

Client
City of Clewiston
MBC Subconsultant to Prime

Scope of Services
Design, permitting, pilot testing, wellfield modeling, bidding, construction administration, resident project representative, and start-up

Contact
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Start Date
02/2006

Completion Date
01/2008

Construction Cost
\$21.18 million

Key MBC Staff
Frank A. Brinson, P.E.

Key Features
Project included four Floridan aquifer brackish raw water supply wells, a 3.0 mgd LPRO water treatment plant, and a 12-inch diameter concentrate disposal deep injection well.

3.0 mgd Low Pressure Reverse Osmosis Water Treatment Plant, Floridan Aquifer Wellfield, and Deep Injection Well Clewiston, Florida



Background

Frank Brinson served as engineer of record for the design and construction of a deep injection well (DIW) in 2008. McCafferty Brinson Consulting LLC (MBC) assisted the City with renewing the DIW permit in 2016. Prior to this project, the City of Clewiston purchased drinking water from the U.S. Sugar Corporation. In August 2003, U.S. Sugar notified the City that they would discontinue the supply of drinking water to the City in September 2007. The City began planning for construction of a new 3.0 million gallon per day (mgd) capacity low pressure reverse osmosis water treatment plant (LPRO WTP), Floridan aquifer raw water supply wellfield, and concentrate disposal DIW. In January 2005, the City contracted with Camp Dresser & McKee Inc. (CDM) to design and provide engineering services during construction of the facilities. It was recognized early on that the design and construction schedule was extremely aggressive to meet U.S. Sugar's deadline. While with CDM, Mr. Brinson acted as project manager and engineer-of-record through the design and bidding phases of the project. The design phase also included membrane pilot testing to establish critical design criteria and confirm the viability of the proposed process.

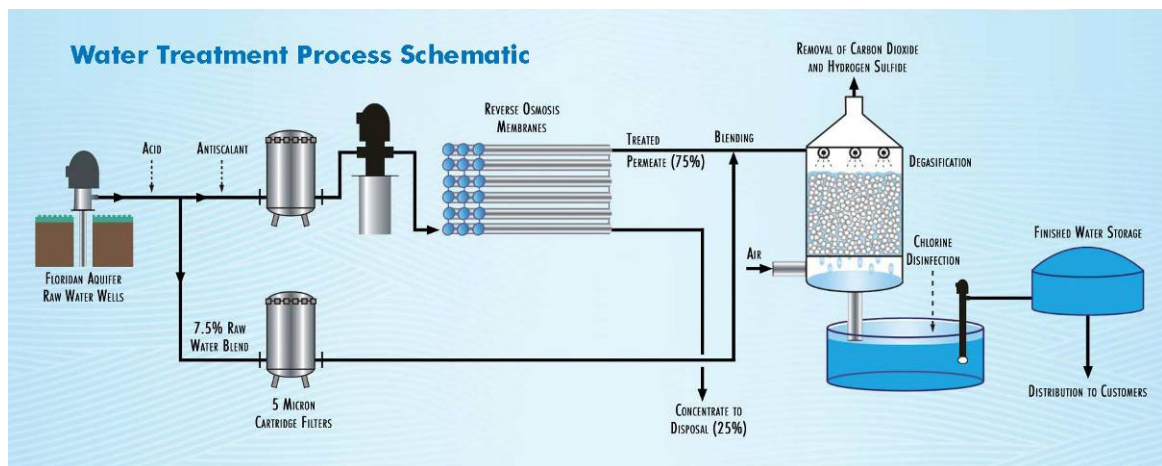


Design of the plant was completed in October 2005, and construction was initiated in February 2006. In February 2006, McCafferty Brinson Consulting, LLC (MBC) began providing services during construction for the project as a subconsultant to CDM. MBC's services included general construction contract administration, review of process and mechanical shop drawings, review of the contractor's applications for payment, review of construction schedules, conducting monthly construction progress meetings, responding to contractor requests for information, negotiation of change orders, coordination with funding agencies, coordination with permitting agencies, and start-up of the water treatment plant.

The Project

The scope of construction included the following:

- The plant is located on a City-owned site adjacent to the City's public works facility.
- Raw water supply is from the upper Floridan aquifer, and includes four production wells with submersible pumps, wellhead piping, controls, and telemetry. The water source is considered an alternative water supply (AWS) by the South Florida Water Management District (SFWMMD).
- The membrane treatment process consists of low-pressure reverse osmosis, with a design recovery rate of 75 percent and a raw water blending rate of 7.5 percent. RO equipment includes three 0.925-mgd nominal capacity membrane skids with dedicated feed pumps. The plant design also includes a membrane cleaning system.
- Pretreatment for the RO system includes raw water acidification, antiscalant feed, and 5-micron cartridge filtration.





- Following RO treatment, permeate is routed to two packed tower-type degasifiers where hydrogen sulfide is stripped from the permeate prior to discharge to the clearwell. An odor control scrubber is provided to treat the degasifier off-gas.
- Chemical post-treatment in the clearwell downstream of the degasifiers includes sodium hydroxide (NaOH) feed for pH adjustment, chlorination and ammoniation for disinfection, and application of a corrosion inhibitor.
- From the clearwell, finished water is pumped to a 1.5 million gallon prestressed concrete ground storage tank.
- The high service pump station includes four 1,600 gallon per minute (gpm) capacity horizontal split case high service pumps and one 750 gpm jockey pump; all equipped with variable frequency drives.
- Concentrate disposal is through one new Class I deep injection well with a dual-zone monitoring well, which was constructed on the City's wastewater treatment plant site.



In order to meet the aggressive schedule and facilitate funding, construction of the facilities was broken up into three contracts, which were advertised and bid separately. The first contract was for drilling of the initial test/production well, and three other production wells, as well as well testing. The second (main) contract included installation of the well pumps, raw water transmission mains, all improvements on the water treatment plant site, concentrate transmission main to the DIW site, and finished water transmission mains to tie the plant into the City's existing distribution system. The third contract was for drilling of the DIW and monitor well and installation of the DIW wellhead piping, pressure tanks, and other surface equipment associated with the DIW.



Funding for the project was provided by the United States Department of Agriculture (USDA) Rural Development, United States Department of Commerce Economic Development Administration (EDA), and the South Florida Water Management District (SFWMD). The contract documents utilized the Engineers Joint Contract Documents Committee (EJCDC) Funding Agency version of the standard General and Supplementary Conditions of the Contract, and other "front-end" documents, and extensive coordination with the various funding agencies was required during development of the contract documents and contract administration during construction.

The plant was started up in December 2007. Change Orders at substantial completion were less than 1 percent of the bid contract price. Frank Brinson served as engineer of record for the design and construction of a DIW in 2008. MBC assisted the City with renewing the DIW permit in 2016.

