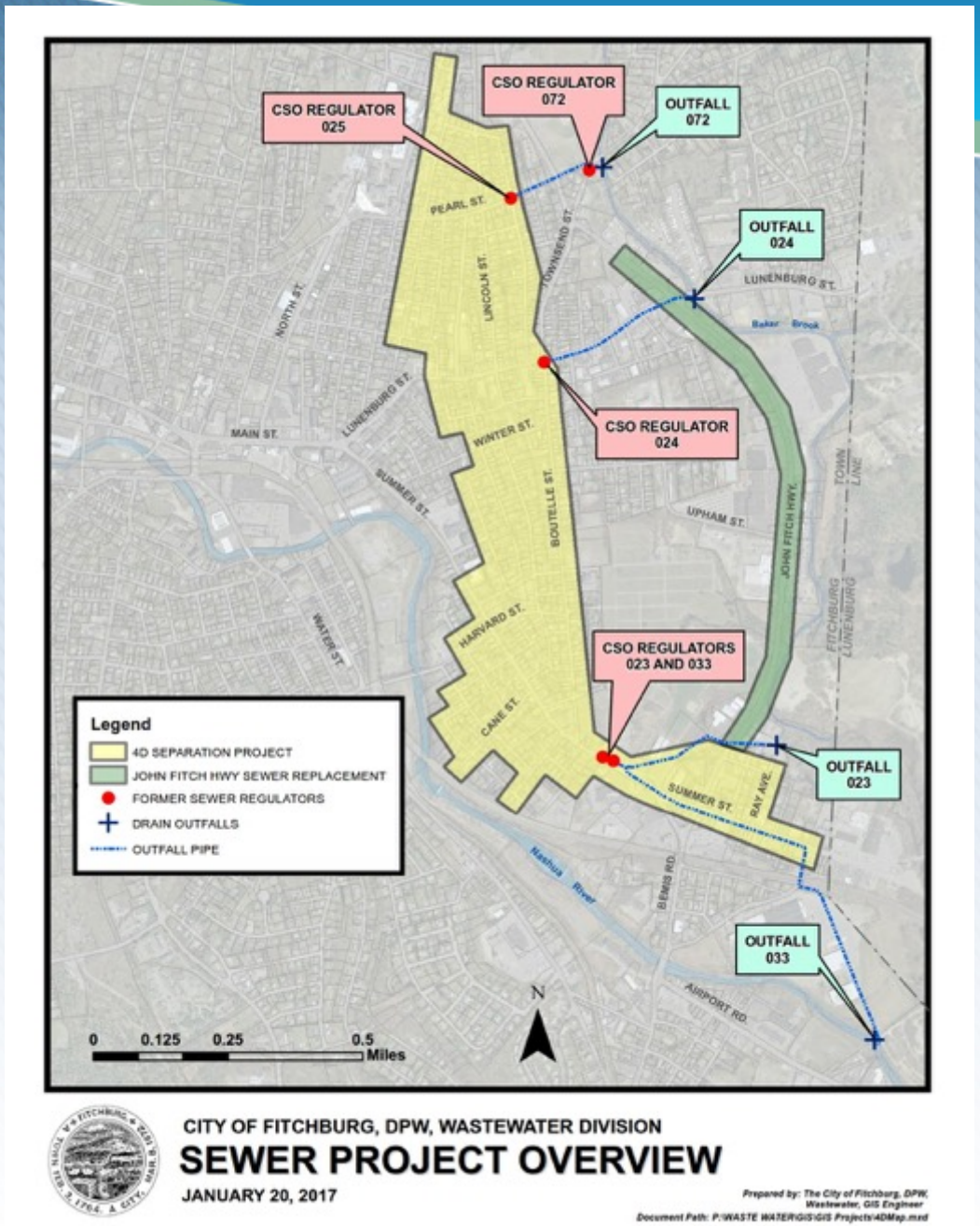
Presentation Overview

- ✓ Background
- ✓ Project Overview
  - ✓ Storm Drainage Work, Sewer Separation
  - ✓ Sewer Rehabilitation, Replacement
  - ✓ Water Main Replacement
- ✓ Change Orders
- ✓ Challenges and Lessons Learned

Project Background, Goals

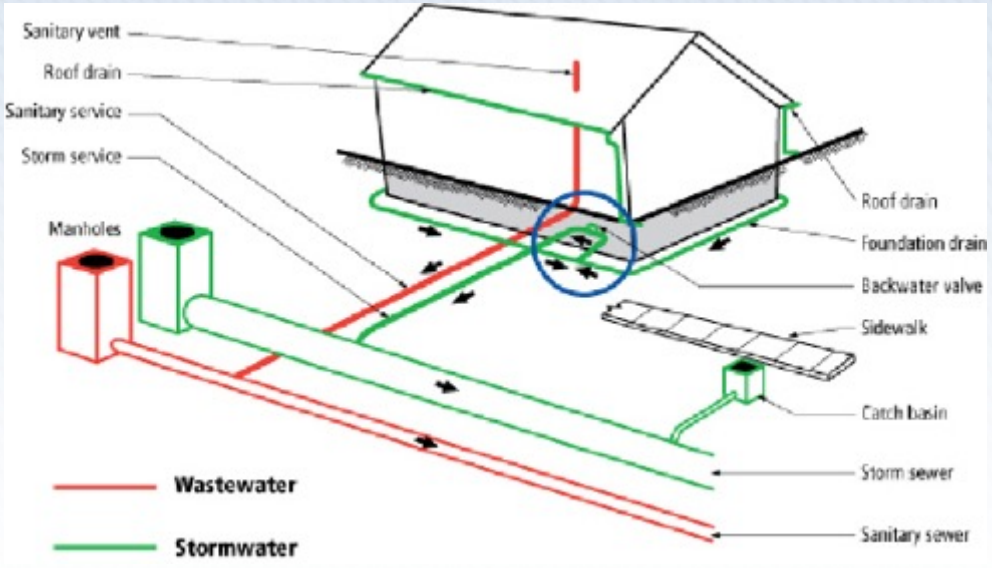
- MassDEP/EPA and the City of Fitchburg signed into a Consent Decree in June 2012
  - Separate the City's combined sewers within the 4D Area by Dec. 31, 2014
- Prevent future CSOs and SSOs
- Replace sewers on John Fitch Highway
- Complete the construction on time, budget, and minimal impacts on residents and businesses

Overview


CSO REGULATOR 025
CSO REGULATOR 072
OUTFALL 072
OUTFALL 024
CSO REGULATOR 024
CSO REGULATORS 023 AND 033
OUTFALL 023
OUTFALL 033
PEARL ST.
LINCOLN ST.
TOWNSEND ST.
NORTH ST.
LUNENBURG ST.
Baker Brook
MAIN ST.
WINTER ST.
SUMMER ST.
BOUTELLE ST.
UPHAM ST.
JOHN FITCH HWY.
TOWN LINE
FITCHBURG
LUNENBURG
WATER ST.
HARVARD ST.
CANE ST.
RAY AVE.
Nashua River
BEMIS RD.
AIRPORT RD.
Legend
4D SEPARATION PROJECT
JOHN FITCH HWY SEWER REPLACEMENT
FORMER SEWER REGULATORS
DRAIN OUTFALLS
OUTFALL PIPE
0 0.125 0.25 0.5 Miles
N
CITY OF FITCHBURG, DPW, WASTEWATER DIVISION
SEWER PROJECT OVERVIEW
JANUARY 20, 2017
Prepared by: The City of Fitchburg, DPW, Wastewater, GIS Engineer
Document Path: P:\WASTE WATER\GIS\GIS Projects\4DMap.mxd

Storm Drain System, Sewer Separation

- 25,000 feet of new storm drains, catch basins and drain manholes
- Clean, improve the existing combined sewer outfalls (outlets)
- New stormwater connections to property lines for homes and businesses to connect to the new storm drain system
  - Sump Pumps
  - Roof Drains
  - Foundation Drains
  - Yard Drains



Sanitary Sewer System

- Approximately 15,000 feet of new sanitary sewers
- New sewer connections to the property lines for homes and businesses
- Lining existing sanitary sewers that are in fair to poor condition
- Rehabilitating and repairing sewer pipes and manholes that are in fair to poor condition

Water System Work

- Approximately 9,000 feet of new water mains
- New water main valves and hydrants
- New water services to the property lines for homes and businesses

Public Outreach - Overview

Public Participation

- Physical Inspections of Sewer Connections
- Coordinate Possible Stormwater Connections- ongoing
- Potential Follow Up Public Meetings

Impacts on Residents & Businesses

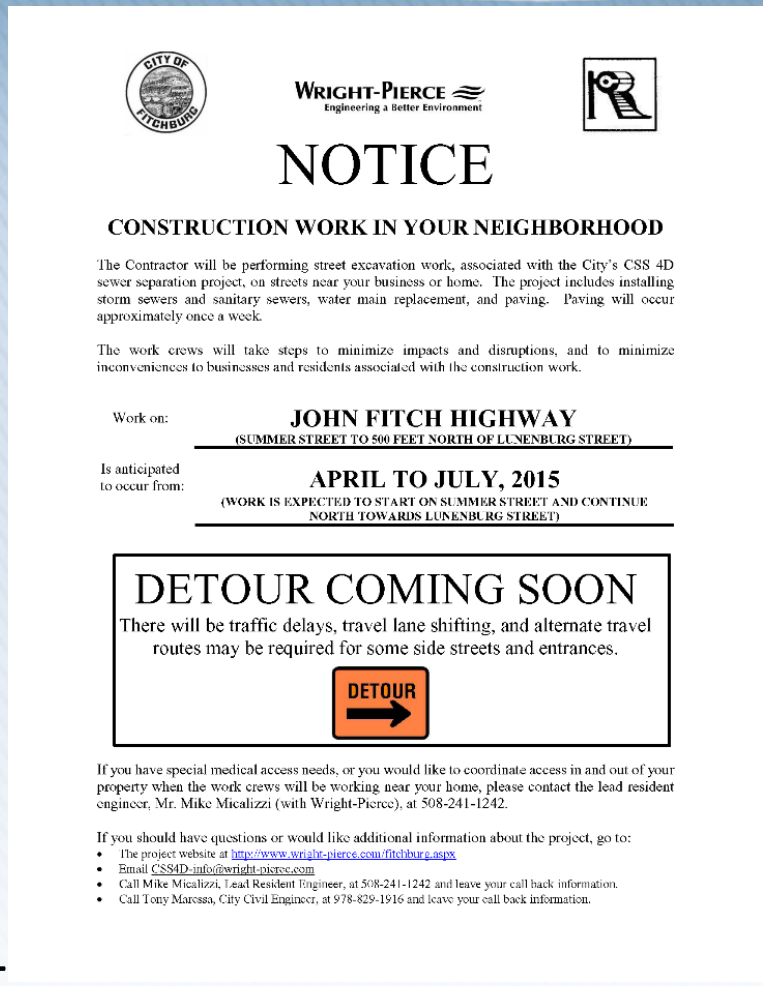
- Temporary Water Services
- Reconnecting Sanitary Sewers
- Driveway Access Issues

Impacts on Traffic

- One lane traffic on streets during excavation
- Possible street detours
- Emergency vehicles routes will not be impacted

Public Notification

- Public Meetings
  - Summer 2013 – Post Bidding
  - Spring 2014 – Pre Construction
  - On-going updates in Ward Meetings
- Project Website, hosted by Wright-Pierce
  - Schedules, Contact information, Maps, Public Meeting Information
  - City website linked to project site
- Construction Coming Soon Flyers
  - Hand delivered twice, water and sewer bills
- Electronic Message Boards
- Local Newspaper
- Public Emergency Notification System – "Code Red"



WRIGHT-PIERCE
Engineering a Better Environment

NOTICE

CONSTRUCTION WORK IN YOUR NEIGHBORHOOD

The Contractor will be performing street excavation work, associated with the City's CSS 4D sewer separation project, on streets near your business or home. The project includes installing storm sewers and sanitary sewers, water main replacement, and paving. Paving will occur approximately once a week.

The work crews will take steps to minimize impacts and disruptions, and to minimize inconveniences to businesses and residents associated with the construction work.

Work on: **JOHN FITCH HIGHWAY**
(SUMMER STREET TO 500 FEET NORTH OF LUNENBURG STREET)

Is anticipated to occur from: **APRIL TO JULY, 2015**
(WORK IS EXPECTED TO START ON SUMMER STREET AND CONTINUE NORTH TOWARDS LUNENBURG STREET)

DETOUR COMING SOON
There will be traffic delays, travel lane shifting, and alternate travel routes may be required for some side streets and entrances.

DETOUR

If you have special medical access needs, or you would like to coordinate access in and out of your property when the work crews will be working near your home, please contact the lead resident engineer, Mr. Mike Micalizzi (with Wright-Pierce), at 508-241-1242.

If you should have questions or would like additional information about the project, go to:
- The project website at http://www.wright-pierce.com/fitchburg.aspx
- Email CSS4D-info@wright-pierce.com
- Call Mike Micalizzi, Lead Resident Engineer, at 508-241-1242 and leave your call back information.
- Call Tony Marassa, City Civil Engineer, at 978-829-1916 and leave your call back information.

Fitchburg

SHARE

City of Fitchburg, MA – CSS 4D Sewer Separation Project Information

A sewer and drain construction project will begin construction in October, 2013 and continue through the summer of 2015. The project area is generally bound by the Nashua River to the south, Holman Street to the north, Cedar Street and Atlantic Avenue to the west, and Boutelle Street to the east. A related project includes the replacement of the sanitary sewer along John Fitch Highway from Pearl Street to Intervale Road.

The goal of the project is to construct a new storm sewer system in order to eliminate three Combined Sewer Overflows (CSOs) in the project area and improve water quality in the Nashua River. The project includes installation of approximately 25,000 feet of storm sewers and sanitary sewers, sewer and manhole rehabilitation, water main replacement, and paving.

Revoli Construction Company from Franklin, MA will be the general contractor for this project.

The following documents have been provided in PDF format. To acquire a free PDF file viewer, please visit the Adobe Reader website (http://get.adobe.com/reader).

September 14, 2015 Update:

The Contractor will be performing paving work and cleanup/restoration work, associated with the City's CSS 4D sewer separation project, on streets near your home or business. Paving work will be performed along John Fitch Highway, as shown in the "look ahead" schedule.

City of Fitchburg Massachusetts

If you have any questions regarding this project or the materials, feel free to contact the following:

Michael Theriault, PE
Lead Project Engineer
Wright-Pierce
175 Ammon Drive, Suite 208
Manchester, NH 03103
(603) 606-4435
mike.theriault@wright-pierce.com

Laurie Perkins, PE
Project Manager
Wright-Pierce
175 Ammon Drive, Suite 208
Manchester, NH 03103
(603) 606-4420
CSS4D-info@wright-pierce.com

Unitil Gas has been performing gas utility infrastructure and replacement work in advance of the City CSS-4D project work in those streets where the CSS-4D work is to be performed. In the event that a question or concern arises regarding Unitil's work, please contact Jon Croteau.

Jonathan Croteau
Unitil Gas Construction Supervisor
285 John Fitch Highway
Fitchburg, MA 01420

Impacts on Public, Traffic

- High impact construction in both residential and commercial districts
- Construction Meetings were held between Owner, Engineer, and Contractor
  - Police Department attended
  - School Department
- Field Meetings between Contractor, Police and Engineer
- “Code Red” messages for detours and construction on major streets.

Construction Schedule –2014

- Continue with combined sewer separation work in order to complete meet Consent Decree requirements:
  - Combined Sewer Overflow Regulators closed by end of 2014
  - Success! All four CSO-Regulators were closed.
  - All separation work completed less than a week before Christmas.
- In order to meet schedule, Contractor had up to 5 separate crews working simultaneously.

Construction Schedule – 2015

- Concentration on non-combined sewer separation work
- Major tasks Completed:
  - John Fitch Highway Sewer Upsizing
  - Manhole replacement and lining
  - Water main replacement
- Final Paving and Punchlist

Major Change Orders

- Siphon Cleaning

Major Change Orders

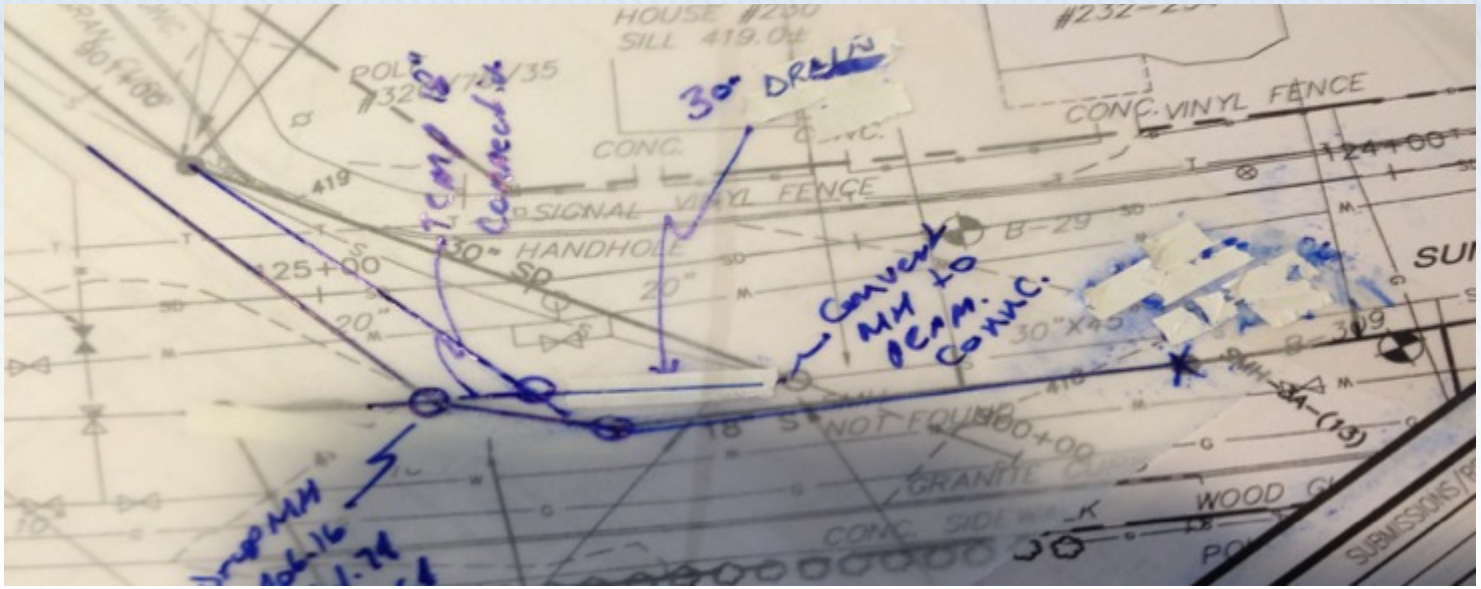
- Siphon Cleaning
- John Fitch Highway Roadway Resurfacing

Major Change Orders

- Siphon Cleaning
- John Fitch Highway Roadway Resurfacing
- Soil Disposal, Contamination

Major Change Orders

- Siphon Cleaning
- John Fitch Highway Roadway Resurfacing
- Soil Disposal, Contamination
- Unforeseen, Changed Conditions



Challenges and Lessons Learned

- Difficult Contractor
- Temporary Connections, Combined System
- Construction Sequencing
- Contaminated Soils Urban Fill
- Winter Construction
- Record Information
- Existing Water
- Existing Gas

Difficult Contractor:
Making A Successful Working Relationship

- Work together as a Team. We all have the same goal.
- Conflict resolution: Doesn't mean everyone needs to be miserable and angry. Compromise works.
- Contractors can have good input/ideas on how to resolve technical issues that arise.
- Minor Adders/Credits, Green Stamps – Work it out in the field.
- The Contractor is not the enemy.
- Pickup the phone, email is not always the most efficient and may lead to miscommunications.

Temporary Connections to Combined Systems

- Egg-shaped combined sewer interceptors
  - Sandbagging, custom piping connections daily
- Replacing a 1-pipe system with a 2-pipe system
  - Downstream piping connection must have adequate capacity to handle peak flows
- Avoid constrictions at the temporary connection
  - Rain events happen and restricting flow could result in surcharging
- Backup plan in place
  - Capacity relief during storm events
  - Bypass pumps
  - Backflow preventers for most vulnerable sewer services

Construction Sequencing

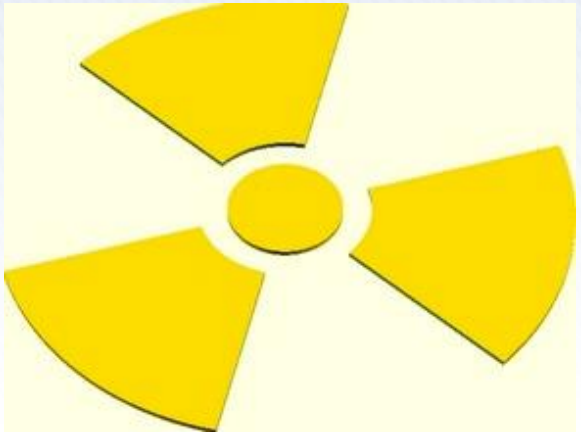
- Recommended Sequence: Phased 2013 and 2014 work
  - Original Start 2013; Delays from Contract Award, Shop Drawings; Work didn't start until 2014
  - Work began consistent with recommended sequence
- Deviation from Sequence
  - Initiated downstream piping replacement prior to upstream combined sewers being separated
  - 2 Surcharge Events: Contractor constricted temporary connection
  - 1 Surcharge Event: Rainfall intensity created flow greater than capacity of existing or new systems.
- Stop Work Order
  - Develop and issue and updated Recommended Construction Sequence

Contaminated Soils, Urban Fill

- Desktop Analysis during Design, More Research
  - Property locations, type of contaminants and magnitude of risk
  - Identify additional bid items, specification sections, testing requirements
  - General soil, Unlined Landfill, Lined Landfill, Remediation/Recycling, Thermal Processing, Hazardous
  - Contaminated groundwater
  - Town/City Licensed Soil Professional (LSP) on-board
- Pre-Construction
  - Contractor hire LSP to create material management plan
  - Health and safety plan
  - Material Stockpile Area, Berm, protection of groundwater beneath and from surface runoff.

Contaminated Soils, Urban Fill

- Construction
  - PID Screening
  - Characterization Report, Sampling
  - Environmental regulator visit – checking for proper handling, gathering information on source of contamination.
  - Transport, Material Shipping Record (MSR)



Wintertime Construction (2014)

- Does not work…at least in Fitchburg!
- Snow:
  - No work allowed, weather is unpredictable
  - Material and equipment storage conflicts with snow storage
  - Melting snow on open trenches = A Mess
- Frost: Difficult to remove, affects shallow utilities.
- Trench Patches and Potholes
  - Maintenance nightmare
  - Temporary Pavement and Cold Patch does not setup well
  - Frequent driver and resident complaints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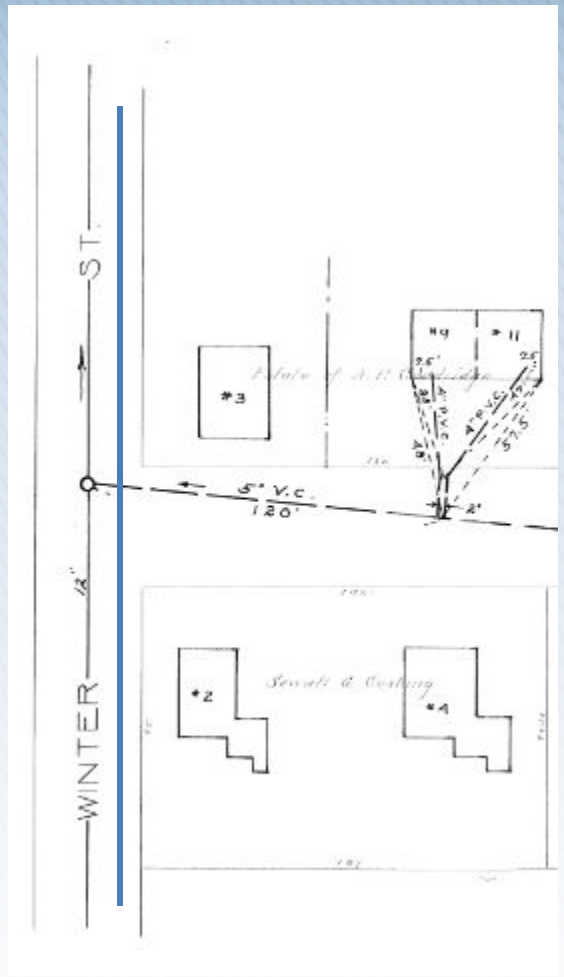
Record Information

- Fitchburg is unique:
  - Record information is held in multiple departments and in multiple formats
    - Water Division – Water hardcopies and Linens
    - Wastewater Division – Sewer CCTV Data and GIS Mapping
    - Engineering Division – Drain/Sewer Plans, PDFs and Hardcopy
  - Ensure Consultant/Designer has all record information
- Municipal Dig-Safe Mark-Out
  - Spot check to make sure utilities are marked out
- Unforeseen/Unmarked Utility Damages
  - Trench compaction, bucket knuckling ahead of pipe installation
  - Crushed Unmarked/Unknown pipe:
    - Water: Repair obvious
    - Sewer/Drain: Home surcharge, delay
    - Importance of a procedure when an unmarked/unknown sewer service is broken: Residents are not happy



Existing Utilities: Water

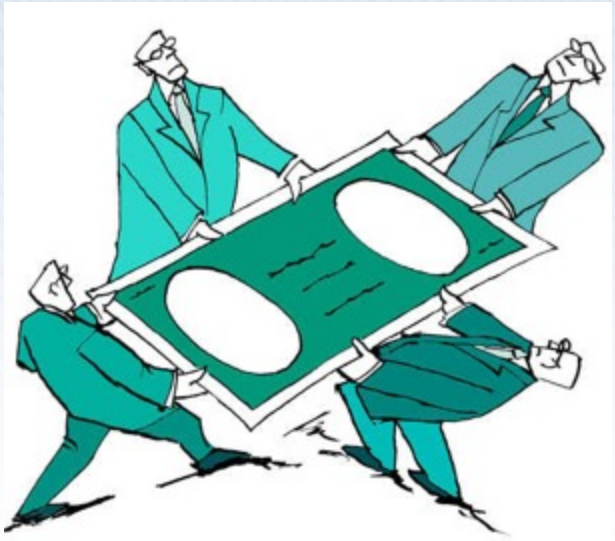
- Water Division had limited finances to participate in project
- Minor water main replacement, looping included in project
- Working around aged water mains and services
  - 20” CI Water on Boutelle Street with leaking lead poured joints – Circa 1910
  - Lack of functioning isolation valving – ideally exercise valves prior to construction.
    - Long shutoff time during an emergency
  - Limited repair parts, options
  - Existing services held together only by earth pressure.
  - Important to have enough Contingency Funds!

Existing Utilities: Gas

- Gas Mains and Services
  - Gas mains and services replaced ahead of construction on *most* streets
  - Contractor chose to attempt advancing work ahead of Gas Company in some areas
  - Milling/Reclamation vibration causing service and mainline breaks
  - Cross trenches, piping held together by earth
  - Safety concerns
  - Change orders
    - New gas main installed on Pacific Street during bidding phase

Funding

- Multiple Sources and Methods
  - SRF Loan to fund project
  - Funding from adjacent community to pay for John Fitch Highway Work – Additional capacity for sewer expansion
  - Water Division funded water improvements
    - 18% of total Project Cost
  - Chapter 90 funding for JFH Paving
  - Sharing of full-width road restoration costs between DPW and Wastewater
    - Paving Contribution = (2” Mill/Fill) - (2” Trench Patch)



Fitchburg CSS 4D - Overall

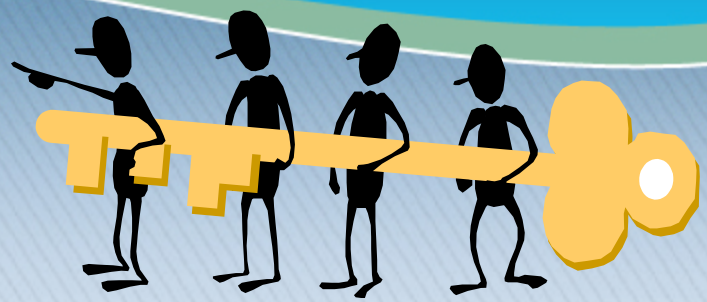
Schedule

- ✓ Late Start, Failed Wintertime Construction, Stop Work Order
- ✓ Met the 2014 EPA/MADEP Consent Decree Sewer Separation Deadline
- ✓ Finished construction on time/early in 2015 despite significant added roadway improvements

Price

- ✓ $10.8M Original Contract Price
- ✓ $12.4M Final Construction Value
  - ✓ Original Contract Balance: $10.74M (-1%)
  - ✓ Owner Requested Siphon Cleaning: +$207K
  - ✓ Owner Requested Roadway Improvements: +$404K
  - ✓ Surplus, Contaminated Soil Handling : +$1.045M

Acknowledgements



CITY OF FITCHBURG

- ✓ Jeff Murawski, PE – Deputy Commissioner of Wastewater
- ✓ Anthony Maressa, PE – Sewer System Manager
- ✓ David Berger – Water Distribution System Manager

Wright-Pierce

- ✓ Laurie Perkins, PE – Project Manager
- ✓ Mike Theriault, PE – Project Engineer

Revoli Construction

Questions / Discussions

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FITCHBURG, A TOWN FEB. 3, 1764, A CITY, MAR. 8, 1872