

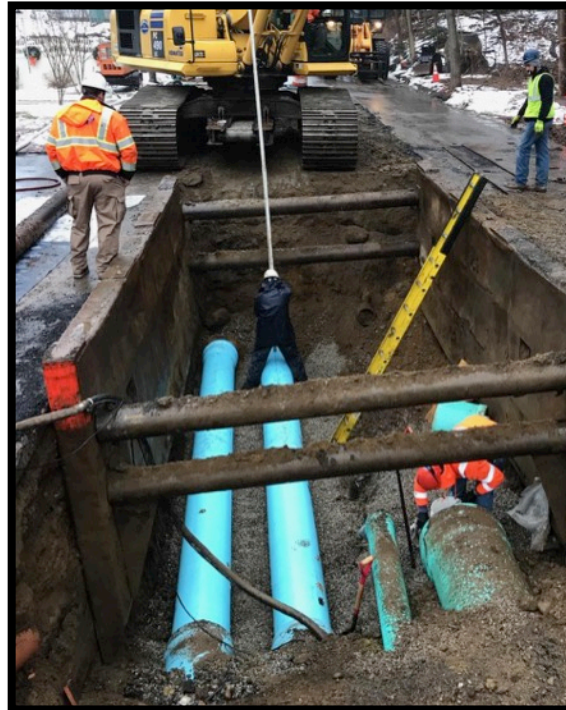


Tighe&Bond

Engineers | Environmental Specialists

Rerouting Worcester's Sewer – The New Whitla Drive Pump Station

City of Worcester, MA



NEWEA Annual Conference
January 23, 2018

Presenter:
Daniel Roop, P.E.
Project Engineer

Presentation Overview

- History & Location
- Key Issues & Drivers
- Design & Hurdles
- Where we are now

Whitla Drive PS



Existing Whitla Drive PS

- Constructed in 1963
- Avg. Flow: 580,000 gpd
- Peak Flow: 2.0 mgd
 - *(PS barely adequate)*
- Centrifugal Pumps
 1. 800 gpm
 2. 1,200 gpm
 3. 1,500 gpm

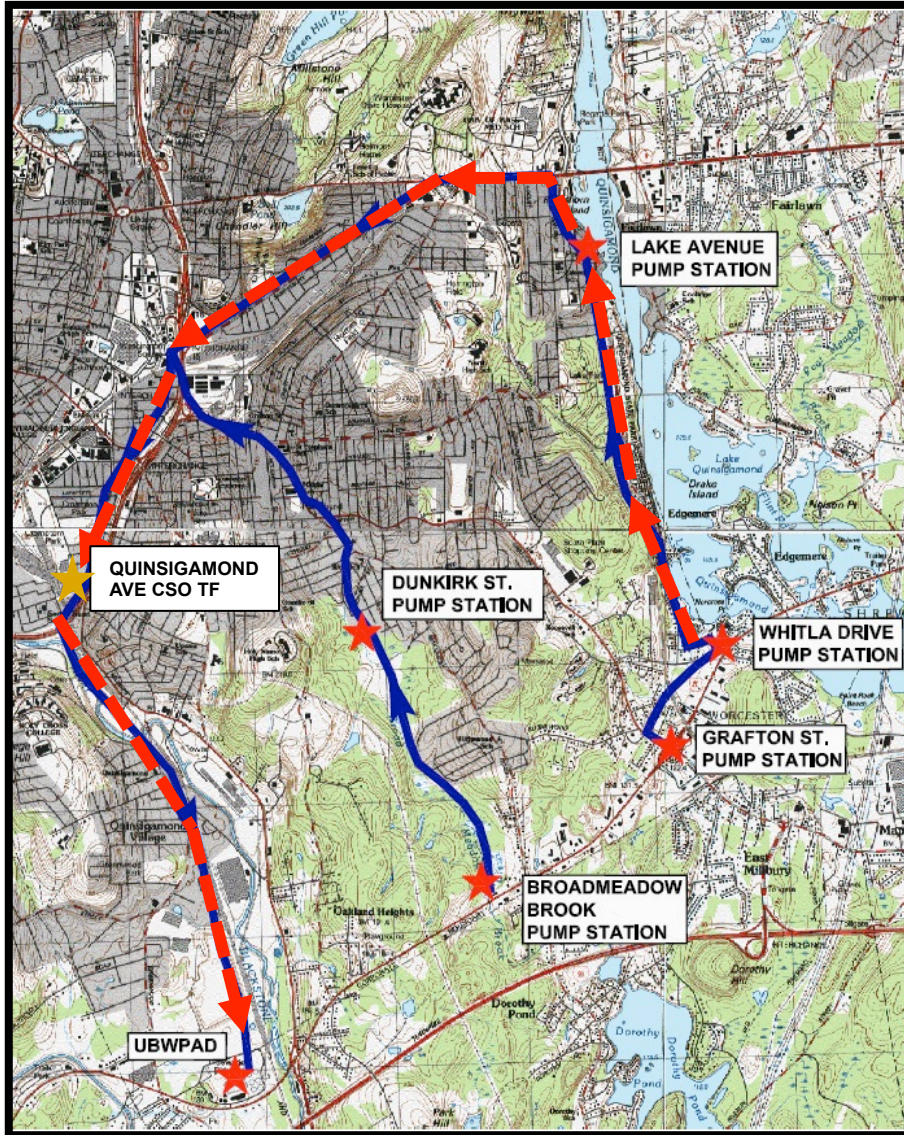


Existing Whitla Drive PS 2

- Pneumatic Ejector Station
- 72,000 gpd
- Pumps to Whitla Drive PS Influent Sewer Manhole



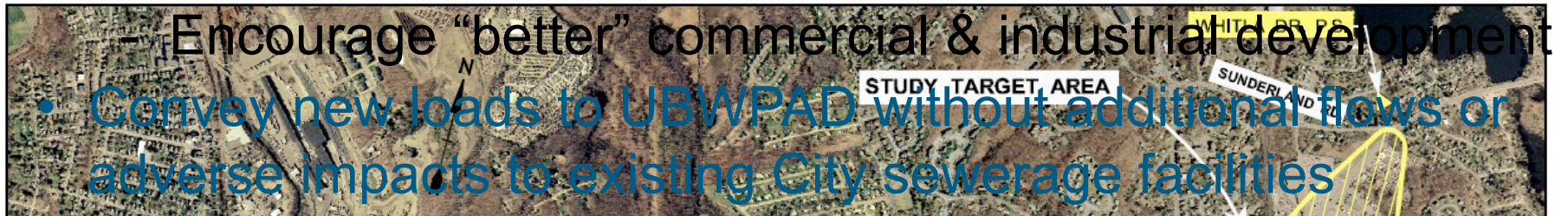
Current Circuitous Sewer Route: “Can’t get there from here”



- 4,860 ft long 12” FM to Lake Avenue Interceptor
- Lake Ave Interceptor to Lake Ave PS (3.8 mgd)
 - *No Wet Weather Capacity*
- Lake Ave. PS 24” FM to Shrewsbury St. 30” Interceptor
- Interceptor becomes combined sewer, joins Millbrook Conduit
- Combined wastewaters flow to Quinsigamond Ave CSO facility
 - *CSO Abatement Goals*
- QCSOSTF to Upper Blackstone WPAD

Key Issues & Drivers: 2006 Route 20 Sewer Study

- Provide sewer service along target area of Rt. 20 corridor



Key Issues & Drivers

- Whitla Drive PS
 - Barely adequate to handle peak flows (2.0 mgd)
 - No Additional Capacity
- Lake Ave PS (3.8 mgd)
 - No additional capacity during wet weather events
- Quinsigamond Ave CSO Facility
 - Reduce sewage flows
 - Comply with long term City CSO abatement goals

- Build New Larger Capacity Whitla Drive PS
- Eliminate Whitla 2 Pneumatic Ejector Pump Station

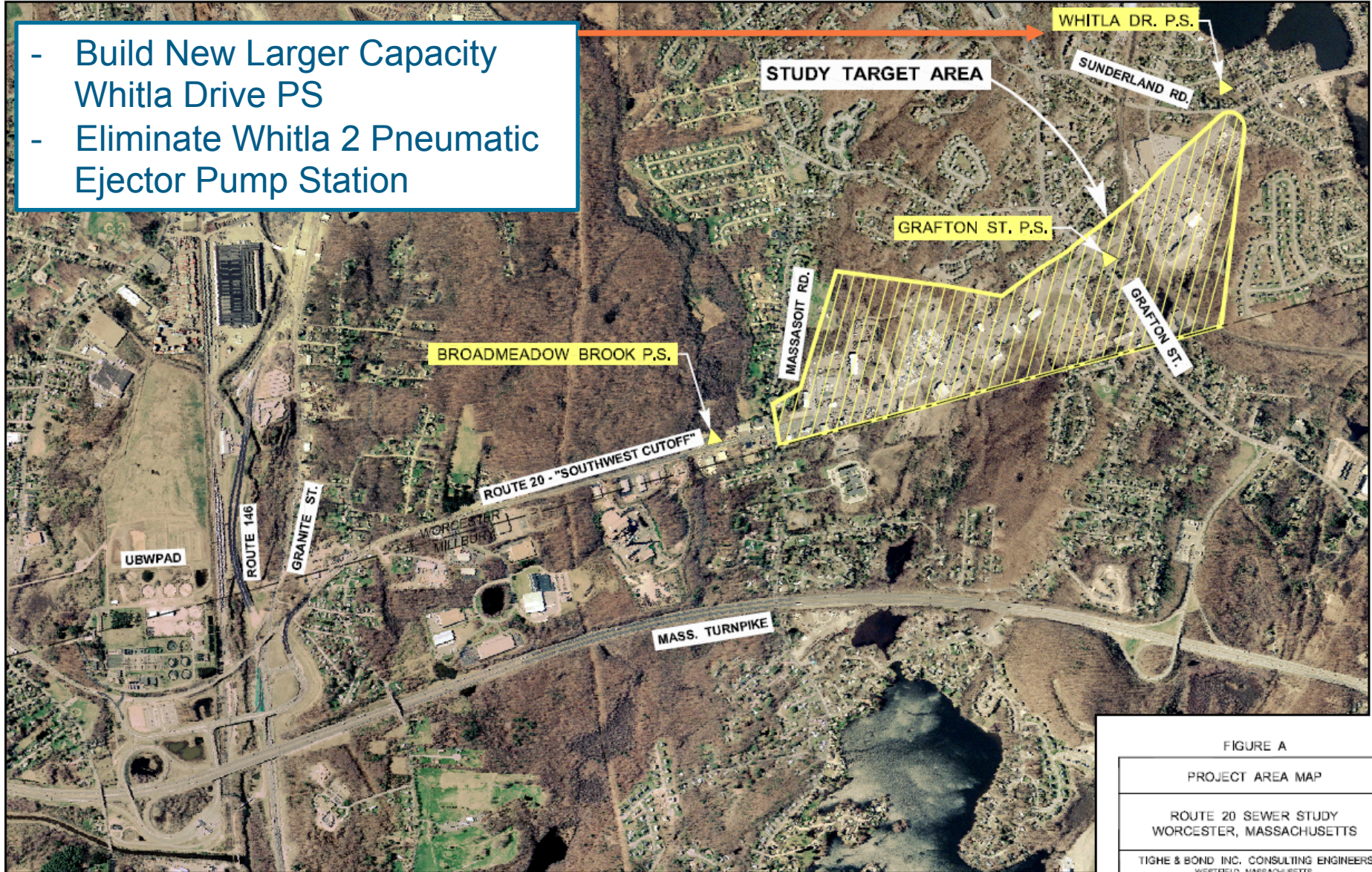


FIGURE A

PROJECT AREA MAP

ROUTE 20 SEWER STUDY
WORCESTER, MASSACHUSETTS

TIGHE & BOND INC. CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS

SCALE: 1"=1200'

DATE: NOVEMBER, 2004

- New Gravity Sewer Connections Along Rt. 20
- 225 Acres Developable Land

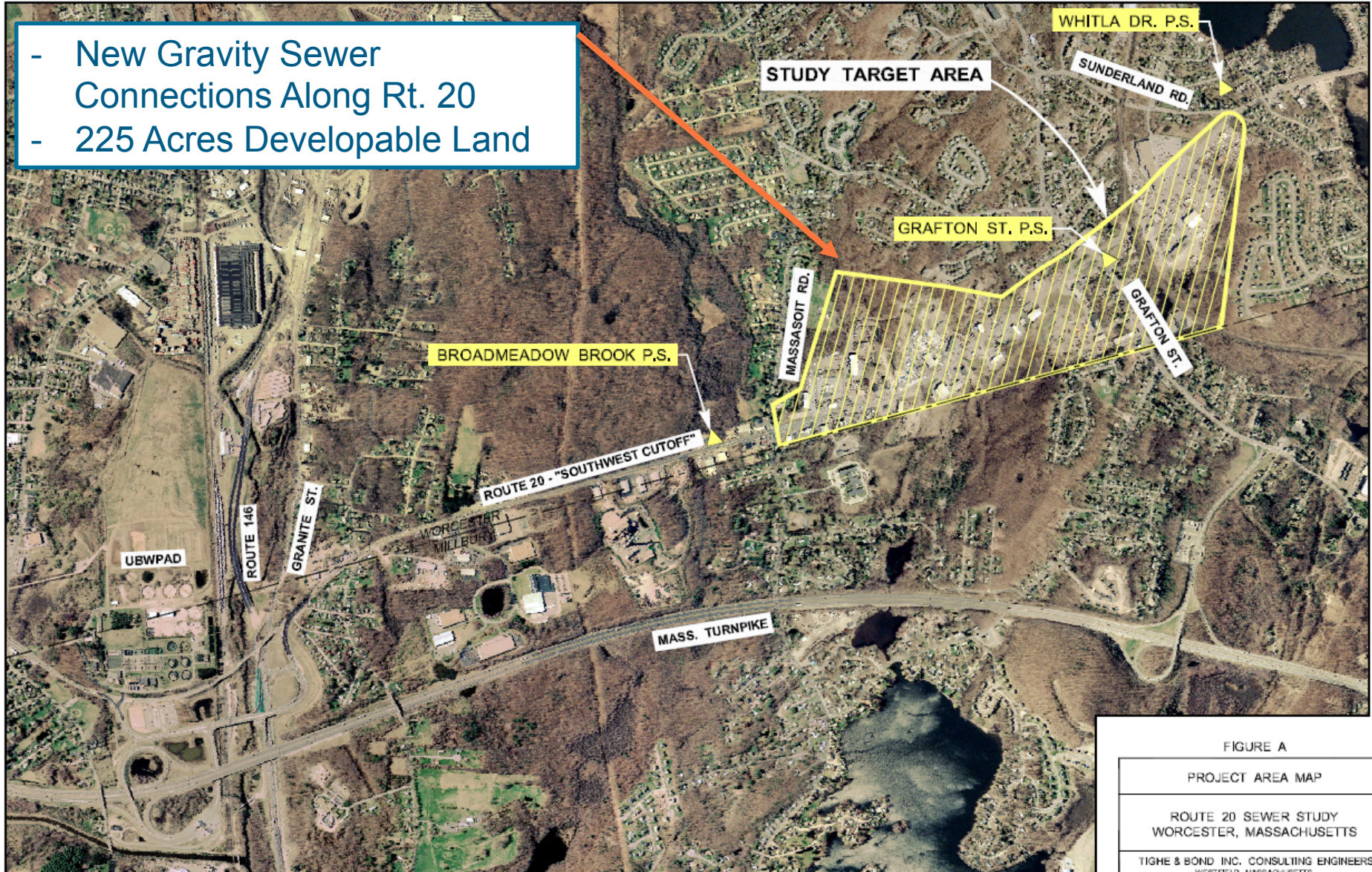


FIGURE A

PROJECT AREA MAP

ROUTE 20 SEWER STUDY
WORCESTER, MASSACHUSETTS

TIGHE & BOND INC. CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS

SCALE: 1"=1200'

DATE: NOVEMBER, 2004

- Reroute Whitla Drive PS FM
- Existing FM becomes Bypass

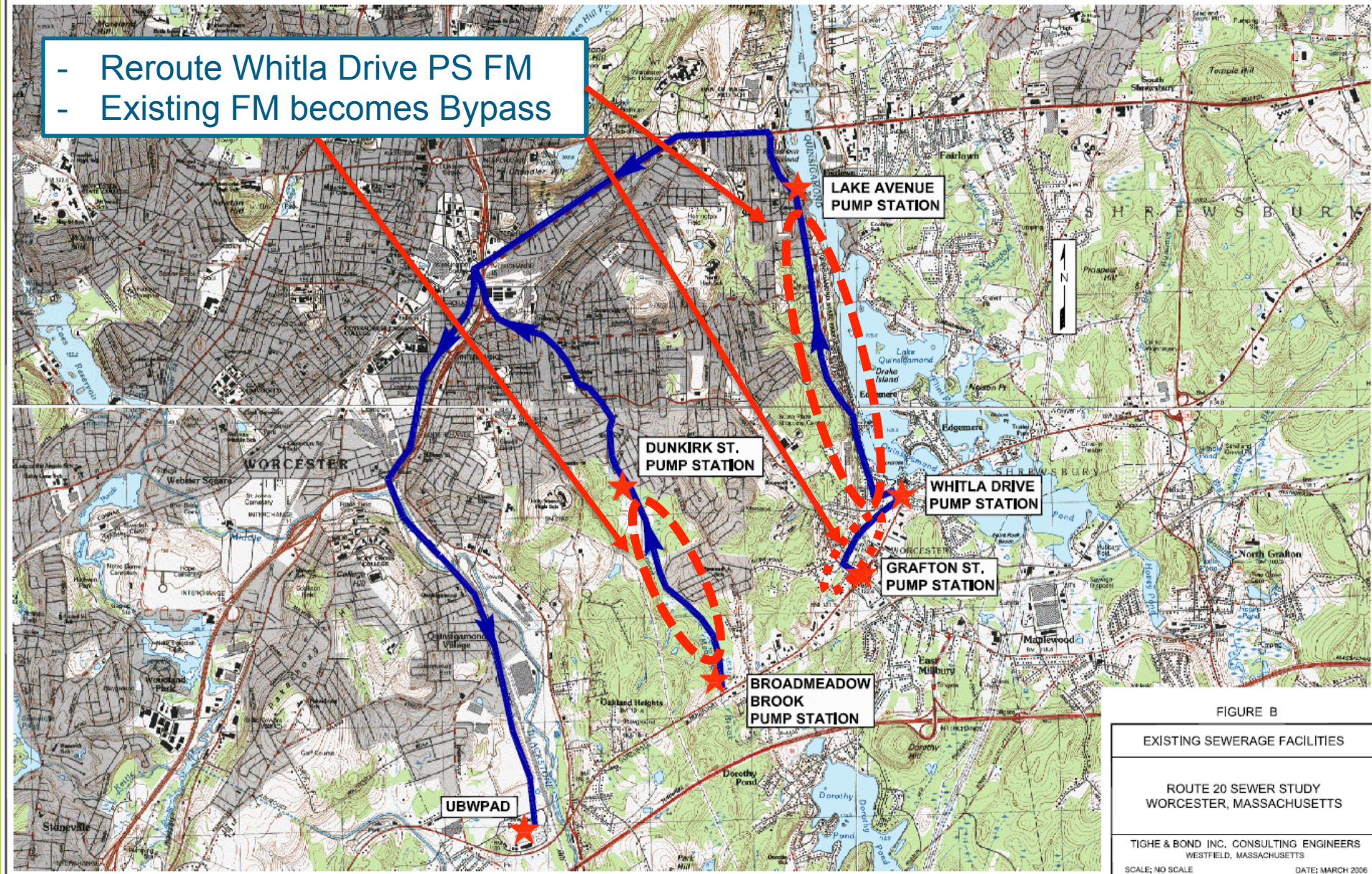


FIGURE B

EXISTING SEWERAGE FACILITIES

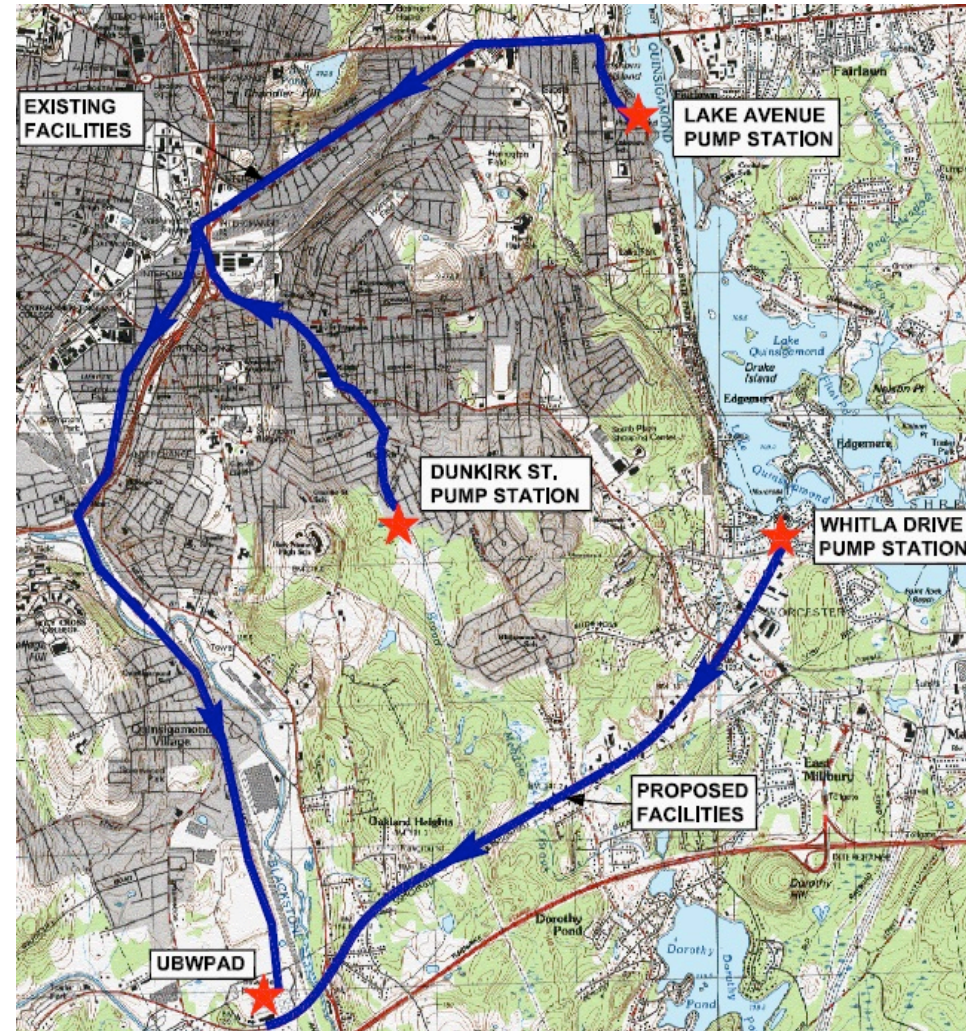
ROUTE 20 SEWER STUDY
WORCESTER, MASSACHUSETTS

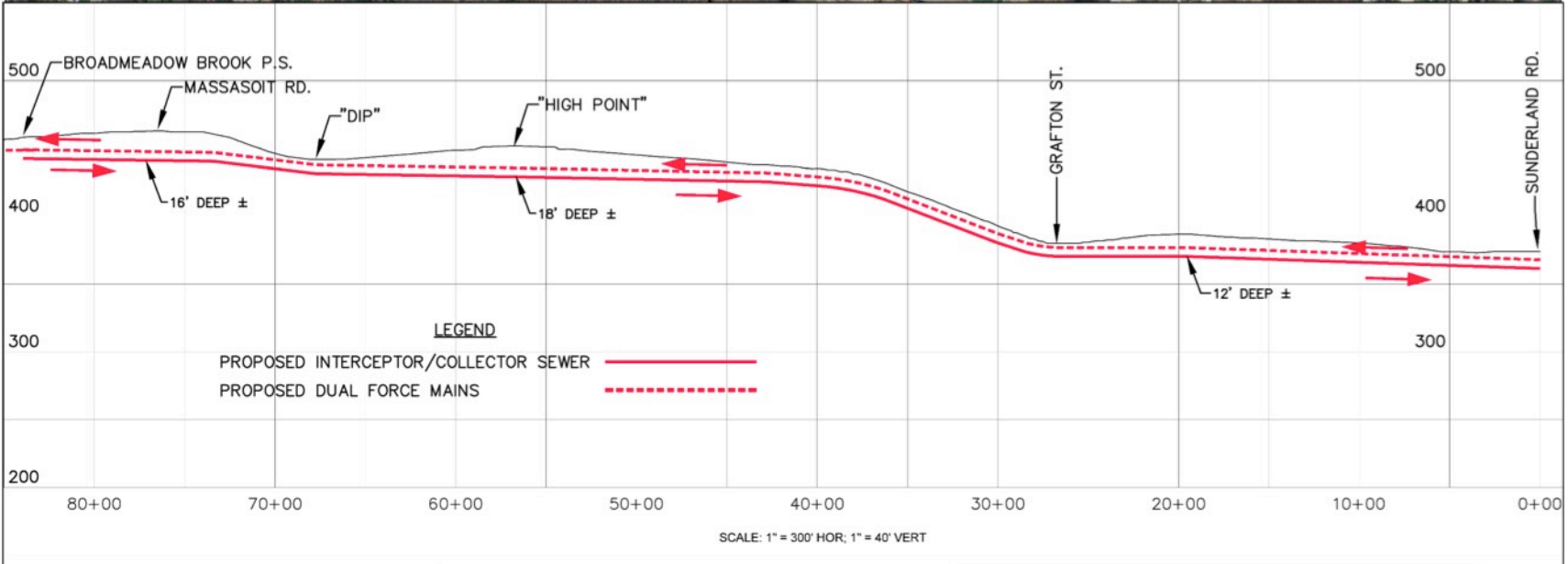
TIGHE & BOND INC., CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS

SCALE: NO SCALE DATE: MARCH 2006

Recommended Sewer Solution

- 19,300 feet of collector sewers (SDR35)
- 11,500 feet of dual 16-inch force mains (C905 PVC)
- An 1,100 foot bridge crossing over the Blackstone River and Route 146
- A new elevated sewer connection to the UBWPAD





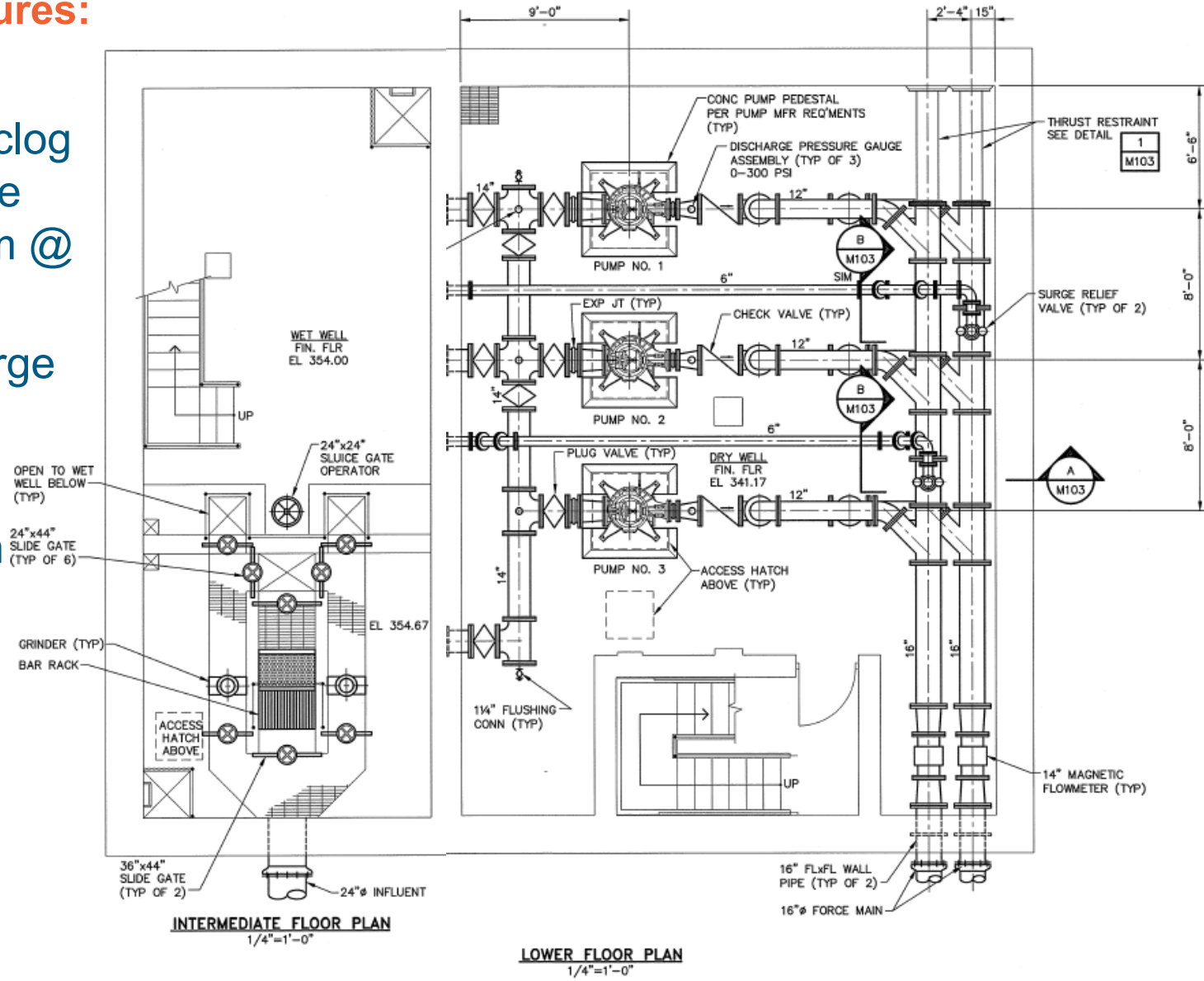


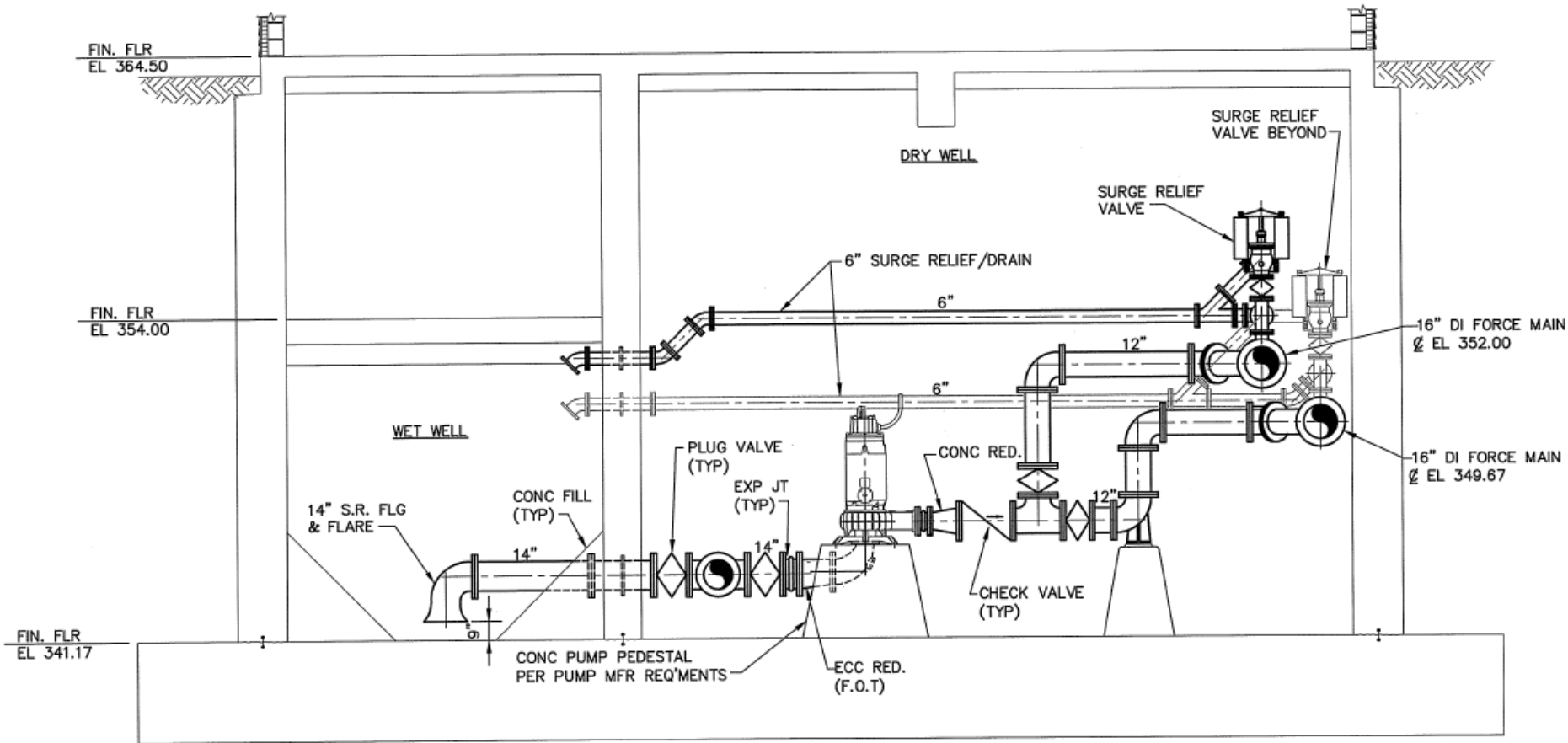
New Whitla PS Design Considerations

- 240-ft Static Head, 270-ft TDH!!
- Capacity increase to 5.76 mgd from 2.0 mgd
 - Rt. 20 Corridor
 - Broadmeadow Brook PS flows
 - Grafton St PS flows
 - Shrewsbury 1 mgd contribution allowance
- Long Retention Times (H₂S / Odors)

New Station Features:

- Wet / Dry Pit
- (3) 250 HP non-clog dry pit submersible pumps. 2,000 gpm @ 270' TDH
- Dual FM Discharge
- Influent channel grinders
- 2000 CFM Drum Scrubber
- New 600 kW generator





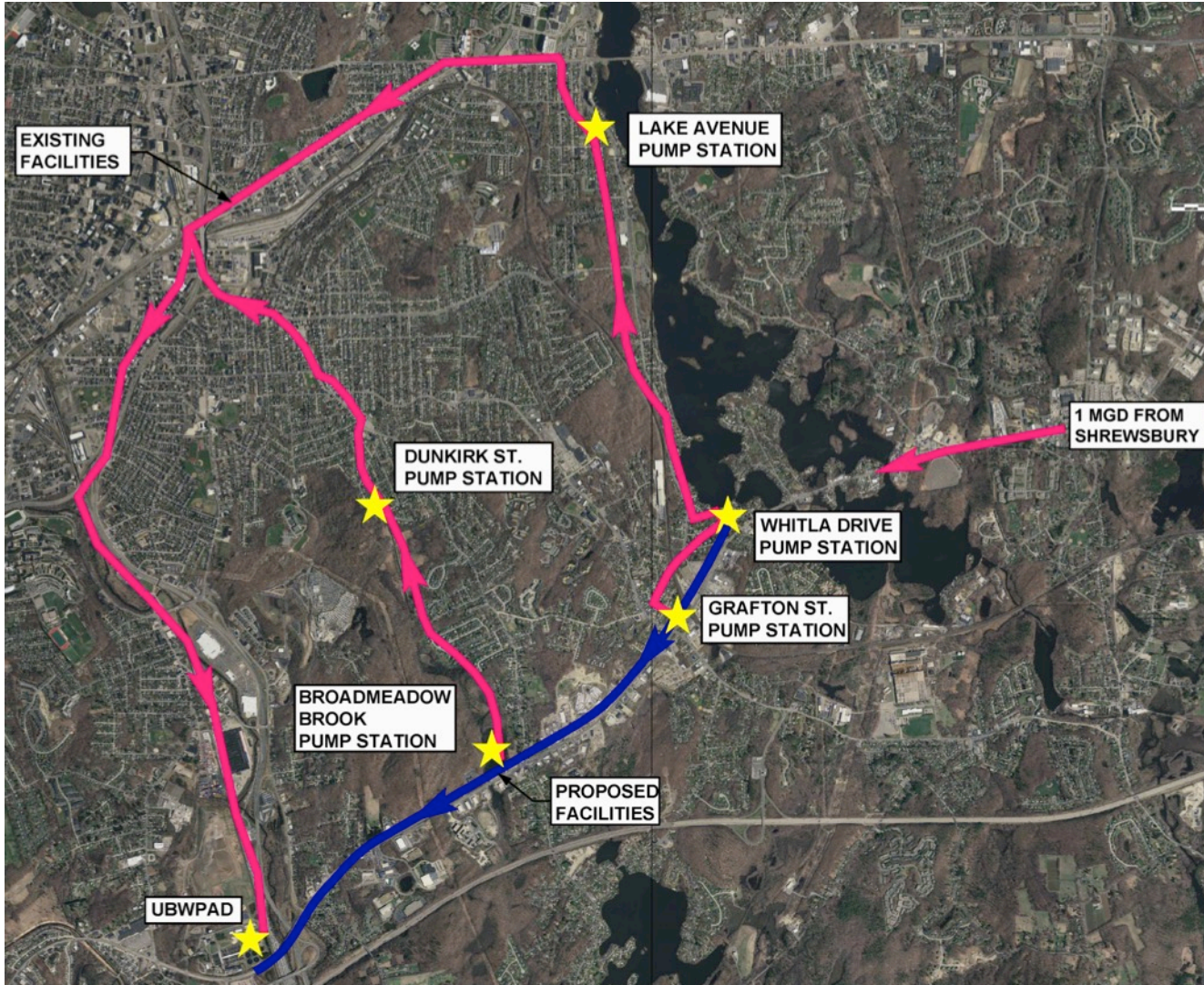
SECTION

1/4"=1'-0"

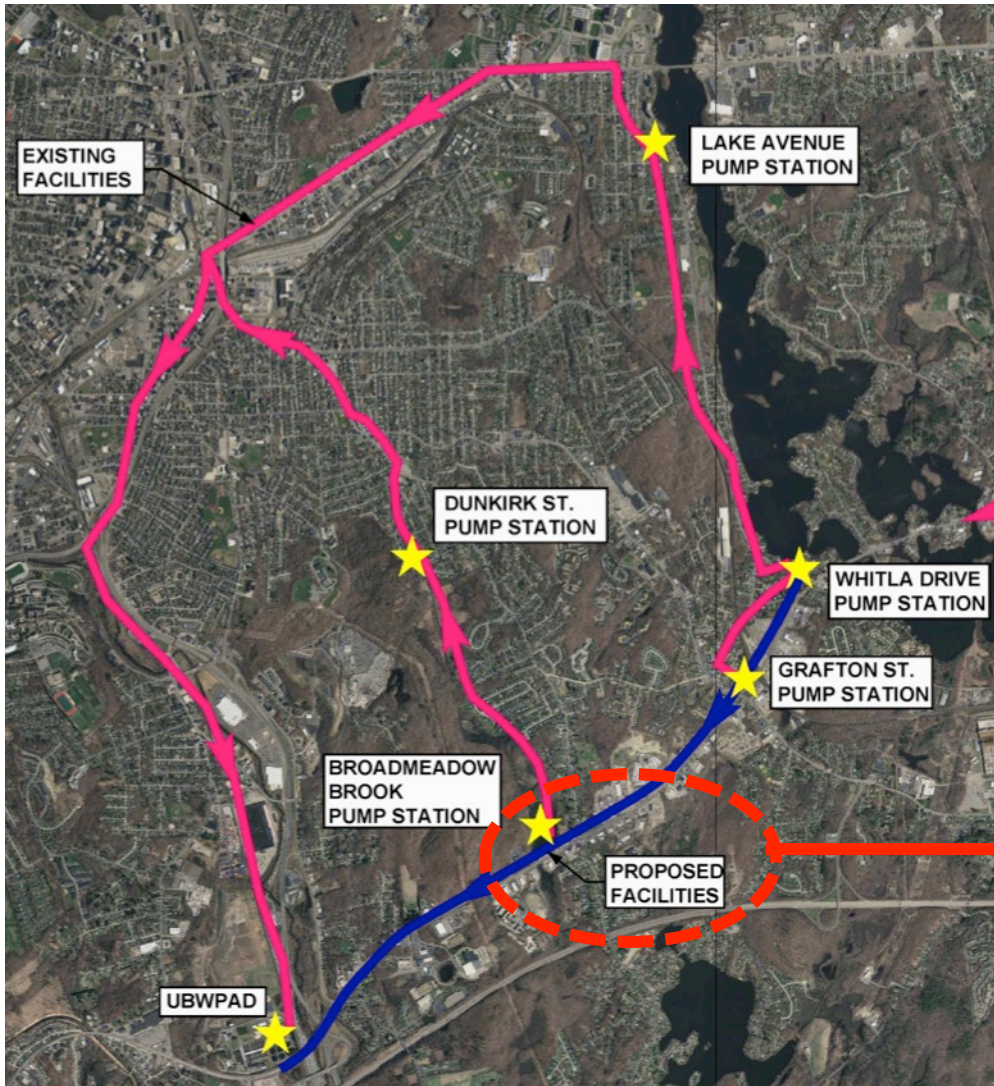


Odor Contingency Plan

- 10 Hour Average FM Retention Time
- Anaerobic Conditions



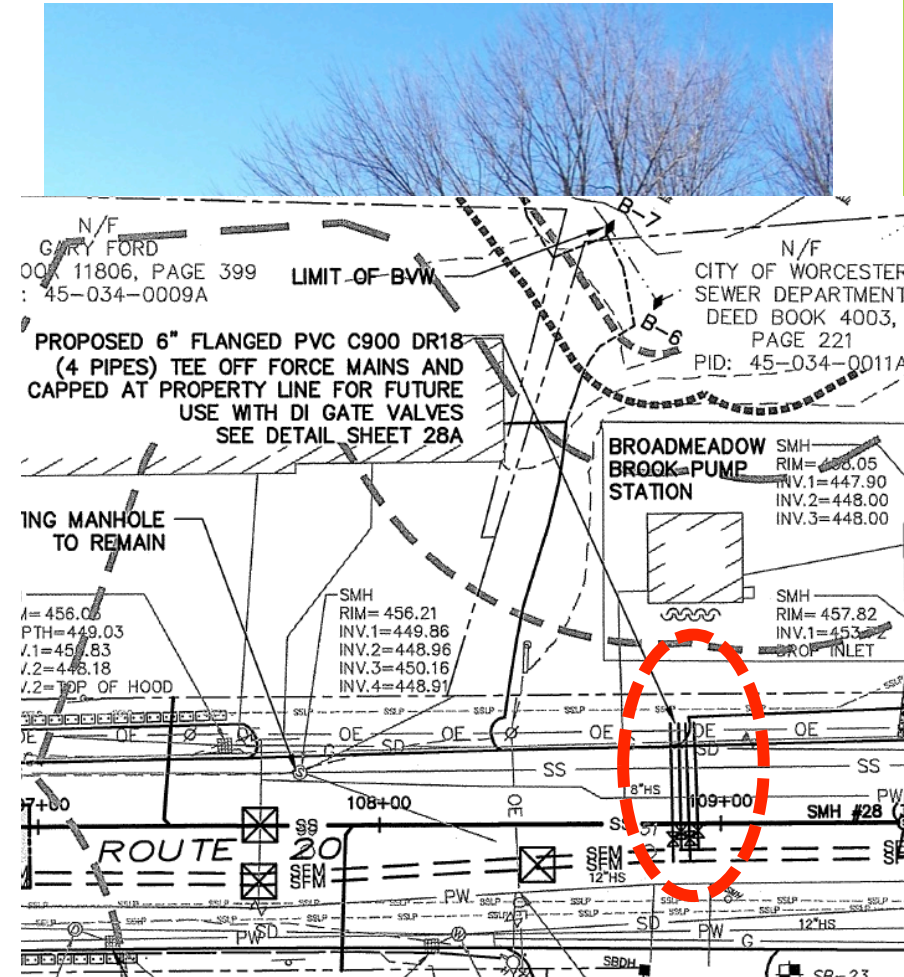
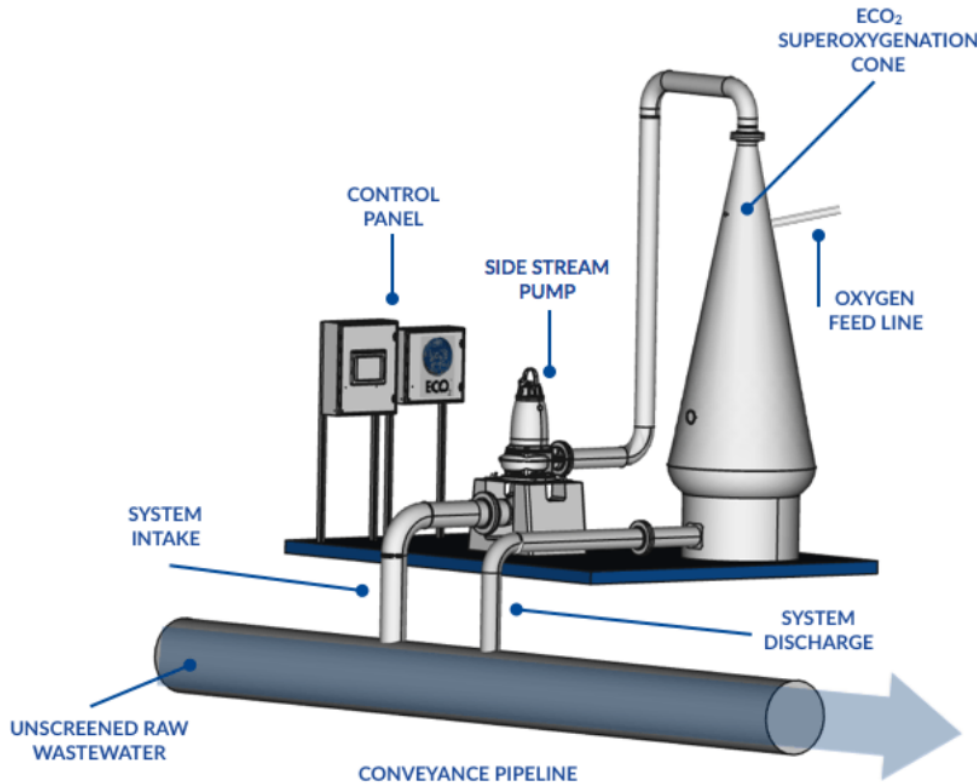
Odor Contingency Plan



Odor Contingency Plan

• Broadmeadow Brook PS – Potential Future Odor Control Facility

- House Future Oxygenation Odor Control System
- 4 Pipes T'd to FM closer to discharge MH
- Monitor H₂S and odor complaints



Project Design & Coordination Hurdles

- **Four Lane MHD State Highway**
- **MassDOT Coordination**
 - Permitting & Review Time
 - Pavement Restoration
 - Significant Traffic Concerns
 - High Traffic Area
 - High Travel Speeds
 - Extensive Traffic Management Plans
 - Police Details
 - Continuous Access to Properties



Project Design & Coordination Hurdles

- **Numerous Stakeholders**

- City of Worcester DPW & Parks
- City of Worcester Water Department
- UBWPAD (WWTP)
- MassDOT
 - Traffic/Permits Division
 - Bridge Division (Boston & Regional)
- Police Details
 - State Police
 - Worcester Police
 - Millbury Police
- Properties owners along corridor
- Town of Millbury
 - Millbury Sewer
 - Aquarion Water Department
- Broadmeadow Brook Wildlife Sanctuary
- MassDEP (SSO's at Whitla Pump Station)

Project Design & Coordination Hurdles

- **Deep Excavation Cuts on Gravity Line (18-20ft)**
- **Railroad Crossings (2 – Worcester / Providence RR & CSX RR)**
- **Geotechnical Concerns**
 - Rock Excavation
 - Unsuitable Soils at UBWPAD (Pipes Supported on Piles)
 - Glacial Till (Slow Progress)
- **Trench Width – 1 Gravity & 2 Force Mains**
- **Connection at UBWPAD Junction Structure**
 - Modify Existing Junction Structure
- **Inverted Siphon**
- **Bridge Crossing (Rt. 146 / Bike Path / Blackstone River / RR)**

Weighing the Benefits

Costs & Hurdles

Benefits

Stakeholder
Coordination

Construction
Coordination

New Construction
Costs

Broadmeadow Brook
Wetland Protection

CSO Abatement &
Reduced Wet
Weather Issues

Reduced Operational
Costs of 2 Pump
Stations

Industrial &
Commercial
Development

Where we are now?

- **State & Local Funding**
 - Obtained \$10M
- **Rt. 20 Sewer Contract**
 - Bid Result Fee: \$16.1 M
 - Contractor: P. Gioioso & Sons, Inc.
 - Field Work Started December 2017
- **Whitla Drive PS**
 - Bid Result: \$6.1 M
 - Contractor: Methuen Construction
 - Field Work Started December 2017



Thank You!



Project Benefits

Economic Benefits

- Encourage Commercial & Industrial Development

Environmental & Operational

- Relieving wet weather capacity concerns & SSO's
- Eliminating 3.3 MGD of peak flow from the Quinsigamond Ave CSO treatment facility
- Positive step relative to City's CMOM goal

Project Benefits

Environmental & Operational *(continued)*

- Reduces the City's operational costs for 2 Pump Stations
 - Broadmeadow Brook & Grafton St PS
- Eliminates troublesome Broadmeadow Brook sanitary force main, located in a valuable wetland resource area
- Significantly reducing wastewater flows to current City facilities
- Significantly reduce flow to Dunkirk Avenue Pump Station
- Significantly reduce flow to Lake Avenue Pump Station

Capacity Increases

	Existing	Proposed
Average Flow (gpd)	658,000	1,450,000
Peak Flow (gpd)	2,000,000	5,760,000
Pumps	1 @ 800 gpm	1 @ 2,000 gpm
	1 @ 1,200 gpm	1 @ 2,000 gpm
	1 @ 1,500 gpm	1 @ 2,000 gpm
Generator	75 KW	600 KW
Whitla 2 PS (gpd)	72,000	Not required

Design Criteria

- **Force Mains**

- 16-Inch Dual FM
- C905 PVC Sewer Pipe
- 11,500-ft
- 240-ft static lift

A

- **Pumping Equipment**

- 2,000 gpm @ 270-ft TDH
- Dry Pit Submersible Non-Clog (Qty 3)

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Layout Plan view

