

OUR VISION

We will be a national leader among water utilities focused on customer satisfaction and delivering outstanding quality and value.





2021 - Castle Rock Water End of Year CIP Report



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Glovers Water Rehabilitation

Project Manager: Matt Hayes, P.E.

The Glovers Water Rehabilitation Project is located east of S. Gilbert Street, between Ash and Elm Avenues. This project replaced the aging and undersized potable water distribution piping in this subdivision. The Glovers subdivision has had a significant number of main breaks in recent years. There have been approximately two to three main breaks per year during the previous four years. This project is being constructed in two phases. Phase 1 included the southern portion of the neighborhood. Phase 2 will replace the water mains in the northern portion of the neighborhood, and will be constructed in 2022.

During construction of the new water mains, the pavement began to fail. The original pavement was less than three inches thick in most areas, and appeared to be original pavement. The pavement was not holding up well to the street cuts and heavy equipment and was no longer a candidate for patching back. The area was scheduled for reconstruction in 2027, under the Pavement Maintenance Program (PMP) managed by Public Works (PW). Castle Rock Water was planning a follow-on project in 2025 to replace aging sewer service laterals in advance of the future road reconstruction by PW. However, with the pavement scope expanded to require full replacement in 2021 in the Phase 1 project area, Castle Rock Water decided to expedite replacement of the sewer service laterals and include them in the project scope of work for completion in 2021, in advance of repaving at completion of the project. This was to avoid having a patched roadway network if the sewer service laterals were delayed to a future year.



Glovers Water Rehabilitation
Project Manager: Matt Hayes, P.E.

The project was awarded to T. Lowell Construction. The total project cost was \$3,025,215 and was completed within the approved budget. Public Works will reimburse Castle Rock Water \$656,346 for the road and sidewalk rehabilitation. The project was completed ahead of schedule.



Tank 3 Drain Line

Project Manager: *Matt Hayes, P.E.*

Tank 3 is located on the butte south of Fifth Street, just east of downtown Castle Rock. The tank was constructed in 1969 and the overflow discharge line was constructed to discharge to grade on the southwest side of the tank. When the tank overflowed, the discharge flowed down the slope towards Tacker Court. In the last few years, several new residential homes have been built on the east side of Tacker Court. Overflow discharge flows would have flowed into the backyard of these residential homes.

This project constructed a new gravity storm sewer to direct the tank overflow discharge to northeast of the tank. The discharge is now directed to an existing drainage that will not impact local properties. A new drain valve was also installed on the transmission main that connects to the new drain line. Previously, our Operations Division had to allow the system's demand to draw down the tank then manually pump the remaining water out to allow for routine maintenance. The project also included a new by-pass main around the tank. This allows Operations to maintain the distribution looping between Tacker Court and Reservoir Road when the tank is down for maintenance. This new by-pass main also includes a pressure relief valve to protect the distribution system from overpressure events during tank maintenance.

The project was awarded to 53 Corporation. The total project cost was \$387,455, and the project was completed within the approved budget. The completion of the project was delayed due to the wet spring weather. The delayed completion did not have any impact on the continued use of Tank 3.



2021 Denver Basin Well Rehabilitation

Project Manager: Lauren Moore

In March 2021, Town Council approved the Denver Basin Wells Rehabilitation, Pumping Equipment Replacement and Well Abandonment Project, which was a planned rehabilitation project for select Denver Basin aquifer wells. In order to complete the project prior to demand season, the contract was split between two contractors. Colorado Pump was awarded four wells for rehab and one well for abandonment in the amount of \$621,514.08, and Applied Ingenuity was awarded three wells for rehab in the amount of \$504,442.05. Total project authorization was in the amount of \$1,125,956.13, with \$800,000 budgeted in 2021 and the remainder carried over from 2020 remaining funds. This project is expected to finish \$21,901.05 under budget, including six change orders for additional hours spent on sand pumping and pulling equipment for CR-39 and CR-41, use of mud dispersant for CR-117, new cable and PVC pipe for CR-86, special acid treatment for a calcium bridge found in CR-72R, as well as additional post-rehab special acid treatment for CR-72R.



Old cable from Well CR-86 that needed to be replaced



Colorado Pump pulling equipment at CR-72R

2021 Denver Basin Well Rehabilitation

Project Manager: Lauren Moore

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The program was designed to help maintain water production yields from our well assets and to reduce the likelihood of emergency well failures. Each year staff reviews well data for all of the wells to identify which wells are showing declines in well yield, and wells with older pumping equipment. The following wells were identified for the 2021 Denver Basin Rehabilitation and Pumping Equipment Project: Arapahoe Aquifer Wells CR-39, CR-86, CR-73R, and CR-117. Also, Denver Aquifer Wells CR-72R, CR-217, and CR-41. The combined daily production from the wells is approximately 2.5 million gallons per day. Staff redesigned the pumping equipment for better efficiency. The project also included the abandonment of one well, CR-31, located at the Town's Enderud Well Site, as required by the State. This project was completed in November 2021, but was substantially complete in July 2021. Rehabilitation of CR-217 was pushed out to the fall of 2021.

The Water Resources Division of Castle Rock Water is currently planning the rehab program for 2022, and hopes to award a contract at the beginning of 2022.



Well video image showing the calcium bridge at 690.5 feet below the surface after the first round of rehabilitation

Lawn Irrigation Return Flows (LIRF) Monitoring Wells

Project Manager: Heather Justus, P.G.

When Castle Rock Water customers irrigate their landscaping, a portion of the water is consumed by vegetation, a portion evaporates, and a portion percolates down into the soil and eventually accumulates back into the stream, thereby increasing stream levels and providing more water supply. These underground flows are known as Lawn Irrigation Return Flows (LIRFs), and if quantified, can be used as part of our water supply portfolio. It is anticipated that the Town's LIRFs will comprise roughly five percent (5%) of the Town's water resources by 2050, or roughly 750 acre-feet.

The best practices for the quantification of LIRFs include a combination of stream flow monitoring and groundwater level monitoring at strategically placed sites along tributaries and main stems of the creek to show that LIRFs accumulate and travel through the soil and back into the creek. A set of four monitoring wells spread through each strategic location (in conjunction with the stream flow monitoring sites) will provide the Town with the strong evidence needed for Water Court, where the Town's ability to claim LIRFs will be determined.

In 2020, Castle Rock Water completed the drilling of 26 new monitoring wells ranging in depths from 50 ft to 150 ft, depending on the depth to groundwater. At the completion of Phase 1, Castle Rock Water staff, with the help of a consulting team, identified, purchased and began the setup of a transducer monitoring system that uploads the water level data to a web portal for the 28 LIRF monitoring wells. The equipment purchased is the In-Situ VuLink Transducers. Town Manager approval was given for the purchase of the equipment at a cost of \$70,592.50. The project was completed on time and within budget.

We are currently planning Phase 2 for 2022. Phase 2 will include the flushing of the existing monitoring wells, the potential of six additional monitoring well sites and continued monitoring.



Well 9 Demolition

Project Manager: Shantanu Tiwari

The Well 9 building was constructed in 1985 to house Well 9. However, Well 9 was abandoned in May 2016, leaving the Well 9 building without any use. The Well 9 building consisted of the pump room (west room), chlorination room (east room) and a 10 ft. deep contact chamber (below the pump room). The Town contracted with Agisi Environmental Services to demolish the building by year-end 2021, and dispose of the debris according to local and state laws.

The total cost of the demolition project was \$23,606.55, which was \$1,000 over the budget estimate. The project was completed on time.



Jerry Street Downtown Alley

Project Manager: Josh Hansen, P.E.

The Town's 2021-2025 Capital Improvement Program identified multiple alleyways in the downtown area that are to receive upgraded infrastructure. In a cooperative and joint funded effort, Public Works and Castle Rock Water Departments identified four alleys where present roadway and sanitary sewer infrastructure were well beyond their design life (some of the sanitary sewer pipes were approaching 90 years in age). The project scope of work included:

- Pavement Replacement (Asphalt to Concrete)
- Drainage Improvements
- ADA and Access Improvements
- Sanitary Sewer Replacement (mainline, manholes, and service laterals to right-of-way)



Jerry Street Downtown Alley
Project Manager: Josh Hansen, P.E.

Elite Infrastructure Consultants was contracted to complete the work under an authorization amount of \$877,888. Construction began in June 2021. The tight confines of the alleys presented many challenges for deep utility excavation, including adjacent building foundations, overhead electric lines, and a significant number of dry utility conflicts that required relocation. There were also numerous abandoned sanitary sewer service lines still connected to the existing sanitary main. These were disconnected during construction, which will reduce wastewater treatment costs by preventing stormwater and groundwater from entering the sanitary collection system. The project was completed slightly behind schedule in September, within the original authorization amount for a total of \$814,790.



Desert Ridge Place Storm Sewer Reconstruction

Project Manager: *Barbara Horton, P.E.*

This project is located in the Castle Oaks/Terrain subdivision, northeast of the intersection of Rising Sun Drive and Autumn Sage Street. Improvements included the removal and replacement of two existing inlets and approximately forty linear feet of 18" reinforced concrete pipe (RCP) storm sewer under Desert Ridge Place.

In January, the Stormwater Division was contacted by Public Works regarding a concern with an existing inlet between 3629 and 3645 Desert Ridge Place. The storm drain inlet had settled beyond allowable tolerances, creating a safety hazard. Public Works had repaired the concrete around the inlet once already and this did not resolve the issue. Video of the storm sewer showed separation at some of the pipe joints, which would ultimately lead to pipe failure and damage to street pavement if not repaired. This infrastructure was installed in 2005 as part of the residential development. The existing inlets did not meet current standards and were upgraded as part of this work.

53 Corporation, LLC was awarded the construction contract. Construction was completed in July. The total construction cost for the project was \$70,820. This project was completed on time and under budget.



Encore Castle Rock Downtown Stormwater Management Facility Upgrades

Project Manager: David Van Dellen, P.E.

This project is a continuation of a public/private partnership on the Encore Castle Rock project, and involves upgrades to the required stormwater management facilities for compatibility with a multi-use urban development project in downtown Castle Rock. Encore is a multi-use development including a public outdoor plaza area, commercial retail space, multifamily residential and public parking facilities. The upgrades converted baseline stormwater management facilities that are typically applied to commercial developments and incorporated elements of low impact development stormwater runoff reduction practices and proprietary stormwater treatment facilities called Silva Cells. These upgrades reduced undesirable public exposure to stormwater treatment systems, enhanced water quality and maximized the usable space for the public plaza area.

The base design of the project would have applied a traditional extended detention basin that would have required the installation of a suspended deck over the top of the stormwater facility resulting in undesirable odors, insects and views to public users of the plaza area. Maintenance of the facility would have also been challenging resulting in complications, hazards and complaints. Upgrades incorporated low impact development practices to reduce stormwater runoff from the plaza area through infiltration. Upgrades also allow for public plaza seating over the stormwater facility infrastructure in a manner much more compatible with the proposed uses and maintenance requirements. These upgrades provide the Town with the opportunity to showcase state of the art stormwater practices in downtown urban infill settings that benefit water quality and reduce impacts to receiving waters.



Silva Cells Under Construction



Porous Paver Subgrade Over Silva Cells

Encore Castle Rock Downtown Stormwater Management Facility Upgrades

Project Manager: *David Van Dellen, P.E.*

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The Town entered into a Financing Agreement with Encore Castle Rock SPE, LLC in March 2021 to upgrade the stormwater management facilities. The improvements were completed by the developer in August 2021. The project was funded through the Economic Development Fund and the Parking Fund in the amount of \$250,000. These funds were not initially available and; therefore, the Stormwater Enterprise Fund sponsored the project and was later reimbursed.

The Town conducted a demonstration using water from a fire hose and found the system to be effective.



Porous Paver Infiltration over Silva Cells during Demonstration

Hangmans Gulch Channel Improvements - Phase IV

Project Manager: *Barbara Horton, P.E.*

This project is located within undeveloped property owned by Douglas County School District, south of the Castle Rock Community Recreation Center and west of Woodlands Boulevard. Channel improvements included three grouted boulder drop structures and one vertical sheetpile cutoff wall to restore the degraded stream and preserve existing native vegetation.

In accordance with the Stormwater Master Plan, the Phase I, II and III Hangmans Gulch Channel Improvements were completed in 2011, 2012 and 2018 to provide stabilization between East Plum Creek and Douglas County High School. Soils along the channel bottom and banks of Hangmans Gulch are highly erosive. The Hangmans Gulch trail under the Union Pacific Railroad and the East Plum Creek trail at Hangmans Gulch have been impacted several times, due to excessive sediment being transported from the Phase IV reach and accumulating in these areas during flood events. Phase IV provides additional stabilization, as outlined in the Master Plan, to mitigate for development impacts and reestablish a healthy and sustainable stream system by restoring the channel invert immediately west of Woodlands Boulevard, and further reducing sedimentation concerns downstream and improving water quality. Additionally, the vertical channel banks were graded to allow for revegetation and minimize safety concerns in this area.

Meridiam Partners, LLC was awarded the construction contract. Construction began in April and was completed in August. The total construction cost for the project was \$523,399. This project was completed on time and under budget.



Metzler Ranch Pond Retrofit

Project Managers: *Jim Swanson, P.E. & David Van Dellen, P.E.*

Castle Rock Water completed improvements to the Metzler Ranch Regional Detention Pond, located in the northwest corner of Metzler Ranch Community Park east of Front Street and south of Sam Walton Lane. Retrofit improvements and analysis of the regional detention pond were completed in 2005. The analysis concluded that approximately 3.5 acre-feet of additional water quality capture volume was needed to restore the design capacity of the facility. Twenty-three volunteer trees and other vegetation had taken over the pond bottom, causing maintenance and operational difficulties.

This project removed the volunteer trees and shrubs from the pond bottom, removed approximately 7,400 cubic yards of sediment that had entered the stormwater system, and added structure improvements at each inlet pipe and at the outlet structure to bring the pond up to current design standards. Maintenance access was also added to provide equipment access for ongoing operation and maintenance. Twenty-three trees were planted in strategic locations to replace those removed during construction. Completion of the retrofit construction added 4.8 acre-feet of water quality capture volume necessary to restore the design capacity of the facility.



Before work began



Metzler Ranch Pond Retrofit

Project Managers: *Jim Swanson, P.E. & David Van Dellen, P.E.*

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53 Corporation was awarded the construction contract. Construction started in December 2020 and is complete. A construction change order extended the original contract time due to wet/muddy site conditions experienced last spring. Construction was completed within that extended time frame.

The project was funded through the Stormwater Enterprise Fund, with contributions from the Cherry Creek Basin Water Quality Authority. The cost of the project was \$830,614, which came in \$19,396 under the authorized budget amount.



Parkview Tributary at Fifth Street Trail Drainage Improvements

Project Manager: Erik Dam, P.E.

This project implemented Stormwater Master Plan improvements for the Parkview Tributary drainageway north of Fifth Street, along Oakwood Court and Oakwood Drive, to improve drainage and minimize flooding in a residential neighborhood. In addition, aging water distribution mains under Oakwood Drive and Oakwood Court have been replaced and full depth pavement replacement of the streets performed.

The new storm sewer system replaced an existing trapezoidal concrete channel through private property along Oakwood Court, and abandonment of an existing storm sewer pipe behind homes on Oakwood Drive. It includes 903 LF of reinforced concrete pipe, 328 LF of plastic pipe, eleven inlets and nine manholes. Street and sidewalk improvements, including new ADA compliant curb ramps, support the storm drainage system and improve pedestrian safety. Water and sanitary sewer system improvements include replacement of 854 LF of water mains with PVC pipe, along with associated service connections. Additionally, residential sanitary sewer service laterals were replaced and two new fire hydrants installed within the project limits.

The contractor was Elite Surface Infrastructure. While this project was primarily funded by Stormwater, Water and Wastewater assisted with the funding. The cost of the project was \$1,536,151, which was within budget. The project was completed on schedule in December 2021.



Parkview Tributary at Fifth Street Trail Drainage Improvements

Project Manager: Erik Dam, P.E.

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2021 Stormwater CIP Projects



Village North Drainage & Infrastructure Improvements

Project Managers: Erik Dam, P.E. and Josh Hansen, P.E.

Castle Rock Water's Stormwater and Engineering Divisions teamed up to construct drainage and sanitary sewer improvements in the Village North commercial district, north of Wolfensberger Road. New storm sewers were needed to address localized flooding along Park Street, Malibu Street and Caprice Drive, and upgrades to the existing Parks Department Central Service Center detention pond will provide additional volume for area-wide flood control and water quality. The storm sewer system consists of 1,600 LF of reinforced concrete pipe, ten inlets and nine manholes. Street section improvements support the new storm drainage system. The modified detention pond has capacity to treat 24 acres of the commercial and light industrial area at a volume of approximately four acre-feet. Future infill development will have the option to purchase volume in the regional pond to help offset the cost of the detention pond expansion.



Village North Drainage & Infrastructure Improvements

Project Managers: Erik Dam, P.E. and Josh Hansen, P.E.

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A secondary goal of the project was to take advantage of the street construction to replace an existing 15" clay sanitary sewer main that was old, undersized, and partially located within easements on private property. This pipe was relocated into Town right-of-way and replaced with 1,172 LF of 21" PVC pipe to account for full-buildout upstream conditions.

Notice to Proceed was issued to the contractor on February 1, 2021. The contractor had to pull off the project for approximately two months in early fall to allow for CORE Electric (formerly IREA) to relocate three undetected conduits in conflict with the storm sewer. Completion of all subsurface improvements is anticipated in 2021, with pavement restoration expected in the spring of 2022, due to cold weather.

The contractor of this project is T. Lowell Construction, Inc. The cost is \$1,699,500, which is within budget. While this project is primarily being funded by Stormwater, Wastewater is sharing in the cost. The project is expected to be completed in the spring of 2022. There were delays due to the utility conflicts and weather.



New Administration & Customer Service (A&CS) Building and Engineering Building Remodel

Project Managers: Tim Friday, P.E. & Walt Schwarz, P.E.

Construction of the Castle Rock Water Administration and Customer Service (A&CS) Building, awarded to Golden Triangle Construction (GTC) in the amount of \$3,944,200, achieved the milestone of substantially complete on September 17, 2021. The project architect was HB&A. The project included completion of a new, more accessible, 12,188 square foot building and retrofitting office space in the existing building, now named the Engineering Building. The new A&CS building includes space for conference rooms, customer service reception, meter and billing services, staff offices, break room kitchenette, a work room, and lavatory facilities. A photovoltaic system with a panel area of almost 1,400 square feet was installed on the roof. The 25 kW power generating system allows excess electricity generated by the panels on sunny days and not needed by the building, to be metered back to CORE Electric.

Following construction of the A&CS Building, GTC remained on-site to complete landscaping and punch list work, as well as the remodel of the former A&CS Building. The landscaping is all low-water use materials and also includes two stormwater retention facilities.



The new Administration & Customer Service Building



Entrance / lobby of the new A&CS Building

New Administration & Customer Service (A&CS) Building and Engineering Building Remodel

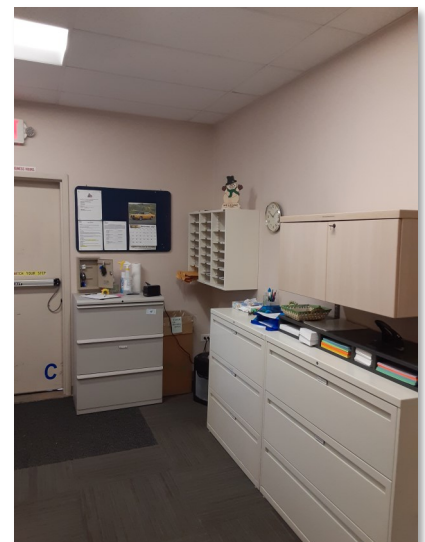
Project Managers: Tim Friday, P.E. & Walt Schwarz, P.E.

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The remodeling of the Engineering Building included framing, drywall installation, and rough-in for mechanical, electrical, and plumbing. Office spaces were reconfigured to house Engineering, Stormwater, GIS and Utility Locate staff. In November, staff moved from the temporary office trailers into the newly remodeled Engineering Building. In addition to office space, the Engineering Building includes a conference room, break room kitchenette, lavatory facilities, and a work room.

A team of Castle Rock Water employees volunteered to serve on a newly formed Art Committee, for the purpose of selecting art work for the buildings on the Castle Rock Water campus (mostly repurposing existing artwork, with a few new creative pieces).

As part of the project, GTC is removing the temporary office trailers that served Castle Rock Water well for almost twenty years. Castle Rock Water administrative staff, as well as the Town's Facilities and IT departments, contributed greatly towards the successful completion of this project. The project was completed on time and within the approved budget.



Engineering Building Remodel

Castle Oaks Wet Well Wizard

Project Managers: Scott Berndt and David Montgomery

The original mixing system at the Castle Oaks lift station did not do a good job of breaking up the fats, oil, and grease (FOG), which caused a buildup of solids in the wet well, requiring frequent attention by lift station operators. A buildup of solids also results in the development of hydrogen sulfide gas, which is corrosive and results in odor problems at the lift station and collection system.

Staff replaced the entire wet well mixing system with a Wet Well Wizard mixer. This aeration system has been installed at two other Castle Rock Water lift stations, with excellent results. The Wet Well Wizard is a completely different type of mixing system, utilizing a topside blower unit, connected to four ejectors which are placed onto the floor of the wet well. This system has flexible hosing connected to each ejector, instead of hard PVC diffuser piping. This enables easy removal of the unit from the top, outside of the wet well, for maintenance.

The Reliant Wizard system aggressively agitates and liquefies the solids in the wet well, preventing FOG buildup. This constant agitation, with highly forced air, introduces oxygen to the water, which encourages aerobic microbes to form, digesting organic wastes and reducing odors downstream. Ultimately the Wet Well Wizard reduces the amount of Biocide chemical needed, saving the Town over \$30,000 through the first eleven months of 2021, compared to the same time frame in 2020. The project cost was \$22,295.



Wet Well Wizard Blower and Ejector System

Enderud Well House Fence Project

Project Managers: Mike Wilder, Scott Berndt and David Montgomery

Recent Terrain neighborhood construction had brought housing adjacent to the Enderud Well House. In order to provide additional facility security, staff was requested to install a new 8' high cedar privacy fence immediately around the well house. This fence serves as a security barrier, provides a visual screen for nearby residents and helps attenuate the high pitch sound of transformers when the wells are operating. In addition, a three rail cedar fence was erected along the cleared perimeter surrounding the well house, matching the type in use throughout the neighborhood.



Fencing at 4286 Hidden Gulch Rd., Castle Rock

Enderud Well House Fence Project

Project Managers: Mike Wilder, Scott Berndt and David Montgomery

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Staff worked with the neighborhood's Homeowner's Association (HOA) to gain approval of the fencing design, which is in accordance with current Terrain HOA standards. This fencing will add another layer of security to the well site. Additional security is already in use at this site, such as security lighting, internal cameras, and security badge access controlled doors. The cost of the project was \$45,434.



Newly Constructed Fencing at Enderud Well House

Plum Creek Diversion Excavator Purchase

Project Managers: Rob Daniels and John Chrestensen

The Linkbelt Excavator model 350X3EX, that had been rented and stored at the Plum Creek Diversion, was purchased from United Rentals for the amount of \$90,225. As part of the purchase, United Rentals agreed to refund \$10,015 of the August rental charge, resulting in a net purchase price of \$80,210.

The water intake structures at CR1 and Plum Creek Diversion (PC Diversion) experience extreme sand accumulation in the stream channel due to spring runoff, summer storms, and monsoonal weather upstream on East and West Plum Creek. The silt, sand, and gravel combine to fill the intake channel and cover the intake screen, forcing the pumps to cycle and turn off due to lack of flow. Additional sand is expected to accumulate in the newly constructed PC Diversion pump station wet well and inlet channels. This accumulation inside the wet well can be mitigated by timely and frequent sand removal, before it enters the intake structure, thus reducing wear and tear on the sand pumps.

This excavator will be used immediately after storms, preventing sand loading. These sand loads clog the diversion structure, at times when our water rights dictate that the most water can be taken from the stream, ultimately restricting water production. The use of an excavator for sand removal makes it possible to maintain production consistently throughout the year.



Linkbelt Excavator Conducting Storm Pond Remediation Operations



Ray Waterman Green Zone Pump Upgrades

Project Managers: Scott Berndt and David Montgomery

Castle Rock Water's engineering staff recently determined that due to increasing population growth, the Ray Waterman Green Zone pumps should be upsized with higher capacity to better meet current and future demands. Furthermore, with expected increases in WISE water imported flows, larger high service pumps are needed to move the additional water throughout the Green Zone distribution system. The two new Green Zone pumps are sized to increase pumping capacity from 2,780 gpm to 3,400 gpm, each. These improvements, along with the previous third pump 870 gpm capacity upgrade, increase the total Green Zone pumping capacity by 1,240 gpm or 1.78 MGD.

The new FlowServe pumping equipment was manufactured and delivered to the Canfield Drilling pump repair facility in Ft Morgan, Colorado. Castle Rock Water plant maintenance staff pulled one pump at a time for replacement; shipping each pump to Canfield for disassembly and rebuild. Upgrading one pump at a time allowed the pump station to continue to operate normally during the pump upgrade process. The cost of this project was \$79,292.



Green Zone Pump Installation

Ray Waterman Perimeter Fence

Project Managers: Mike Wilder, Scott Berndt and David Montgomery

In order to improve the physical security at the Ray Waterman Water Treatment Facility (RWWTF), staff contracted with Commercial Fence & Iron Works. The pre-existing fence, shown by the blue line in the diagram below, surrounded the treatment plant, pump house and southern wellfield. Now additional areas of six-foot black vinyl chain link fence, shown by the red line in the diagram below, enclose the Water Infrastructure Supply Efficiency (WISE) vault and the western well field. Man gates and double vehicle access gates were also included in this project.



Ray Waterman Perimeter Fence

Project Managers: Mike Wilder, Scott Berndt and David Montgomery

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Recent development in the Terrain neighborhood has brought numerous multi-family housing units to the edge of the treatment facility's property boundaries. The fencing that now encompasses all of the facilities at RWWTF prevents access to treatment plant facilities and equipment, protecting Castle Rock Water infrastructure from unauthorized intrusions. The cost of this project was \$49,334.



Ray Waterman Fencing Extensions

SCADA Owl Data Diode

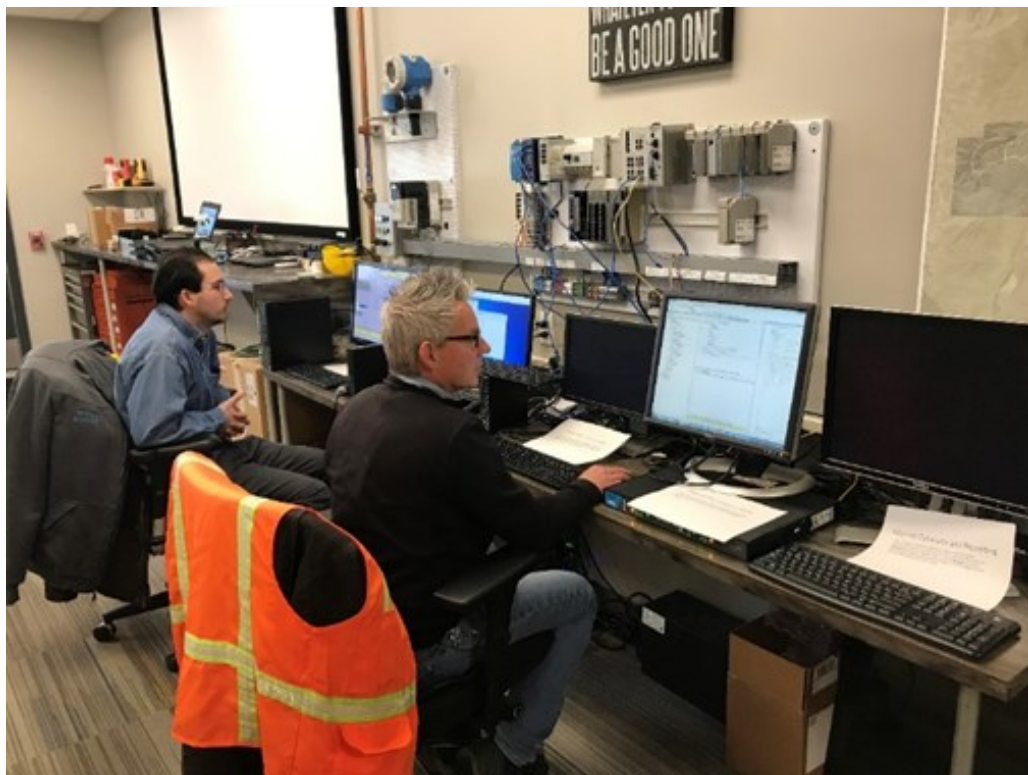
Project Manager: Harvey Bessonett

The SCADA team began implementing their five-year Master Plan Upgrade project. The first phase was to ensure a safe and secure SCADA system. This was accomplished by installing a Data Diode, which separates the SCADA system from the Town's IT system. This device provides an air gap, separating the SCADA network from the "Business" side of the Town's network, protecting the system from unauthorized users.

The team also completed hard wiring and protocol isolation for any shared system with other water providers and users. This was done to help protect against cyberattacks and to further secure the Town's water and wastewater systems. The cost of this project was \$46,562.



Owl Data Diode



SCADA Team Members Hard at Work

Weaver Wells 39, 41 & 67 Replacements

Project Managers: Scott Berndt and David Montgomery

The Centrilift Variable Frequency Drives (VFDs) at the Weaver 1 Well Facility (Weaver 1) were installed in 2000, and were no longer supported by Centrilift as repair parts are not available. Considering the criticality for water production and the concern over long procurement times, 10-12 weeks, staff made the decision to replace the drives before they failed. The Toshiba HX7 VFD at Well 67 suffered an arc flash and catastrophic failure, requiring immediate replacement.

Wells 39 and 41, located at Weaver 1, supply raw water to the Founders Water Treatment Plant, for treatment and distribution to the Founders neighborhoods. The VFDs provide power and control to the wells and provide the ability to speed up or slow down well production to match the aquifer water level. Well 39 draws water from the Arapahoe aquifer. This well typically produces up to 400 gpm and its VFD is sized to power a 550 HP motor. Well 41 draws water from the Denver aquifer. This well typically produces up to 275 gpm and its VFD is sized to power a 325 HP motor. These drives are located inside the Weaver 1 well house.

The Well 67 VFD provides power and control to the well, with the ability to speed up and slow down well production and accurately keep pace with the Arapahoe aquifer water level. This well typically produces over 500 gpm and the VFD is sized to drive the well's 500 HP motor. The project scope included removal of the failed VFD and cabinetry from the well house, installation of the new VFD and cabinetry, testing, and startup.

Staff contracted with Applied Ingenuity, to replace the obsolete and failed VFD drives with Centrilift drives, as they are a Master Plan approved drive, were lower in price, did not require additional sine wave filters, and provided the best value for the Town. The cost of this project was \$184,083.



Wells 39, 41 & 67 Centrilift VFDs