

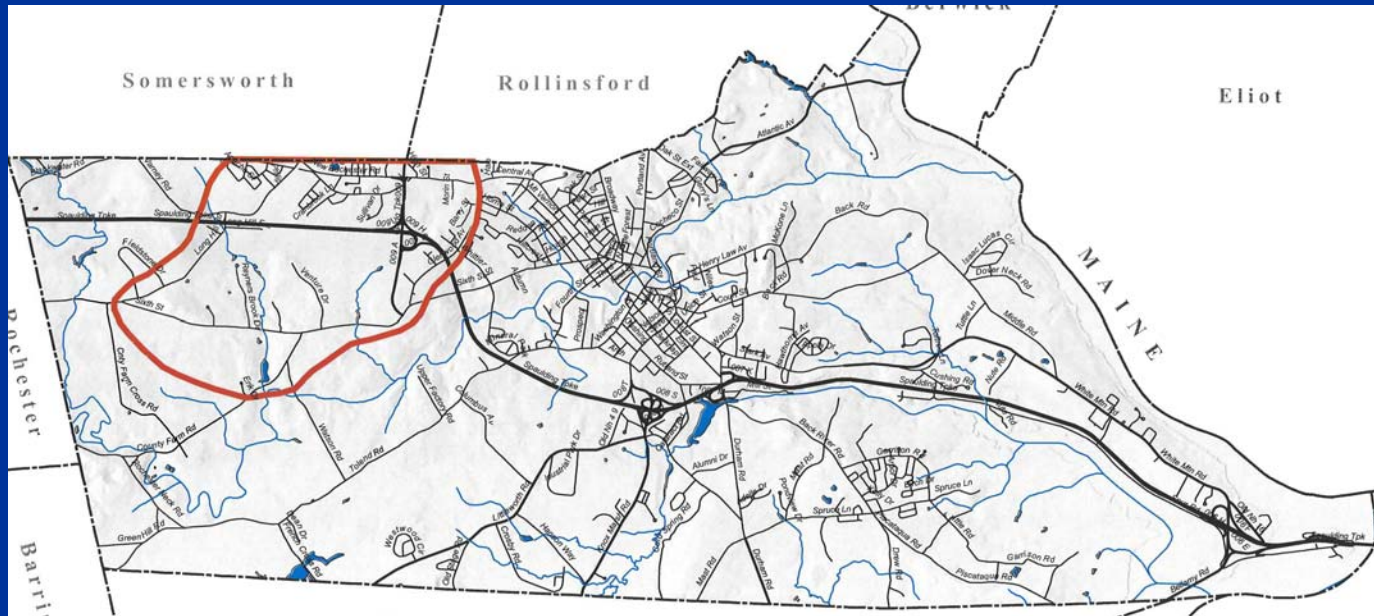


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PROJECT AREA





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PROJECT TEAM

Paul Cote, PE
Senior Project Manager

Kristen Berger
Project Engineer

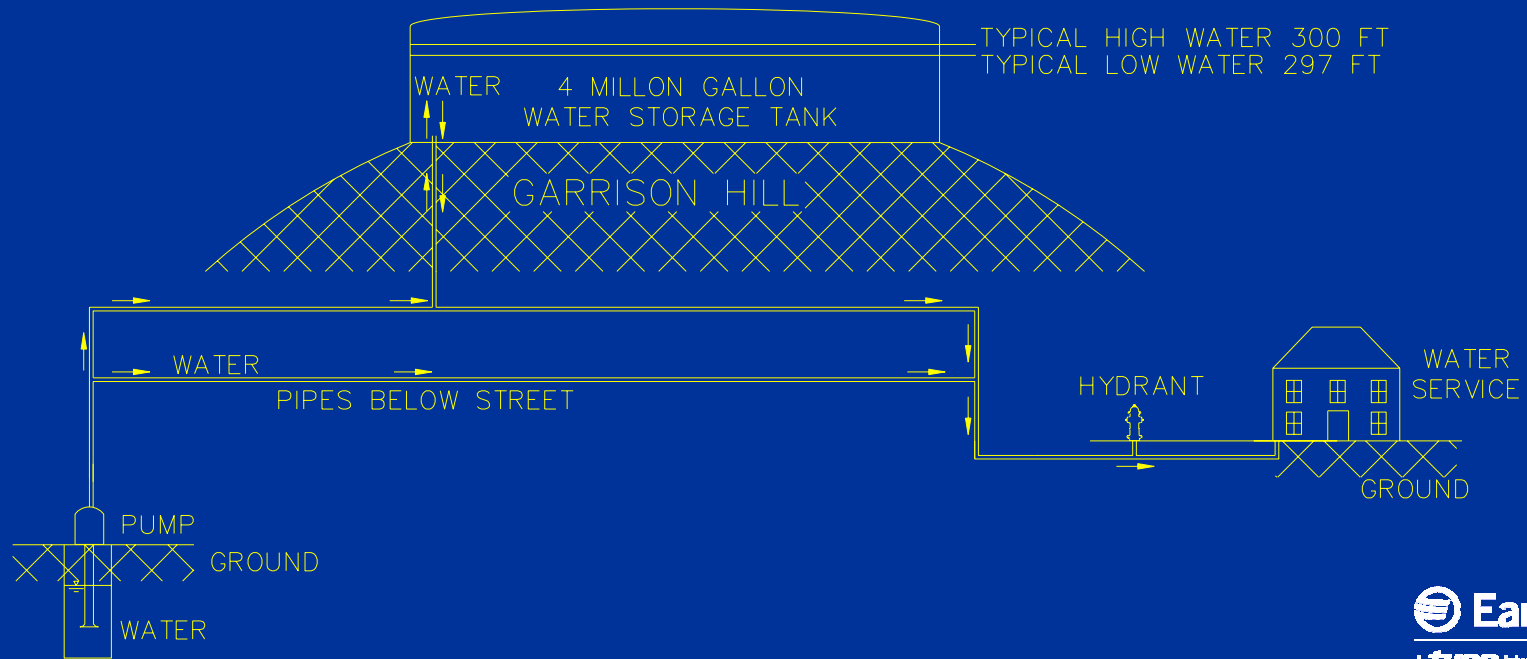


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SCHEMATIC OF DOVER WATER SYSTEM





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EARTH TECH TASKS

- Review Historical Data
- Attend Neighborhood Meeting
- Conduct Fire Flow Tests
- Install Pressure Data Recorders
- Investigate Alternatives
- Utilize Computer Hydraulic Water Model
- Compare Advantages & Disadvantages
- Prepare Cost Estimate



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HISTORICAL PRESSURE ISSUES

- Pressures Low 40 psi Range
 - Old & New Rochester Roads Area
 - Sixth Street Area
- Customer Complaints
 - Neighborhood Meeting
- Industry Standard
 - Min. Working Pressure 35 psi (Non-emergency)
 - Min. Working Pressure 20 psi (Emergency)
 - Normal Working Pressure 60 to 80 psi





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FIRE FLOW TESTS

- Purpose
 - Provide data to confirm the model calibration in the North End,
 - Estimate flow available for fire protection at specific locations in the North End,
 - Indicate relative strengths and weaknesses of the North End of the water system.
- Results
 - Sufficient Fire Flow provided in North End while maintaining adequate minimum water pressure of 20 psi



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PRESSURE DATA RECORDERS

- Pressure recorded every 2 minutes over 4.5 days from Thursday, 8/3/06 to Tuesday, 8/8/06

	Hydrant #55 on Old Rochester Road	Hydrant #984 on Sixth Street
Average Pressure	39.5 psi	38.2 psi
Maximum Pressure	42.1 psi	44.1 psi
Minimum Pressure	31.7 psi	34.8 psi

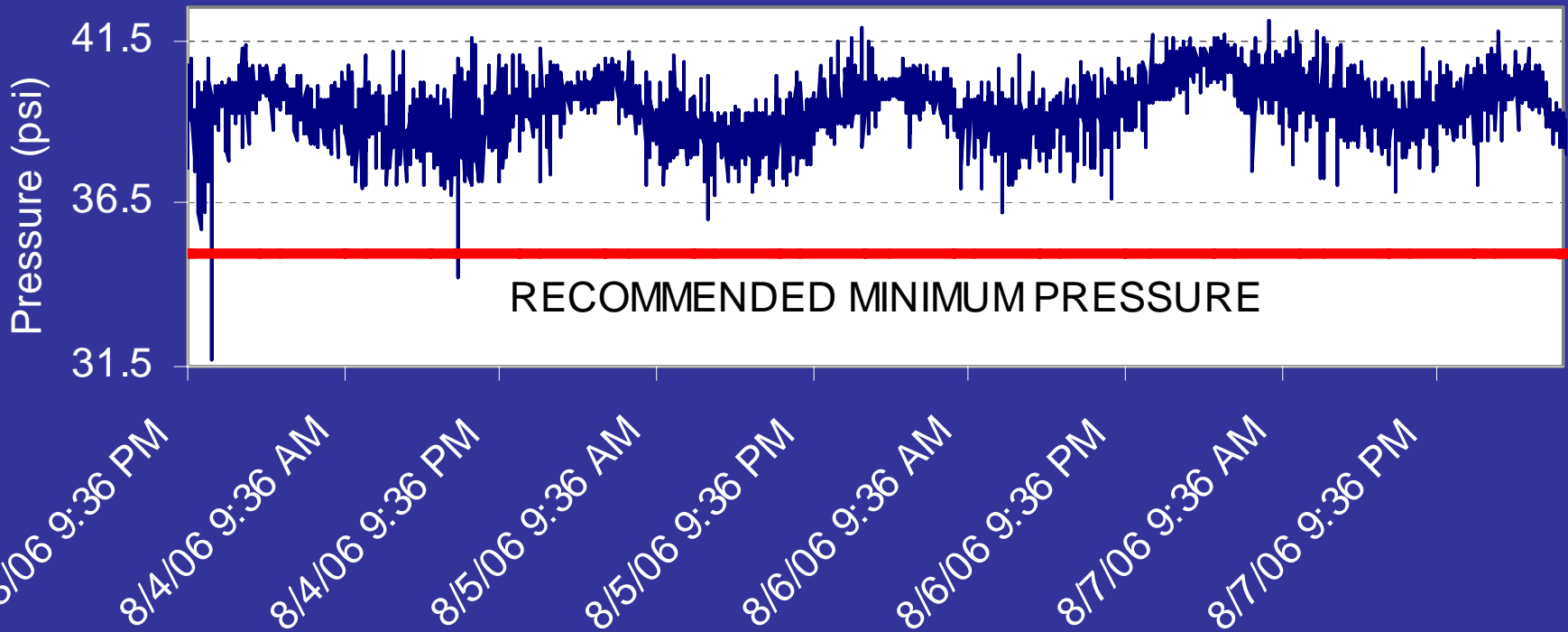


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PRESSURE DATA - OLD ROCHESTER ROAD - HYDRANT #55



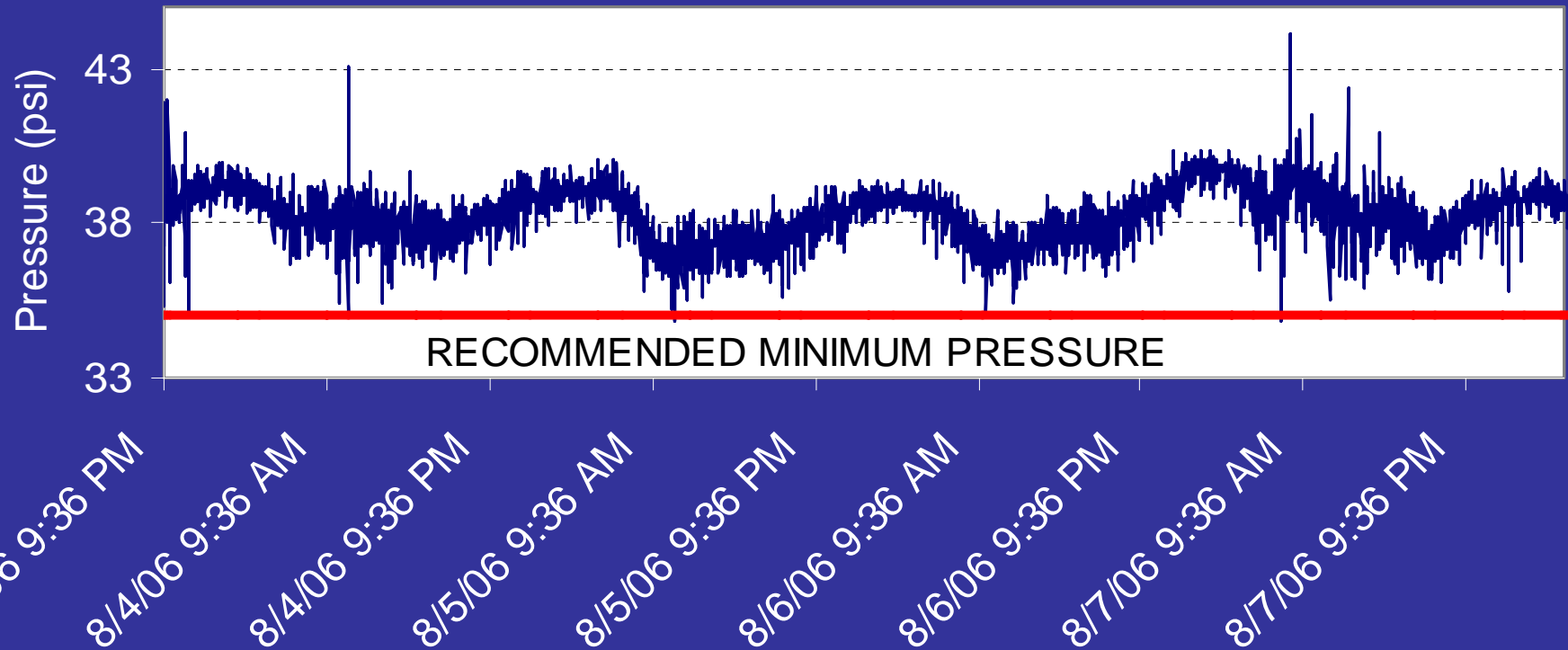


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PRESSURE DATA - SIXTH STREET - HYDRANT #984





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PRESSURE DATA RECORDERS

- Pressures recorded every 2 minutes over 4 days from Friday, 10/06/06 to Tuesday, 10/10/06

	83 Old Rochester Road	Hydrant #55 on Old Rochester Road
Average Pressure	37.3 psi	39.0 psi
Maximum Pressure	46.0 psi	43.0 psi
Minimum Pressure	13.5 psi	32.0 psi

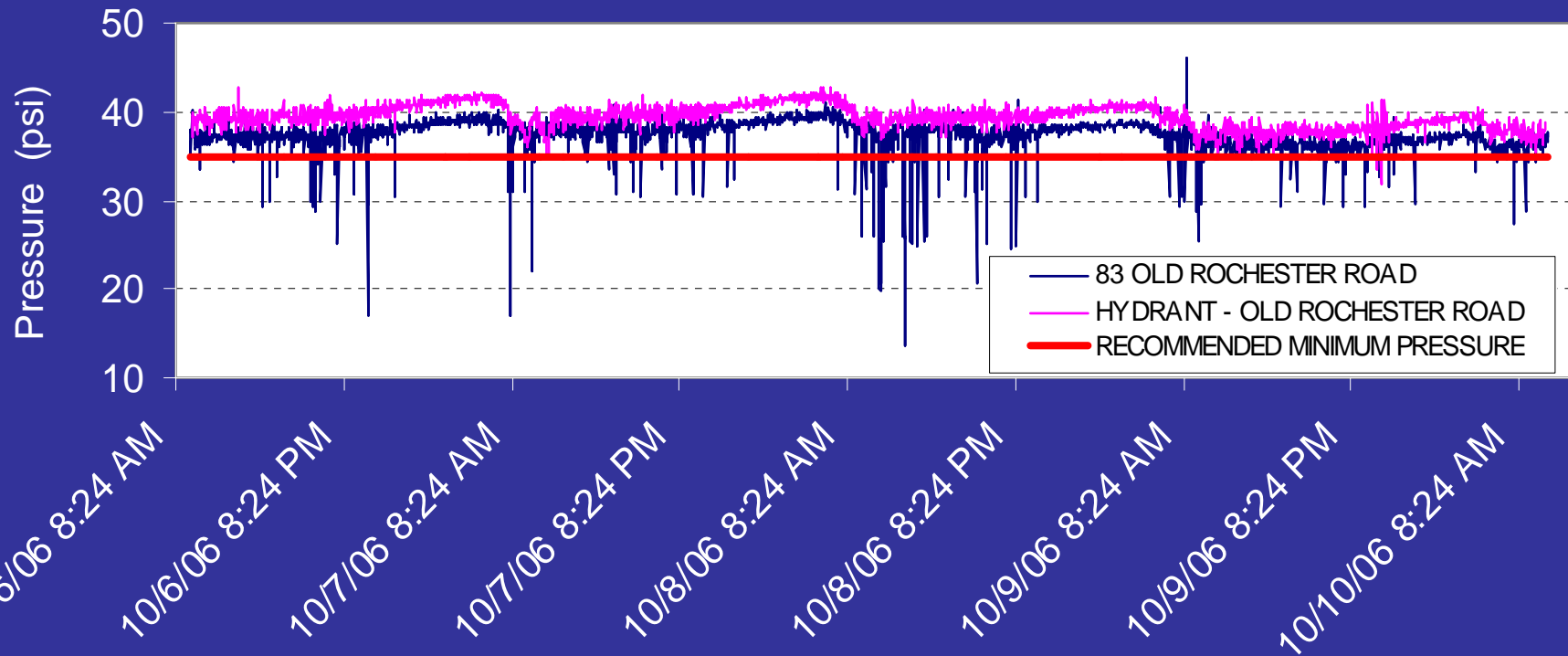


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PRESSURE DATA - 83 OLD ROCHESTER ROAD AND HYDRANT





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ANALYSIS

- Computer hydraulic water model
- Field tests (Fire Flow and Pressure Recording)
- Elevation constraints
- Minimum pressure requirement of 35 psi is met by the existing water system service area!

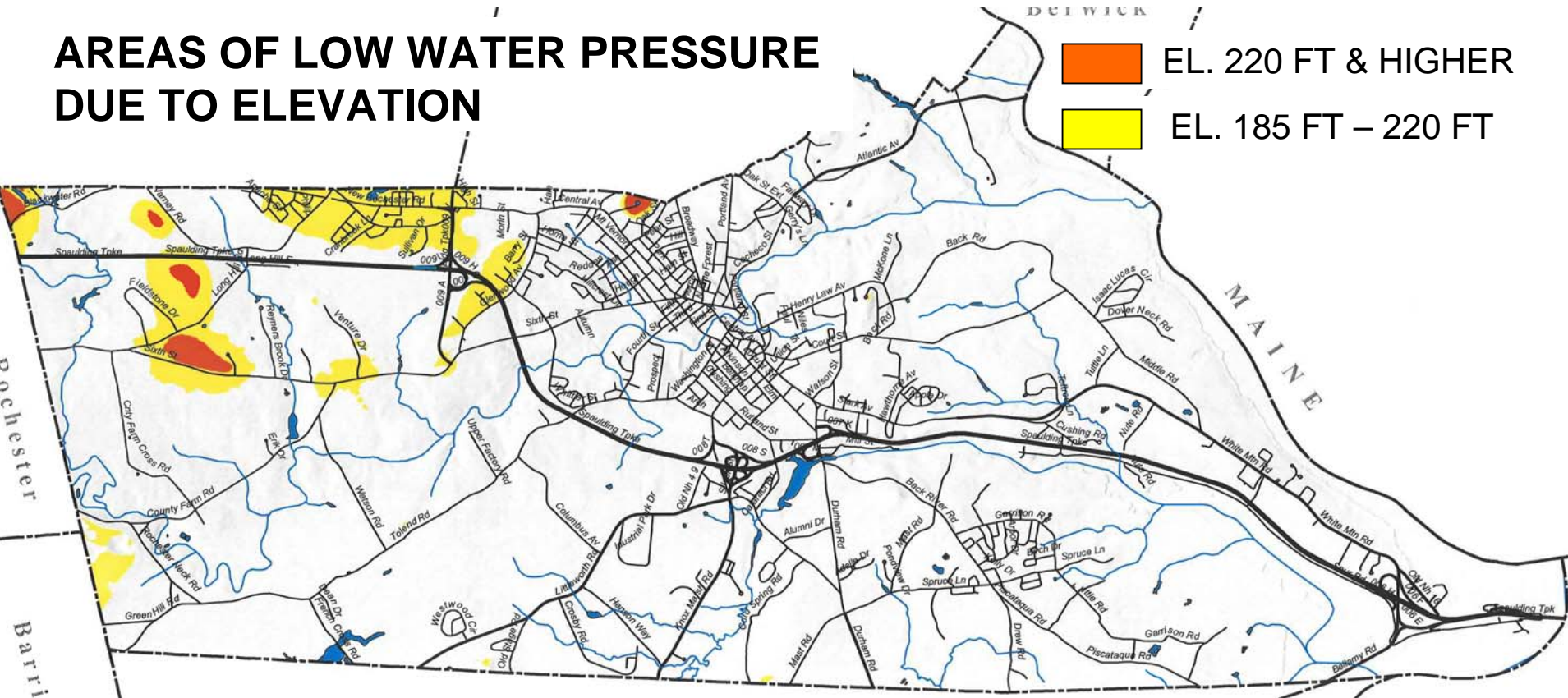


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AREAS OF LOW WATER PRESSURE DUE TO ELEVATION





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FINDINGS

- Water System Meets Required Standards
- House services Investigated appeared 'normal'
- Recorded pressures at a home with low pressure
- Operational changes can be made to offer small improvements in daily pressure
- If the City wants to dramatically increase pressures it will cost money



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SYSTEM IMPROVEMENTS – TANK WATER LEVEL

- Currently, City operates water level in tank 5 feet below overflow level
- Increase water level in tank - maximize use of the water storage tank and increase water pressures throughout water system
- Change in operation will increase pressures by almost 2 psi throughout water system



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SYSTEM IMPROVEMENTS – WATER MAIN INSTALLATION

- Ongoing water main design for Old Rochester Road and Longhill Road – provides pipe “loop” in North End
- Replace water main on Central Ave with 16-inch water main
- Primary benefits increase in fire flow, stabilization of pressures and improved water quality
- Slight increase in available pressure



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INCREASE MINIMUM PRESSURE GOAL

- City may decide to increase minimum pressure goal to 50 psi
- Elevation constraints
- Pumping required to increase pressure



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SYSTEM IMPROVEMENTS – BOOSTER PUMPING

- Construction of booster pumping station for North End is not recommended without a dedicated water storage tank
- Booster pumps alone would operate all of the time to maintain pressures
- During maintenance, one or more pumps would be unavailable which could impact water pressures
- Does not provide adequate system redundancy and safety
- Typically used for small developments, not large portions of distribution systems.



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SYSTEM IMPROVEMENTS – NORTH END PRESSURE ZONE

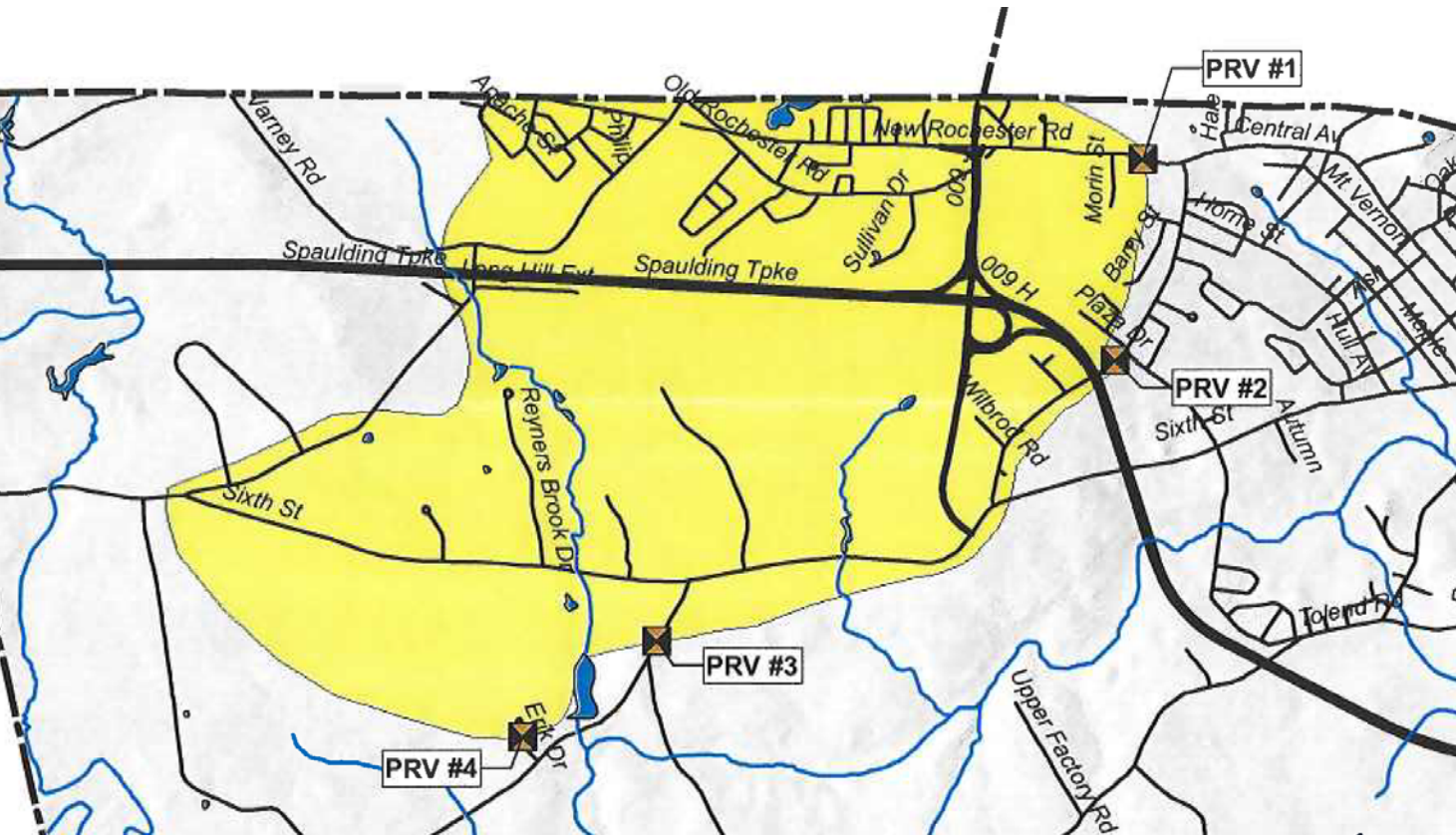
- Booster Pumping Station
- 1.5 Million Gallon Water Storage Tank
 - Elevated (Hydropillar)
 - Standpipe on Hill
- Pressure Reducing Valves (Manholes)






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**PROPOSED
NORTH END
PRESSURE
ZONE**



A **tyco** International Ltd. Company



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SYSTEM IMPROVEMENTS – CONNECTION TO ADJACENT SYSTEMS

- Water Connection to Somersworth and Rochester
 - Approximately 21,700 feet water main
 - Pressure Reducing Valves
 - Large “Master” Water Meters
- Potential water quality issues
- Less control over water system
- Political issues



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PLANNING COST ESTIMATES* - NEW PRESSURE ZONE

2006 Estimated Construction Costs**	
1.5 Million Gallon Hydropillar	\$3,240,000.00
Booster Pumping Station	\$710,000.00
Pressure Reducing Valve Systems	\$250,000.00
40% Engineering & Contingency	\$1,680,000.00
Total Budget Cost Estimate	\$5,690,000.00

*The cost estimate does not include land acquisition or cost to provide three phase power to the site

**Construction costs are based on year 2006 construction (ENR CCI 7763).
Cost estimates must be adjusted after final design.



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PLANNING COST ESTIMATES* – WATER CONNECTION

2006 Estimated Construction Costs**	
Water Main	\$1,850,000.00
Water Meter Systems	\$350,000.00
Pressure Reducing Valve Systems	\$250,000.00
40% Engineering & Contingency	\$930,000.00
Total Budget Cost Estimate	\$3,260,000.00

*The cost estimate does not include land acquisition or cost to provide three phase power to the site

**Construction costs are based on year 2006 construction (ENR CCI 7763).
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QUESTIONS?



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DECISION MATRIX

1 = Poor, 2 = Good, 3 = Excellent		Proposed System Improvements	
Factor	Weight	Pressure Zone	Connection
System Redundancy	15%	3	2
Additional Pressure Available	15%	3	3
Available Flow	15%	3	2
Effect on water quality	10%	2	1
Community opinion	10%	2	2
Regulatory constraints	5%	3	1
Intermunicipal agreements and regulations	10%	3	1
Property owned by City	5%	1	3
Cost Factors (Average of the following items.)	15%	1.7	1.7
Estimated construction cost		1	2
Maintenance		1	2
Cost to purchase water		3	1
RELATIVE SCORE		1.75	1.50