

•Substation

# The Wave of the Future: Taking Houston's Groundwater Operations Into the 21st Century

By James Rice

With the completion of a \$27M Supervisory Control and Data Acquisition (SCADA) project this summer, the City of Houston's water production facilities will leap forward into the 21<sup>st</sup> century. What was once a host of isolated, decentralized ground water plants will soon consist of a centralized system running on a wireless network controlled from multiple state-of-the-art command centers. The project consists of an extensive overhaul of the system's control infrastructure includ-

ing the installation of SCADA, communications and emergency power systems. Boyer, Inc. is a Houston-based construction and engineering firm and has been installing SCADA systems for the city and surrounding areas for several years. This project, which was awarded to them in late 2004, consists of extensive upgrades to existing ground water sites, which already house some SCADA systems, as well as a complete overhaul of those that were operating manually. Boyer also installed radio and communications gear as well as con-



One of Boyer, Inc.'s delivery trucks departing their facility in route to a Houston groundwater site loaded with a Lonestar Prestress 10x14x8 foot Easi-Set building, pod and microwave antennas.

structed the wireless backbone around the city utilizing 10 existing water towers and one new 150-foot lattice tower structure to support the antennas. In order to use the existing towers, Boyer's engineering



Lonestar Prestress' 10x14x8 foot Easi-Set building being offloaded at a Houston groundwater facility onto a prepared foundation consisting of precast retaining walls backfilled with pea gravel.

department had to analyze each individual tower's structural capacity to ensure that they could support the additional communications gear. Some towers required no additional foundation support while others needed significant foundation enhancements, which were also designed and constructed by Boyer. They then designed and fabricated a unique antenna support structure called a "pod". These pod structures were not only cost-effective and fabricated within the allotted time, but also were designed to support sand blasting and painting tarps. This added feature will eliminate the need to shut down the wireless system during the painting process.

Boyer, Inc. believes strongly in going the extra mile to meet or exceed customer expectations, and in order to safely and efficiently install the pods they prepared extensive work and safety lifting plans to mobilize a Linkbelt 218H 100-ton crawler crane to each site. Due to limited space at each location, an individual, comprehensive lifting plan was prepared for each site which included transportation, traffic control and assembly of the boom crane to safely erect the pods on the 185-foot tall water towers. Crane hoists were also used to place workmen, materials and welding equipment on top of the structures. (Continued on page 34)

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The management team at Boyer dictated that the pod assemblies be fabricated, assembled and dressed completely with all antennas and wiring before the final placement to limit the number of man-hours necessary to complete the installation 185 feet above ground level. Boyer averaged one pod per week for 10 weeks and in doing so completed the installation on schedule.

Radio subcontractor Johnston Technical Services mounted the aerial antennas before the pods were hoisted to the top of each tank and only minor aerial alignment was required after placement.

Lonestar Prestress Mfg., Inc. was chosen to provide 19 Easi-Set transportable precast concrete buildings to house much of the expensive SCADA and communica-

tions equipment. One of the driving factors in Boyer's decision to install precast buildings over metal cabinets was the overall cost savings due to ease of constructability and time management. They saved countless hours at the jobsite and throughout the project because they were able to combine all of the equipment into one fortified, well-organized package. Boyer took delivery of the precast buildings at their 18-acre facility in northwest Houston months in advance of the installation date, where in a

factory setting they installed and tested all of the SCADA and communications gear as well as the generators. Once on site, the buildings were placed, in some cases in less than one hour, which allowed them to be operational in a very short time. At most of these locations, the 100-ton crane was used to set not only the pod but also to place the Easi-Set buildings, which housed the rack equipment and backup generator for the wireless backbone.

Another benefit of Lonestar's buildings is that they provide an office setting for technicians tasked with repairing or maintaining the equipment down the road. Given the fact that Houston is in a hurricane-prone area, precast buildings provide not only a fortified structure designed to protect equipment in 140 mph winds, but also a safe, efficient working environment for repair personnel in severe weather conditions. All of these factors will assist the city in keeping its ground water systems operational during critical times or allow for quick recovery should severe flooding occur.

Easi-Set precast concrete buildings provide a lifetime, maintenance-free solution suitable for almost any application. Their patented post tension floors and roofs provide water-tight construction along with superior strength. Easi-Set's modular construction design allows for efficient customization at the factory as well as continuous relocation should the building need to be moved to different sites in the future. Easi-Set buildings can (Continued on page 36)

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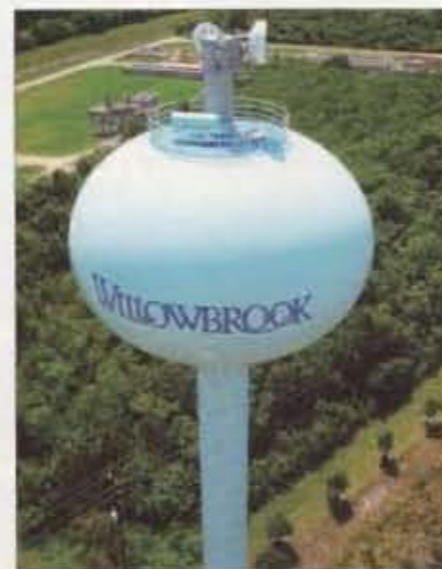
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Boyer Inc's 100-ton crane placing a fully dressed antenna pod atop a water tower in Houston.



Antenna pod installed and operating atop a water tower in Houston.



An example of a Lonestar Prestress Easi-Span 30x70x15 (clear span) site-erect precast concrete buildings in Friendswood, TX.



One Lonestar Prestress 35-foot tall prestressed concrete camera pole with light and one 70-foot tall antenna pole installed at a Houston groundwater facility.

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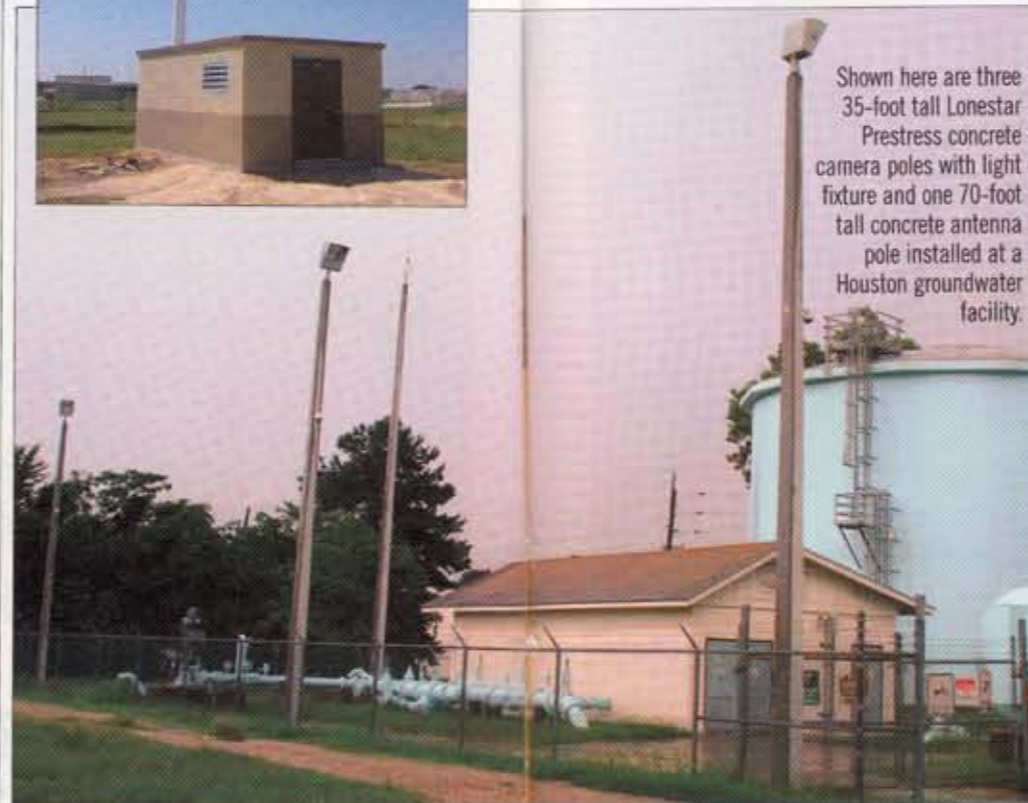
be custom built to just about any size from as small as 8x8 feet to as large as 40x200 feet (clear span). Also available are a variety of custom-finished exteriors which allow the buildings to blend in with existing surroundings or to the customer's specific requirements. Recently, Easi-Set officials introduced a two-piece post tension, pitched roof design which a number of the

company's licensed manufacturers are now producing. Easi-Set buildings are available from local manufacturers throughout North America.

Lonestar provided two different building designs for this project. The first was a one-room 8x10x8 foot structure which houses most of the SCADA equipment, servers, and electrical panels. The second building

design was a two-room 10x14x8 foot platform which houses the 10KW backup generator in one room and the electrical and communications gear in the other. Given Houston's 100+ degree summers and the fact that most of this sensitive equipment needs an air-conditioned environment, Lonestar provided the city with insulated wall systems consisting of rigid foam insulation sandwiched between two layers of concrete. Lonestar's standard insulated wall systems provide an R-26 insulation rating, which doubles what most Green homes ad-

Another example of a Lonestar Prestress Easi-Set precast concrete building measuring 12x20x8 feet located at an airport near Houston. This building features the Easi-Brick exterior finish.



Shown here are three 35-foot tall Lonestar Prestress concrete camera poles with light fixture and one 70-foot tall concrete antenna pole installed at a Houston groundwater facility.



These Easi-Set precast concrete buildings, manufactured by Lonestar Prestress Mfg., Inc., were delivered in July as part of a City of Houston public works project. The buildings, engineered to withstand 140mph winds, house communications and Supervisory Control and Data Acquisition (SCADA) equipment for the Houston groundwater infrastructure upgrade project.

*About the Author:  
James Rice, a native Houstonian, is the director of marketing and business development for Lonestar Prestress Mfg., Inc. located in Houston, TX, which provides a variety of precast products across the Gulf Coast Region and beyond.*

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