Utilities Department News

Fall 2014

Sellers WRF receives major renovation of headworks and odor control

Jerry Sellers Water Reclamation Facility headworks prior to renovation.

On September 30, 2013, an $854,000 project was completed at the Jerry Sellers Water Reclamation Facility (WRF) which completely renovated the headworks of the plant. Jones Construction was the contractor for the project.

Cocoa Utilities' Jerry Sellers WRF was converted to a 5-stage Bardenpho process (a biological nutrient removal process) during the last major modification in 1989. Much of the equipment installed in 1989 was at or near the end of its useful service life. CDM Smith, Cocoa's provider of engineering services for wastewater and disposal systems, was tasked with conducting an equipment assessment in 2011. The assessment focused on evaluating the headworks, odor control and secondary clarifiers. The assessment identified alternatives where changes in technology over the past 20 years could allow for improved process performance, less maintenance, and/or increased ease of operability.

The assessment resulted in two separate projects. One to overhaul and repair the headworks, and one to overhaul and repair the clarifiers. This article focuses on the headworks project.

The "headworks" of a wastewater treatment plant is the initial stage of the treatment process. The function of the headworks is to remove inorganics such as sticks, stones, rags, plastics, grit and sand from the incoming (influent) wastewater stream. This is done to significantly reduce the plugging and clogging of pumps and pipes, the abrasive action of grit on equipment, and the settling of these materials in downstream tanks and basins. CDM Smith evaluated the equipment within the headworks structure including the bar screen and screenings conveyor, Parshall flume, vortex grit removal unit, grit pump, grit classifier, and slide gates.

New bar screen, conveyor belt and washer/compactor unit.

Bar Screen and Conveyor System

The existing headworks structure consists of two influent channels. Prior to construction one channel contained a 6 mm mechanical bar screen, while the other contained a manually cleaned bar rack. During normal operation all of the influent flow is directed to the mechanical bar screen. Screenings drop onto a conveyor belt that discharges to a dumpster. The manually cleaned bar rack is only utilized during periods of extreme high flow or extended down-time of the mechanical screen. The existing mechanical screen had reached the end of its useful service life and needed to be replaced. The belt conveyor was also in poor condition. The contractor installed a washer/compactor unit. These units are now the industry standard for processing screenings. The washer/compactor unit consists of a spray system for removing organic material and an auger. The auger reduces water content, and compacts screenings for transport to a dumpster. The existing 6 mm bar screen was replaced with a smaller 3 mm bar screen to increase the capture rate of the screen.

Parshall Flume and Flow Metering

Influent flow is measured using a Parshall flume located downstream of the bar screen. Essentially, it is a narrow place in an open channel that allows the quantity of flow to be determined by measuring the depth of the liquid. Prior to construction the Parshall flume, a fiberglass reinforced plastic (FRP) insert, was delaminating from the adjacent concrete and was distorted to an extent that the manufacturer would not recertify the accuracy of the flow metering instrument.

Grit Removal System

The grit removal system at the Jerry Sellers WRF is composed of three primary components; the grit removal vortex unit, grit pump, and grit classifier. The vortex unit was making excessive noise, an indicator of energy loss and inefficiency. The drive of the vortex unit was corroded in some areas. The grit classifier showed signs of corrosion, especially in the drive of the unit and was at the end of its service life. It had also become difficult to maintain. Due to their age and condition both were replaced.

New grit pump and grit classifier. The new grit pump sits atop the filled in vault where the old recessed-impeller pump was housed.

The grit pump, prior to construction, was a recessed-impeller pump that sat in an underground vault to maintain a flooded suction, which is required for this type of grit pump. The below-grade vault was a confined space as defined by OSHA; and presented a

safety hazard when the pump needed servicing. Cocoa decided to replace the recessed-impeller pump with an above ground grit pump that uses a self-priming vacuum system. The vault was filled in and abandoned thus eliminating a safety concern.

New ozone generator/odor control.

Odor Control System

The old odor control system was not effective in reducing odor and hydrogen sulfide concentrations. Cocoa opted to install an ozone system. Ozone is an emerging odor control alternative for municipal wastewater treatment. In contrast to traditional odor control systems where the foul air is pulled from the structure to be treated in a separate vessel, ozone is injected directly into the structure to oxidize hydrogen sulfide and other odor causing compounds. Using ozone for odor control at municipal wastewater treatment facilities is a relatively new application.

Electrical Assessment

Prior to construction the existing underground conduit system was galvanized rigid steel encased in concrete. Exposed conduit, fittings and boxes had substantial corrosion consistent with the age and material type. New equipment included new wire and PVC schedule 80 conduit underground, and rigid aluminum conduit for exposed work to avoid future corrosion. Control panels for the screenings conveyor belt and bar screen were also replaced.

Proceeding with Renovation

Cocoa Utilities Department proceeded with CDM Smith's recommendations to overhaul the mechanical screen, compactor, Parshall flume, grit removal system, and install a new odor control system. The estimate for the overhaul was $1,100,000. The Utilities Department decided to do all of the improvements at one time.

The Sellers' WRF had to divert the incoming wasterwater (two million gallons per day) away from the headworks for almost four months. Over 200 million gallons of wastewater passed through the plant without receiving pre-treatment (screening and grit removal). This had a detrimental impact on the equipment in the plant requiring more maintenance by plant personnel. Rags and other debris clogged pumps and valves and became entangled on impellers. According to Plant Superintendent Don Stevens, "This project created a lot more work for our plant staff. Our plant mechanics had to unclog pumps, valves and impellers way more often than usual. Our operators had to remove more floatable debris from the various treatment tanks. But our staff stepped up to the challenge and we maintained our high treatment standards."

However, completing all the improvements at once allowed the entire structure to be taken offline, inspected, repaired, and retrofitted with new equipment with minimal downtime. The result is a much improved pretreatment process that saves time and money through efficiency and will extend the life of downstream equipment.

Capital Plan for Water Reclamation/Wastewater Assets provides a guide for improvements and maintenance

In 2012 the Cocoa teamed up with CDM Smith to create a comprehensive Capital Plan for the city's Water Reclamation Facility/Wastewater Assets. The goal of this effort was to provide a diagnostic of the infrastructure and prioritize the associated improvements. The Jerry Sellers Water Reclamation Facility (WRF) treats an average of about two million gallons a day (MGD). A network of 52 lift stations, approximately 100 miles of gravity sewers and 50 miles of force mains transport wastewater to the Jerry Sellers WRF. Following wastewater treatment at the Sellers Reclamation Facility, 50 miles of reclaimed water distribution main deliver the reclaimed water to reclaimed water customers.

Arial view of the Jerry Seller Water Reclamation Facility

Cocoa and CDM uses a phased approach to produce the comprehensive Capital Plan. First the city needed to get a better understanding of the current condition of its assets. CDM Smith prepared a Wastewater Utility Asset Condition Assessment Technical Memorandum that focused on evaluating the physical condition of wastewater and reclaimed water assets. In parallel with the condition assessment evaluation, hydraulic models of the Cocoa's wastewater and reclaimed water systems were developed. The Hydraulic Modeling Technical Memorandum details the development of the models, and associated recommendations for improvements to the gravity sewer and force main systems to accommodate Cocoa's needs.

The second phase of the project was the completion of the Wastewater Capital Plan. This plan includes a 20 year outlook on capital projects. Some of the highlighted improvements include:

- Feasibility Study for discharge sources to keep effluent out of the Indian River Lagoon. The city recognizes the importance in being good stewards of the environment and these studies provide the best environmental management options for treatment.

- Continuing to line portions of the gravity collection system to reduce the amount or rain and groundwater reaching the Water Reclamation Facility.

- Upgrading the Cocoa's lift stations to improve reliability and to reduce the aesthetic impact of some of the older stations on the surrounding community.

- Completing the electrical rehabilitation at the Water Reclamation Facility to allow the facility to operate at peak performance for another 20 years.

- Exploring odor control options to reduce the impact on the community.

Cocoa continues its efforts to provide superior service to its customers. The Capital Plan for the Water Reclamation/Wastewater Assets provides better direction, a more detailed road map, for the city's infrastructure improvements.

Cocoa Utilities "Old Glory" Elevated Tank Gets A Makeover

Scaffolding is going up under the elevated tank in preparation for sand blasting and painting.

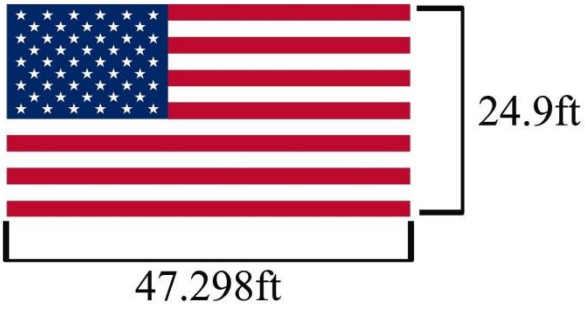
1Perhaps one of the most recognizable landmarks in Cocoa is the elevated water tank with three American flags painted on it located on U. S. Highway 1 north of State Road 520. Cocoa recently contracted with Worth Contracting, Inc. out of Jacksonville Florida to repaint the tank. The city opted to keep the "old glory" logo on the tank. Work should be completed by spring of 2015. Blast cleaning and repainting the take will cause approximately $810,000.

The steel elevated tank holds up to 1.5-million-gallons and stands 156 feet tall. The elevated tank is used to maintain a constant pressure in the distribution system.

The tank was built by Chicago Bridge & Iron Company in 1957, and was painted with an old fashioned silver alkyd coating. In 1976, the city accepted the design and services of Demetrios Dourakos, a grateful Greek immigrant resident, to paint a huge American flag on the tank for the bicentennial year. Cocoa contributed the flag paint. Dourakos, owner of Royal Painting Company in Merritt Island, also painted a flag on the Vehicle Assembly Building at the nearby Kennedy Space Center.

By 1991, the Cocoa tank was in need of total renovation, so the tank was sandblasted down to bare metal inside and out to get rid of the rust and corrosion caused by the salty, coastal environment. Portions of the steel plate were replaced. By popular demand, the Greek artist's flag design was replicated, only this time with three of the

colorful flags. The tank was repainted again in 2003.



The dimensions of the new flags will be a little smaller than the previous flags.

For the current project, the contractor will prepare the structure by masking, removing, or otherwise protecting all hardware, machined surfaces, nameplates and other surfaces not intended for painting. The contractor will clean and prepare the steel surface by detergent washing to removal all salt spray contamination, followed by an abrasive blast cleaning to near-white metal standards. Removing all the old pain will require approximately 350,000 pounds of abrasive blast media. The contractor must provide containment during the entire blast and painting operation.

After blasting the contractor will apply a series of coatings beginning with an organic zinc-rich primer, then a high-build epoxy, followed by a fluoropolymer finish. It will take approximately 750-800 gallons of Tnemec's finest products to protect the structure.

More About Toilets

More than 45% of water use in the average American home occurs in the bathroom, with nearly 27% being used by toilets. Fortunately, your household can significantly curb its toilet water usage by regularly checking for and fixing leaks, retrofitting older toilets, or installing a new toilet.

High Efficiency Toilets (HETs)
WaterSense (think EnergyStar, only water), has made choosing a high quality toilet simple with its labeling system. To earn this label, toilets must meet rigorous criteria for performance and must use no more than 1.28 gallons per flush (GPF). Only HETs that complete the third-party certification process can earn the WaterSense label.

How much water toilets use per flush
Toilet water use can vary significantly. Older toilets can use 3.5, 5, or even up to 7 gallons of water with every flush. Federal plumbing standards now specify that new toilets can only use up to 1.6 GPF, and there

are high efficiency toilets that use 1.28 GPF. Replacing an older model toilet with a new low-flow (1.6 GPF) or high efficiency toilet (1.28 GPF) can greatly affect your household's total water usage and save you money on water and sewer bills.

Not sure about the how much water your toilet uses per flush?

Oftentimes, manufacturers stamp their toilet's water usage per flush on the inside of the tank or on the "neck" of the toilet bowl. If you cannot find your toilet's water use stamp, then determining its age is your key to its water use. Federal plumbing standards passed in 1992 required that toilets use no more than 1.6 GPF, so if your toilet was installed prior to 1992, then it likely uses 3.5-7 GPF.

Think you might have a toilet leak?

Water leaks account for approximately 14% of all water use in the average American home, and the toilet is one of the most likely places to find them.

Are you ready to tackle the toilet?

Water leaks account for approximately 14% of all water use in the average American home, and the toilet is one of the most likely places to find them. Sometimes it is easy to tell that your toilet is leaking - you hear the sound of running water or a faint hissing or trickling. But many times, water flows through the tank silently, which is why these leaks are often overlooked.

How to check your toilet for leaks

1. Remove the toilet tank lid.
2. Drop one dye tablet or 10 drops of food coloring into the tank. (Dye tablets are often available for free through local water providers).
3. Put the lid back on. Do not flush.
4. Wait at least 10-15 minutes, and then look in the bowl. If you see colored water, you have a leak. If not, you don't.

Clean or replace the flapper

- The most common cause of slow leaks is a leaky flapper. Over time, this inexpensive rubber part may decay or get old and stiff to the point that it needs replacing, or minerals may build up on it and/or the rim of the flush valve where it seats.
- If the flapper is still in good shape, sometimes all it takes to make it work is to clean it &/or the rim where it seats.

- Run a finger carefully around the underside of the flapper and the rim where it seats. Remove any uneven buildup of minerals that might cause a leak. Use a sponge with bleach or steel wool or #500 wet-or-dry abrasive paper.

Cleaning may work to remove mineral buildup, but it's usually best just to replace the whole part. To perform a replacement:

1. Close the water valve and flush the toilet. If the valve is completely closed, the tank will not refill and you will not hear water running after the tank empties.

2. Pop the old flapper off its hinges, disconnect it from the chain, and pop the new one into place.
3. Don't forget to open the valve all the way when you're ready for water again.
4. Try flushing a few times to make sure the chain is the right length for the new flapper. It should open when you push the handle and then drop closed all the way when the tank empties. You may have to trim and adjust the chain by trial and error. Also, make sure that the flapper aligns properly with the opening.

Utilities September Statistics

Claude H. Dyal Water Treatment Plant

Raw Well Water

- Total raw water pumped: 640.85 MG, 21.362 MGD Avg.
- Peak day: September 3, 23.64 MGD
- pH: 7.70
- Total Hardness: 343
- Chlorides: 109
- Color: 33

Finished Water

- Total treated: 622.37 MG, 20.75 MGD Avg.
- pH: 8.89
- Total Hardness: 107
- Chlorides: 118
- Color: 5

Customer Service

- Total gallons billed: 694.38 MG
- Total billed FY 13-14: 7,664.20 MG
- Total water meters read: 80,737
- Total reuse meters read: 2,108

Jerry Sellers Water Reclamation Facility

- Influent (incoming wastewater): 73.2 MG
- Total Influent FY 13-14: 655.82
- Reclaimed water: 70.21 MG
- Total Reclaimed water FY 13-14: 682.32

For suggestions, comments, or questions about the
City of Cocoa Utilities Department
Call 321-433-8705 or email ddowns@cocoafl.org