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Custom, Pre-Fab, Portable Booster Pump Stations Help Meet Pressure and Quality Emergency For Rapidly Expanding Water System



Custom, pre-fab, portable booster pump stations helped meet a pressure and quality emergency deriving from extraordinary expansion of water system demand. Upon delivery to meet emergency lead time, each station simply needed attachment of radio contact hardware to each skid's PLC in order to communicate with central water control room; wiring of skids electrically; and connection of piping.



Specifications called for three two-pump stations---two that could typically provide 3000 gpm during peak times at designated locations, and a smaller that could typically provide 1500 gpm at those times.

Jacksonville, FL --- Water system management here reports successful deployment of custom, pre-fab booster pump stations to help meet a pressure and quality emergency deriving from extraordinary expansion of system demand. Three portable units have been installed as a temporary measure while new main structure is built at critical locations. One of the stations has already been moved to another service area, with new main installation now completed at the site of its original deployment.

The skid-mounted, fully integrated pump stations, including factory-assembled and tested controls, were designed and manufactured by Flowtronex PSI Inc., an ITT Industries company, at its Dallas, Texas plant. Consulting engineering services for the utility were provided by the Jacksonville office of CH2M HILL Inc.

"We've had massive growth in our demand for potable water in the past three to four years---on the order of tens of millions of gallons per year," said Jim Wood, project manager for JEA, the municipally-owned water, electric, and sewer utility for the City of Jacksonville.

"With further growth expected at least in the millions of gallons per year for the foreseeable future, we chose to assure continued high levels of pressure and quality for our customers by deploying booster pump stations mid-grid, while we work at upgrading our entirely gridded network of mains," he continued.

"We've certainly stressed the new pump stations---pushing their design operation within the curve range---and they've done fine, doing what they are supposed to do, thereby helping to meet the emergency that had been declared by our Board."

The utility's potable water system, consisting of 2 grids separated by the St. Johns River, serves about 240,000 customers in four counties, including 80% residential and most of the rest commercial, plus pulp mills, a brewery, and small manufacturers. Fourteen major water plants, from 2-15 mgd, and 16 smaller plants send water as far as 25-30 miles to service locations. Mains range from 30" down to 6".

New single family subdivisions in the service area range from 5,000-30,000 units, with grey water used for irrigation to reduce stress on aquifers. The dramatic growth in potable water demand is primarily from remote areas, where neither water quality nor quantity are sufficient, and where Florida Department of Environmental Protection regulations and County agreements preclude drilling new wells.

"In the remote areas where we don't have the good productive well fields we have elsewhere, we're blending local water with transported, and are very responsive to customer feedback regarding pressure and taste," Wood said. "We want to maintain at least 40 psi throughout the system, preferably 55 psi. We were getting pressure drops down to as low as 30 psi, and there were taste complaints where local water is brackish. The problem was primarily a capacity issue, where we couldn't get what we needed without overstressing the local wells."

JEA planning and operations management considered options and did system modeling, and presented Wood's project design and build group in September, 2004 with basic specifications calling for a large-size booster station that could typically provide 3000 gpm during peak times at designated locations, and a smaller one providing 1500 gpm at those times.

Increasing pumping capability at JEA's water plants had been ruled out as much too capital-intensive and time-consuming, as well as over-compensating for what was only a peak-demand emergency. The booster stations were designated for "choke point" service while water main structure was upgraded. Meanwhile, a process engineer in JEA's operations group had recommended Flowtronex to Wood's consulting engineering firm CH2M HILL as a supplier for the stations, based on his previous experience evaluating their capabilities.

Shortly afterwards, another large booster station was added to the basic spec. The two larger size stations were to operate at 1500-4200 gpm, and the smaller one at 750-2000 gpm. All three stations were to operate at 55-70 p.s.i. at all times, for service at each deployment typically ranging from 1-2 years until main structure was upgraded.

Typical operation for each station was to be 2-3 hours at a time most days, for a total of 4-6 hours during morning and nighttime peak periods. They were to be portable, and have 2 pumps each with variable frequency drives (VFD's) and programmable logic controller (PLC) interface.

Two of the stations had to be up and running by March, 2005, and the third by June, 2005. All three were to be deployed in the middle of the system, as the best place to help meet intermittent peaking demand.

CH2M HILL initiated contact with Flowtronex through their local representative Larry Hickey of Equipment Plus in Ocala, FL, who requested the company's Dallas, TX headquarters to respond to JEA's standards and special requirements.

"They were very responsive to conforming with JEA standardization protocols," recalled Steve Riley, project manager at CH2M Hill's Jacksonville office. "As part of its efforts to control operations and maintenance costs, JEA had previously specified particular manufacturers and models for a variety of components that were needed in this project,



Each skid-mounted, fully integrated pump station included factory-assembled and tested controls.

including programmable logic controllers (PLC's), flowmeters, and variable frequency drives (VFD's). They customized their skids accordingly to conform."

"As we went through a few rounds on the technical documentation," he added, "they were also very responsive in turning things around very rapidly, which we needed to accommodate the accelerated nature of the project. JEA had to have the stations on line before their springtime peak water demand. You have to leap on a project of this size in order to meet that kind of schedule, and they helped us do that by working with us extensively by phone and also by preparing detailed drawings and specifications."

The project was then turned over to Wood for purchasing, delivery, and contracting for installation.

"With the emergency declared by our Board, there wasn't time for our standard procurement solicitation, so we did our initial search by phone," Wood recalled. "Two vendors were responsive, with only Flowtronex able to meet the delivery criterion. Upon delivery, we just needed to attach radio contact hardware to each skid's PLC in order to communicate with our central water control room; wire the skids electrically; and connect the piping. We had each of the stations up and running within three days from delivery, and one has already been moved to another demand 'hot spot'."

In addition to its custom manufacturing capability, Flowtronex provides a comprehensive service network that includes both in-house, annually certified technicians and independent, factory-trained licensed contractors located nationwide. Flowtronex contractors must be re-certified every two years.

For further information, contact ITT Flowtronex, 10661 Newkirk St., Dallas, TX 75220, Tel. 469/221-1200, Fax 214/357-5861, www.flowtronex.com.