NEW WATER TREATMENT PLANT

FACILITY INFORMATION

General Contract Information

- $7,882,240.00 Original Contract Price
- ($253,325.27) Savings During Construction
- ($2,678,749.10) Grant from SJRWMD
- $4,950,165.63 Actual Construction Costs Paid by Dunes CDD
- **$2,932074.37 Total Savings to the Dunes CDD**
- Placed into service on August 15, 2007

Permit Capacities

- RO train capacity of 650,000 gallon per day
- Blended water capacity of 720,000 gallons per day
- Concentrate disposal of 250,000 gallons per day to Intracoastal Waterway
- Well capacity of 695,000 gallons per day (2007 – escalates each year)

Scope of Services

This project was broken down into two phases to help alleviate pressure problems in our distribution system by expediting the construction of the high lift pump station. The first phase included the construction of a new ground storage tank and a high lift pump station. The equipment installed in the first phase of the project were part of the overall project in the first place. The second phase included the construction of a new administration/process building and to finish the construction for the entire reverse osmosis water treatment plant. A more detailed description of each process has been provided below under "System Process Overview".

The following items were constructed or furnished in Phase I:

- 750,000 gallon ground storage tank
- High lift pump station
- SCADA computerized control system
- Storm water drainage system
- Motor Control Center

- Back up power
- Yard piping

The following items were constructed or furnished in Phase II:

- Administration Building
- Two potable water wells
- Reverse Osmosis (RO) skids
- Degasifier/Scrubber
- Chemical Feed Area
- Transfer Pump Station
- Concentrate Discharge line

SYSTEM PROCESS OVERVIEW

Below are brief descriptions of the various RO systems installed under this project. They are shown in the sequential order where possible.

Administration Building

The 6,669 square foot administration building is broken down into three separate areas. The southwest side of the building is the administration area, the northwest side is the chemical area, and the east side of the building is the process area where the RO skids are located. There is 2,622 square feet of space in the administration area. The administration area has three offices, a reception area, a conference room, a break room, storage area, and the bathrooms. The 3,444 square foot process area includes a maintenance area, an electrical room, and the process room. All the chemicals for the water treatment plant with the exception of the chlorine used for disinfection are stored in the 603 square foot chemical area.

Wells

There are two wells located just south of our facility that provide water to the RO plant. They each have a 12" diameter casing and are approximately 300 feet deep. The wells take water from the Upper Floridan Aquifer where the water quality is brackish. The water from these wells has approximately 1,500 mg/L of chloride and 3,400 mg/L of total dissolved solids. The well pumps are located 40' below ground and are powered by 40 HP motors. Each well is capable of supplying enough water for both skids. Only one well runs at a time and they alternate after each cycle. Each well has its own flow meter.

RO Skids

There are two separate RO skids each capable of producing 325,000 gallons of water per day (226 gpm). Each skid has 8 vessels, five in the 1st stage and three in the second stage. Each vessel has seven 8" diameter and 40" long membrane elements. The membrane elements are made from a spiral wound composite polyamide. The RO membranes remove approximately 95% of the chlorides and total dissolved solids from the raw water. The

membranes separate the flow stream into a purified permeate stream and a smaller brine concentrate stream. The purified permeate stream is sent downstream for additional treatment at the degasifier and the brine concentrate stream is sent to the Intracoastal Waterway for disposal.

The skids receive water from the wells after adjusting the raw water pH by using 93% sulfuric acid and adding a scale inhibitor for the membranes. The next step is to filter the water through a 5 micron filter. Water is then put through the 1st stage of the membranes at about 300 psi (5 vessels) where 193 gpm is sent to the degasifier for additional treatment and the remainder is sent to the 2nd stage (3 vessels). After treatment through the 2nd stage, 33 gpm is sent to the degasifier for additional treatment and the remainder (called concentrate) is sent to the Intracoastal Waterway for disposal through the concentrate line.

Degasifier/Scubber

The degasifier removes unwanted tastes and odors from the drinking water. The degasifier is used to strip out the carbon dioxide and hydrogen sulfide gases left in the permeate flow. Water from the membranes is sent to the top of the degasifier where it trickles down through a special media while air is forced upwards through the column. The special media is designed to break up the flow as it falls so the air can better react with the water. Treated water from the degasifier is then sent to the product transfer station where it is pumped to the ground storage tank. The exhaust from the degasifier is sent to the scrubber to convert the hydrogen sulfide gas back into a liquid where it is disposed of at our waste water treatment plant. The scrubber makes sure that the air released into the atmosphere does not contain any unpleasant odors.

Product Transfer Station

The product transfer station is used to pump the finished drinking water into the ground storage tank. The product transfer station uses two constant speed 10 HP pumps each rated at 500 gpm. The transfer station has an ultrasonic level indicator and a modulating valve to regulate the flow to prevent excessive cycling of the pumps. The water is adjusted for pH and chlorine is added as a disinfectant prior to sending this water to the ground storage tank.

Ground Storage Tank

The 750,000 gallon ground storage is where all of the treated drinking water is stored before being sent out to our customers. The high lift pump station draws water from this tank as needed to meet the current demands in our system. The ground storage tank is 82' in diameter and holds 19' of water inside. The tank levels are monitored by our control system using an ultrasonic level sensor. The ground storage tank is made of concrete and is pre-stressed wire wrapped.

High Lift Pump Station

The high lift pump station is what pressurizes the waterlines throughout the District. Pumps at the high lift pump station are operational 24 hours a day 7 days a week. There are

currently five pumps installed at the high lift pump station with a future sixth pump piped for future expansion. These pumps are operated by our computerized control system to maintain a constant pressure to our customers under varying demands. The pumps are powered and controlled through the motor control center adjacent to the high lift pump station. The pumps at the high lift pump station include: 2 – 60 HP variable speed pumps rated at 785 gpm each; 2 – 60 HP constant speed pumps rated at 785 gpm each; and 1 – 20 HP constant speed low flow pump rated at 150 gpm. Also located at the high lift pump station are the distribution system flow meter, chlorine analyzer, chlorine injectors, and pressure transmitter.

Concentrate Discharge Line

Concentrate is the water that has been rejected from the RO process and is of very poor quality. A 3,100 foot long 6" diameter concentrate discharge line is used to send this water to the Intracoastal Waterway where it is diluted.

SCADA System

SCADA stands for Supervisory Control and Data Acquisition. Our systems here are monitored and controlled through a computer based SCADA system. Various sensors throughout the plant are continually updating the SCADA system and the SCADA system makes changes to the appropriate components. As an example, if the pressure sensor to our distribution system was reading low the SCADA system would send a command to the pumps to ramp up to maintain the required system pressure. The SCADA system monitors and controls the critical components of the plant and also is used to determine when an alarm condition exists. In the event that something goes wrong, the SCADA system will call an operator and notify them of the problem. The operator may be able to fix the problem by logging on to the SCADA system from home or the operator may have to come in to fix the problem.

Back up power

Back up power was provided by a 600 KW emergency generator capable of powering the entire facility in a power outage. The generator is powered by diesel fuel and has a 4,000 gallon fuel tank capable of lasting nearly four days under full load. The power switches over to generator power automatically if regular power becomes unavailable and switches back when regular power becomes available again.

Chemical Storage

Chemicals are stored in the chemical storage area in the northwest corner of the administration building. This area is open to the outside so the chemicals can vent to the atmosphere. The chemical area stores 275 gallons of Sodium Hydroxide, 55 gallons of Hydrogen Peroxide, 235 gallons of Sulfuric Acid, 55 gallons of anti-scalant, and 55 gallons of corrosion inhibitor. The chemical metering pumps for each of these chemicals are also located within the chemical area.

RO Design/Construction Costs (Proposed vs Actual)

	Proposed	Actual	Savings
Design	$ 656,067.00	$ 656,067.00	
Phase I (Change order # 1)	$ 2,982,866.00	$ 2,970,765.86	
Phase II (Change order # 2)	$ 4,159,067.00	$ 3,720,616.61	
Change order # 3	$ 84,240.00	included above	
Retainage Due CH2M Hill & MSI		$ 281,465.26	
Subtotal	**$ 7,882,240.00**	**$ 7,628,914.73**	**$ 253,325.27**
Less SJRWMD Grant		($2,678,749.10)	
Totals	**$ 7,882,240.00**	**$ 4,950,165.63**	**$ 2,932,074.37**