

Northeast Water Purification Plant (NEWPP) Facilities and On-going Expansion Work

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1. Introduction

The Northeast Water Purification Plant (NEWPP) Expansion is one of the largest water treatment projects under construction in North America. When completed, it will deliver 320 million gallons of drinking water per day (MGD) to over 2 million citizens through Harris and Fort Bend Counties. The project is nearing the 80 percent completion mark and will begin producing the first installment of drinking water sometime in 2023.

2. Objectives

- Provide an overview of the project
- Present information on the delivery method, why it was selected, and unique aspects associated with its use
- Discuss the unique challenges of the project and how they have been addressed

3. Project Overview

The NEWPP Expansion was initiated in response to subsidence regulations in the region, which require the conversion of ground water to surface water supplies. By 2025, Houston and its four Authority partners (North Harris County Regional Water Authority, West Harris County Regional Water Authority, North Fort Bend Water Authority, and Central Harris County Regional Water Authority) will be responsible for supplying 60 percent of their annual water distribution from surface sources.

NEWPP Expansion kicked off in February 2012. Evaluations, studies, planning, and preparation for the follow-on design and construction phases extended through 2015. In 2016, the Design-Builder was hired and the design process was initiated. Four early work packages were designed and negotiated, and construction on the packages began in 2017. The balance of plant design was negotiated in late 2019 and early 2019, the amendment for the Guaranteed Maximum Price was approved by Houston's Council in July 2019. Final design was completed not long after, and construction has been progressing ever since with an expected final completion date occurring in the later part of 2025.

Raw water for the new facilities will be supplied directly from Lake Houston, which will have received water from the Trinity River transferred via the Luce Bayou facilities. The water supply is notoriously difficult to treat due to the rapidly changing conditions that often occur

after storm events that often cause dramatic increases in turbidity, organics, and ammonia while alkalinity correspondingly falls. The need to reliably treat this supply led the team to select intermediate ozonation and chlorine dioxide to enhance treatment. Both technologies, in addition to lamella settling plates designed into the settling basins, are new to Houston drinking water operations.

Equipping staff with the proper tools and training them up to be ready to successfully operate the new facilities have been important goals for the project. A water simulation model (Blue Plan-it®) was created to help staff run simulations on water quality conditions in order to predict performance under differing treatment scenarios. The use of a Zeta meter to monitor the particle charge of the water is another critical tool for helping optimize coagulation. The process of training staff in advance of taking over the new facilities is ongoing. A series of water treatment seminars was conducted and hands-on training with individual components and equipment is preparing them to be able to operate the plant once the Design-Builder reaches Substantial Completion.

4. Lessons Learned

The following are lessons learned from project:

- The decision to deliver the project using a progressive design-build approach was driven by three factors:
 - The need to place 80 MGD into production within a fairly short period of time.
 - The desire to obtain a performance guarantee for the operation of the completed facilities.
 - The goal of having owner input during the design process .
- Overcoming the challenges and risks of delivering a mega project like the NEWPP Expansion required collaboration between the Design-Builder, City, Project Advisor/Technical Consultant, the Authority partners, and other stakeholders.
- The water supply to the NEWPP Expansion is notoriously difficult to treat, which led to a robust and resilient design that incorporated an amazing array of treatment and support facilities.
- Early work packages helped advance critical path activities while design was being completed and also helped procure major materials and equipment in advance of the global pandemic that was followed by supply chain and inflation issues.
- Attention to quality has been crucial for achieving a new facility that will provide decades or reliable service.
- Keeping the existing plant operational during construction has required close coordination between the construction teams and the operations team.
- Hiring and training up staff to operate a brand-new 320 MGD plant with new technologies has required significant planning and coordinated efforts.