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Let's Solve Water

Case study
Backup Pumping System

Xylem Provides Pumping & Control Equipment to Reduce Force Main Pressure

Pressure-reducing station solves the problem, at a fraction of the time and cost

HRSD, the regional wastewater treatment utility that serves 17 cities and counties in southeast Virginia, had been experiencing high-pressures in their Williamsburg area force main network during wet weather events. These high pressure events caused operational trouble and, on occasion, resulted in SSOs in the collection system. Since the Regional Wet Weather Management Plan (RWWMP) of HRSD's Federal Consent Decree to address these SSO issues was still years from finalization, HRSD staff studied the problem to come up with options to mitigate the issue. One option studied was to completely revamp and upgrade a number of pump stations with new pumps, piping and the necessary control equipment to address increased flow and pressures. Another option considered was to install a pressure reducing station (PRS) along the sewer force main system to reduce system pressures and thus increase capacity. After many options were considered, the preferred and the most cost-effective solution that could address the situation was an interim PRS. After HRSD's procurement staff found the necessary purchasing mechanism to move forward with the solution, the local Xylem branch offered their support and assistance with the design, action plan, purchase, and equipment coordination.

Solution

Working with the Xylem engineering team, HRSD developed a plan to deploy a pressure-reducing station (PRS) at a strategic location along the force main. Given the district's dedication to compliance and environmental stewardship, and its need to align with future planned upgrades in their network, the new pressure reducing station was designed and implemented with the Godwin Dri-Prime Backup System (DBS). This provided the additional capacity to handle wet-weather flows and pressures and to minimize issues with sanitary sewer overflows (SSOs) during these events.

As required in the design specifications for the PRS project, it was equipped with two Godwin diesel-driven, critically silenced CD500M pumps with Final Tier 4 low-emission engines. The fuel supply was provided by Godwin 250 gallon diesel fuel cubes with double-wall containment to ensure environmental safety. Given the historic sensitivities of neighboring Colonial Williamsburg, the pumps and fuel cubes were customized to a specific color (Weathered Bark) to comply with Williamsburg's Code of Ordinance requirements.

Xylem customized paint color to meet Colonial Williamsburg historic ordinances and HRSD insulated the suction and discharge piping to address cold-weather issues.

Customer: HRSD, Williamsburg, Virginia

Challenge: Address high-pressure issues with force main network, without completely revamping and upgrading the existing pump stations, all while maintaining a commitment to environmental stewardship and regulatory compliance.

Product:

- 2 Godwin Dri-Prime Backup Systems (DBS) with diesel-driven critically silenced CD500M Dri-Prime Tier 4 pumps with custom paint color (Weathered Bark)
- 2 Godwin Advanced PrimeGuard Controllers, tied into HRSD SCADA
- 2 diesel fuel cubes (250 gallon) with custom paint color (Weathered Bark)

Result: The installation of this pressure reducing station with the Godwin DBS in this strategic location enabled HRSD to stay on track with their long-term plans and minimize SSOs, while realizing substantial capacity enhancements with a cost-effective solution in the short term.

Xylem engineers customized the Godwin Advanced PrimeGuard Controller to tie into the HRSD supervisory control and data acquisition (SCADA) system that could activate and control the pumps via local pressure readings. The Xylem team engineered a solution for HRSD that allowed the Godwin DBS to pump when pressure in the force main reached an elevated pressure level. The Advanced Primeguard Controller maintained a specific designed suction pressure setting by ramping the diesel engine up and down based on measured suction pressure levels. At the end of a wet weather event, the controller would ramp down the RPM's and stop the DBS pumps.

Based on additional requirements of the procurement conditions from HRSD, the Xylem team customized the pump controls so that they could be accessed in three different ways:

Automatic – pumps turned on/off via pre-set (pressure, flow, or level) parameters with the Godwin Advanced PrimeGuard Controller
Manual – pumps operated manually on-site, via the Godwin Advanced PrimeGuard Controller
Pass Thru – pumps operated remotely via the HRSD SCADA system, which was tied in to the Godwin Advanced PrimeGuard Controller. This future remote control ability will be invaluable during extreme weather events – whether it's a hurricane or severe snow/ice conditions – when roads are oftentimes closed by local or state authorities, making access to the PRS site impossible. However infrequent these events might be, HRSD considered the Pass Thru capability to be critical as a way to address these specific scenarios.

Xylem's unique solution included other customized components:

- Skid mounted system
- Integrated Junction box
- Interior and exterior working lights (at suction inlets) for emergency/night work
- Power inverter to recharge remote SCADA controller batteries, enabling remote access to pump controls even during a long-term power outage
- Cold weather customization, to minimize cold weather issues:
    - Block heater
    - Battery trickle charge
    - Suction line drains with pump shut-off, to minimize potential for freezing
    - Suction/discharge pipes equipped with heat cables and wrapped with insulation

Xylem customized the Advanced PrimeGuard Controller to address multiple customer requirements, including a tie-in to the HRSD network SCADA system.

Result

As HRSD seeks to address capacity issues throughout its entire network, it implemented this specific solution with a Godwin Dri-Prime Backup System (DBS) as a less expensive and environmentally and technically sound short-term solution. Xylem worked closely with the HRSD team to design and implement this customized application that provided the right solution for the job, and specifically addressed HRSD needs and concerns.

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