Alto Utility 2023 Infrastructure Update

A brief history of Alto's South Well.
(a riveting read for those persistent and keen to learn about water and pumps)

The initial installation of Alto's south well was completed in the fall of 2002.
South well facts :

- 305 mm (12") well
- drilled to a depth of 34.75 m (114')
- rated to pump at 39L/s.

Over the last twenty years, Alto utility has encountered power supply issues that have resulted in several motor failures. These power supply issues were most severe during peak demand periods (4:00-10:00pm) in the summer months. Due to the high power demands, a phase imbalance would occur leading to pump motor failures. During peak periods of heat Alto's pump technicians would have to 'babysit' the south well pump to prevent motor failure.

In 2013, after much time and research, Alto's pump installer and the pump supplier developed a solution to protect the motors. This solution did not resolve the peak period power supply problems, but the enhanced monitoring added a robust layer of protection to the motor. Subsequently, when the power supply was poor, the Alto system would keep the pump from starting up until the power delivery improved. This process worked for 9 years until late in 2021.

In November 2021 the south pump motor failed again. An extensive review of the Alto monitoring equipment followed and it was determined that the motor was simply at the end of its life and both the motor and pump needed replacing. A new pump that met current health guidelines and had slightly higher pumping capacity was installed in late January 2022. An unfortunate side effect of the increased pumping rate (from 31 L/s to 33L/s) was an increase in the drawdown over the spring of 2022 and into the summer (drawdown is how much the water level inside the well casing drops when the pump is running). Plans were made to rehabilitate the well in the Spring of 2023 to regain some of the well capacity that had been lost over the 20 years since the well was initially drilled.

At the end of March 2023 the well rehabilitation process was started. The new pump and motor were removed while a camera scanned the entire well from top to bottom to assess. There was biofouling evident all along the well screen. The well redevelopment employed a surge and bail technique that flushed the well by forcing water in and out of the aquifer over the course of 5 days. This action opened the aquifer by removing accumulated sand and silt that had become lodged over 20 years of use. Once again, a camera was sent down the well to assess the progress and it was determined that a course of acid would help remove persistent biofouling.

Once the acid treatment was completed, the motor and pump were ready to be reinstalled. In the first week of May 2023, after testing for pathogens, the south well was brought back online. The well rehabilitation was successful with most of the lost capacity being regained. Drawdown

before the well rehabilitation was 18 m (59’). After the rehabilitation, drawdown decreased to 4 m (13’)...very close to the values when the well was originally drilled.

Unfortunately, 10 days later the motor failed yet again. The high temperatures experienced in the beginning of May 2023 caused the same old troubles as recurrent poor power supply issues resurfaced. Fortunately, the pump motor was insured, and Alto was able to replace the motor quickly. However, the troublesome power supply issue would continue throughout the 2023 summer. This required constant monitoring and avoiding start-ups for the South pump during peak electrical demand.

Once again, Alto’s pump installer and the pump supplier worked to develop a solution. They determined that installing a Variable Frequency Drive (VFD) would deliver a stable balanced power to a pump motor. While this would solve the motor power supply problem that was causing the pump motor failures the dirty power would still damage the VFD itself. To solve this problem a load reactor and filter were installed at the same as the VFD.

One of the benefits of a VFD is that it allows the operator to adjust the pump output. Now with the new VFD, Alto is able to adjust the pump output to match the system demand which increases the flexibility of pumping water during different seasons (peak demand in the summer versus winter). Additionally, the VFD reduces water hammer, a powerful force that causes pressure spikes in water lines when pumps turn on and off. The VFD is able to “ramp up” and “ramp down” the motor which reduces the water hammer and its negative effects on water supply lines.

We write this so that you can know a little bit about the work that goes on behind the scenes maintaining and upgrading the system that supplies water to your house everyday.

Sincerely,
Alto Utilities