

LOW LIFT #2 (15HP) VFD Conversion Project

EXPLANATION OF WHY LENOX NEEDED TO DO THIS PROJECT

Distribution System Demand and Pumping Efficiency

Lenox has 2 Water Mains which leave the Water Plant, referred to as the Gravity Main and Force Main. The Gravity main water leaves the water plant at a very low pressure and picks up pressure as it flows down the mountain (via gravity). The Force Main uses pumps at the water plant to pump the water over the mountain into Town. These mains provide the water to town homes/businesses and fill the 2 storage tanks in Town.

In the fall of 2016 Lenox completed a 2 phase project. The project involved replacing the Town's Gravity Main which dated back to 1895. The old 8 inch and 10 inch cast iron water main was replaced with 12 inch ductile iron. The increase in pipe size caused an increase in flow down the Gravity Main. The increase in flow resulted in the Town's water tanks filling too fast and putting a strain on the Town's treatment plant filters, mostly during the summer months.

During the winter, spring, and fall, Lenox produces a lot less water than it does in the summer. In winter, spring, and fall the Town uses a Variable Frequency Drive (VFD) 5 HP Low Lift Pump Motor, to regulate the flow into Town. During these periods only 1 filter unit at the Treatment Plant is run, saving the Town a lot of energy usage having to only run 1 filter.

In the summer months when demand for water in Town increases we use a 15 HP Low Lift Pump Motor, and both filters units need to be running to keep up with demand. The 15 HP Motor has to be run at 100% and does not have the capability to be run at varying speeds like the 5 HP motor. Regulating flow to Town with this 15 HP motor is all or nothing. The added flow down the Gravity Main due to the larger 12 inch pipe and the 15 HP Motor running at full speed is a lot for the 2 water plant filters to handle. This causes a strain on the water plants equipment having to run at near maximum. This increase in flow also causes the 2 Storage tanks in Town to fill too fast. We were able to navigate through the summer of 2017 and 2018, but we realized we now needed to also install a Variable Frequency Drive on the 15 HP Motor as well.

THE SOLUTION

The solution to this problem was to install a new 15 HP capable VFD Motor which will enable us to regulate the flow of water coming into Town from the Treatment Plant. Controlling the water flow using a variable frequency drive motor will also save the Town a significant amount on electric bills as well.

Explanation of how the old pump worked:

- Old Motor runs at 100% speed = pump puts out close to 800 gallons per minute
 - o Each plant filter is producing about 400 gpm (about the maximum the filters can produce, causing high head losses and other filter problems due to the strain on the filters to run at their maximum)
 - o Tanks fill up fast
 - Newly treated water fills the tanks and is distributed to town homes/businesses

- Treatment plant needs to lower the rate so tanks do not overflow, most of town water then comes from the storage tanks
- this motor can only run at 100% all the time, using a lot of electricity

Explanation of how the new pump will work:

- New Motor runs at 80% speed (as an example) = pump puts out 600 gallons per minute
 - Each filter is producing about 300 gpm (a good flow for the filters to run at, head losses are minimized and it puts less strain on the filter equipment)
 - Tanks fill up slower
 - Newly treated water fills the tanks and is distributed to town homes/businesses
 - Treatment plant takes longer to fill the tanks, so water is dispersed better between the homes/businesses and the storage tanks. Thus less water is coming from just the storage tanks to supply the town, resulting in better water quality throughout the Town.
- This motor can be adjusted to varying speeds, running the motor at a lower speed will save electricity and lower electric bills

HOW WAS THIS PROJECT PAID FOR?

In November of 2017/April of 2018 the Lenox Water Department applied for and was awarded a Gap II Grant for Energy Efficiency and Clean Energy Projects at Drinking Water and Wastewater Facilities in Massachusetts. The Grant is through the Massachusetts Department of Environmental Protection. The Town of Lenox will pay for 30% of the project and Mass DEP Grant will pay for the remaining 70%.

WHO DID THE WORK?

Reliable Electric Motor Solutions, Elm Electric Inc., I&C Systems Engineering worked together to install the new VFD capable 15 HP motor. They ran all the wiring, and made the VFD controllable via the Water Plants SCADA system. The Lenox Water Department removed the old 15 HP Motor and replaced it with the new VFD Compatible Motor.

CONCLUSION

The project was completed and tested on September 18, 2018. The new VFD capable 15 HP motor is working great. This will allow the Lenox Water Department greater control of its flow into town, storage tanks will fill slower, less strain will be put on the water plant filters during high summer demand, better water quality should be noticed throughout the Town of Lenox, and energy savings will be seen with the use of the variable speed motor.

For any further questions or to schedule a tour of the Lenox Water Plant contact:

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