

Water System Project Narrative

Discussion of the Problem to be Solved

The Dunstable Water Department (DWD) owns and operates a public water system that consists of two wells. The distribution system is pressurized using two buried 5,000-gallon hydro-pneumatic tanks. The well pumps operate to maintain pressure in the distribution system. The system serves a drinking water population of approximately 598 persons per day in the winter and 234 persons per day in the summer when school is out. The service area has 101 service connections which consist of 90 residential, 7 municipal, and 4 commercial/industrial users.

The public water system currently utilizes an existing hydro-pneumatic storage tank system that is over 100-years old and past its expected useful life with documented deficiencies. This is the only finished water storage facility in the system and lacks redundancy. It is also no longer in compliance with MassDEP's Guidelines for Public Water Systems. The system does not have an emergency interconnection with any neighboring water systems, so a failure of the tank would impact 100% of the Dunstable water system. In addition, the system has been experiencing inconsistent pH readings in the finished water leaving their well site.

In July 2017, the DWD received a Notice of Noncompliance (NON) from the Massachusetts Department of Environmental Protection (MassDEP) based on the findings during their Sanitary Survey. MassDEP subsequently issued an Administrative Consent Order with Penalty (ACOP-CE-18-5D00004407) in May 2018. The ACOP identified concerns with inconsistent pH leaving the well site as well as issues with the existing hydro-pneumatic tanks. As part of the ACOP, MassDEP is requiring that Dunstable submit a WS33 Permit for the design of a new elevated 75,000-gallon water storage tank and water main replacement along Pleasant Street for improved hydraulics in the system. The new water storage tank would replace the existing hydro-pneumatic system. In addition, MassDEP has requested the corrosion control treatment process be optimized to ensure that the pH of the water entering the system is at least 7.0 or greater.

The existing water main on Pleasant Street between Pond Street and the US Post Office (#170) is understood to be a 4-inch asbestos cement (AC) pipe. This stretch of pipe was previously determined by another consultant to be undersized for connection of a new water storage tank and needs to be upgraded to 12-inch diameter ductile iron as part of the project. In addition to being undersized, AC pipe can be prone to leaks/breaks. Replacing this section of pipe will improve hydraulics in the system and provide a more reliable pipeline.

In addition to the current ACOP that the Town needs to comply with, the condition of the existing hydro-pneumatic tanks and the inconsistent pH of the finished water is a potential serious threat to the public and for future reliability of the supply. A failure of the tanks would impact all users of the system; therefore this project would be classified as Tier IV.

Public Health Issues

As noted in the NON (page 19), MassDEP observed the following issues with the existing hydro-pneumatic tanks during their Sanitary Survey in 2017:

1. It is unknown when the last time the tanks were cleaned or inspected.
2. Leaks were observed in numerous locations on one tank.
3. The site glass on tank is full of iron and manganese deposits which have the potential to cause a bacteria contamination.
4. The valves have been exercised in the past but not for a number of years.
5. If one tank has a problem, the operators will need to close the valve and operate off one tank, however it is unknown if the valve will close.

Work to be Completed

The Water Infrastructure Improvements project is broken down into three components, each of which will be bid as a separate construction contract. These components include the following:

- Contract 1 – Elevated Storage Tank
- Contract 2 – Pleasant Street Water Main Upgrades
- Contract 3 – Well Station and Access Road Improvements

A summary of the work included as part of each Contract is provided below:

Contract 1 – Elevated Storage Tank

1. Construction of a new 75,000-gallon, pedestal type, elevated steel storage tank to replace the existing hydro-pneumatic tanks.
 - a. Approximate tank height = 130 FT to overflow.
 - b. Diameter = 27 FT
 - c. Tank Site Location: 108 Pleasant Street.
 - d. Tank will include a passive type mixing system for improved water quality.
 - e. Tank design will meet the MassDEP Guidelines for Public Water System requirements for Finished Water Storage (Chapter 8).
2. The tank will be connected to the distribution system at Pleasant Street via new 12-inch DI piping (approx. 600 LF). The existing 4-inch AC pipe on Pleasant Street will be upgraded to a 12-inch DI pipe as part of Contract 2 work.
3. Site piping will include gate valves, hydrants, and appurtenances.
4. The existing site is undeveloped forest land, so clearing and grubbing will be required to allow for construction of the new tank.
5. A chain link fence will be installed around the tank for security.
6. A temporary gravel access road will be constructed as part of this Contract. The site is also the future location of a proposed new Public Safety Building for the Town (not part of this contract). A permanent access driveway will be incorporated as part of that future project.
7. New electrical service will be brought to the site. Tank level will be controlled by distribution pressure at the well station.

Contract 2 – Pleasant Street Water Main Upgrades

1. Installation of approximately 1,800 LF of new 12-inch DI pipe to replace an existing 4-inch AC main that is undersized.
2. The project area is between Pond Street and the US Post Office (170 Pleasant St).
3. A 12-inch connection to the new elevated storage tank piping (coordinated with Contract 1)
4. A total of 16 existing water services will be replaced and connected to the new water main. This includes one 6-inch service that feeds a private road.
5. Associated gate valves, fittings, and hydrant assemblies are also included.
6. Road restoration.

Contract 3 – Well Station and Access Road Improvements

This Contract includes various upgrades at the Dunstable Well Site (711 Main Street) to help optimize the existing potassium hydroxide (KOH) feed system, which is used for pH control of source water. Currently, there is one dedicated injection location that is utilized no matter what well pump is online. Chemical metering pumps located in Well Station 2 are flow paced off a master water meter located in an injection manhole downstream of both wells. Under the proposed conditions, each well pump will have its own dedicated magnetic flow meter for chemical pacing.

Upgrades at Well Station 1

1. Installation of a dedicated flow meter for the well pump and upgrades to chemical feed controls to optimize the KOH feed system.
2. Installation of a new 1" 100' sample line and tap.
3. Incorporation of all minimum required chemical feed controls per MassDEP Guidelines.
4. Associated electrical work and instrumentation/controls.

Upgrades at Well Station 2

1. Installation of a pre-cast meter vault on the existing discharge of Well No. 2 and dedicated flow meter.
2. Upgrades to the chemical feed system to optimize the KOH system.
3. Miscellaneous demolition inside Well Station 2.
4. Replacing the existing soft-starter with a new VFD for improved flow control on the well pump.
5. Associated Interior/Exterior Electrical Work and Instrumentation/Controls.

Access Road Improvements:

1. Widening of the access road from 10 FT to 14 FT and minor grade changes to the vertical profile to help smooth out steep areas for safer delivery of chemicals and routine visits.

Relative Importance

The relative importance of this project is that it's needed to comply with the current ACOP and NON that MassDEP has issued the DWD. Currently the reliability and water quality cannot be guaranteed, and public health and safety is threatened if there were to be a failure with the hydro-

pneumatic tanks or corrosion system. By replacing the hydro-pneumatic tanks with a new elevated atmospheric storage tank and optimizing the KOH feed system, public health and safety will be improved. This project would allow the Dunstable Water Department to be able to continue to provide safe drinking water to customers in compliance with all applicable regulations and help meet the requirements of the ACOP.