A Look Back at 2018

Please join us as we take a look back at some of our major accomplishments and projects in 2018.

A near-term source of imported, renewable water will be from the Water Infrastructure and Supply Efficiency (WISE) Project. This project is key to the Town's long term water plan. It took nearly a decade of work and negotiations with Denver Water, Aurora Water and ten other South Metro water providers to bring this project to a successful completion. The project consisted of many pipelines, a water storage tank, a new water treatment plant and other infrastructure. To date, Castle Rock has invested over $40 million to make this project a reality. The final piece of the project which was completed in 2018 consisted of a potable water pipeline to convey WISE water from Parker Water & Sanitation District (PWSD) infrastructure near Outter Marker Road in Douglas County to the Town's Ray Waterman Regional Water Treatment Center (RWRWTC), and is approximately 5.5 miles. This last piece of pipe won a national award from the American Council of Engineering Consultants for its innovative design and construction. The project was completed $822,684 under budget and on-schedule.

In July of 2018, Town Council approved an option for the Town to subscribe to an additional 1,000 acre-feet per year of this water. Castle Rock Water will have to make additional investments in this long term water supply over the coming years.

We got WISE

Ribbon Cutting on June 8, 2018 included staff and Council/Board members from the partners.

Spring Up the Creek!

Spring Up the Creek is a community event to preserve our waterways by removing trash that collects along the stream banks. The theme for the 2018 event was *"Think About Your Drink"* . This message encourages residents to think about their drink, and what can be done at home, school, and workplace to protect the water that you use every day. Southeast Metro Stormwater Authority (SEMSWA) generously allowed us to borrow their giant straw with the same messaging

In only two hours, **166 bags** of trash and various pieces of debris, including several bike tires, a kiddie pool, decades old bike frame, pallets, sports balls and a couple of animal skulls were removed from East Plum Creek and its tributaries. Volunteers gathered at Festival Park, and then walked or were shuttled to seven locations throughout town where they enjoyed exercise on the trails while collecting trash along the banks of the stream.

Before the event, volunteers were treated to breakfast burritos from the B&B Café, bottled water from Allstate and coffee from Briccy's Coffee. A special thanks to all of our event sponsors, including Burns & McDonnell, Butler Snow LLP, Castle Rock Development Company, Core Consultants, Enginuity, JRS Engineering, Lyons Gaddis Kahn Hall, Muller, Rocky Mountain Self Defense & Fitness, RESPEC, Richmond American Homes and W. W. Wheeler & Associates, Inc.

We are very appreciative of the tremendous team effort from several different departments in the Town and all the partners involved including Castle Rock Water, Community Relations, Public Works, and Parks and Recreation.

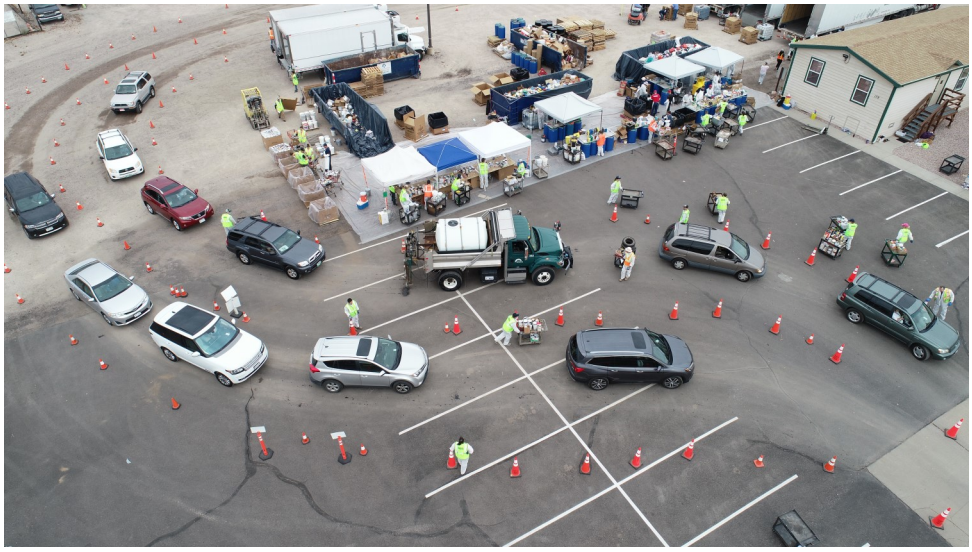
The Town of Castle Rock hosted this event in partnership with Douglas County, Castle Pines Metro District, Chatfield Watershed Authority, and Plum Creek Water Reclamation Authority.

Year	Volunteers	Bags Collected
2014	172	352
2015	173	182
2016	180	192
2017	174	98
2018	208	166

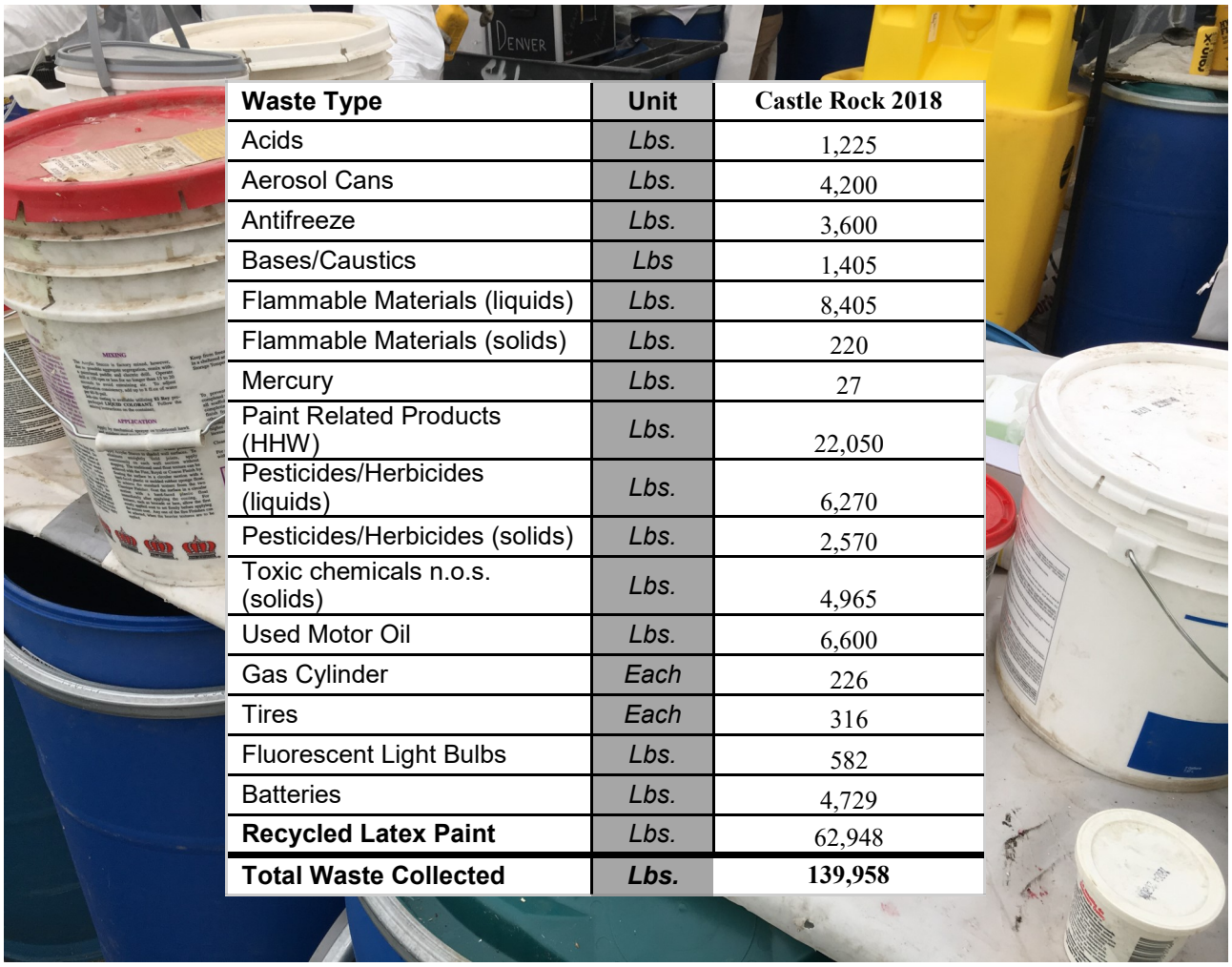
Remember: One thing is clear: our creeks, rivers and lakes depend on you!

Community Events

Household Chemical Round-up



Another popular community event is the Household Chemical Round-up. In 2018, 110 volunteers served 849 vehicles. Household chemicals, including aerosol cans, flammable materials, paint products, motor oil, tires, fluorescent light bulbs and pesticides were dropped off.



Waste Type	Unit	Castle Rock 2018
Acids	*Lbs.*	1,225
Aerosol Cans	*Lbs.*	4,200
Antifreeze	*Lbs.*	3,600
Bases/Caustics	*Lbs*	1,405
Flammable Materials (liquids)	*Lbs.*	8,405
Flammable Materials (solids)	*Lbs.*	220
Mercury	*Lbs.*	27
Paint Related Products (HHW)	*Lbs.*	22,050
Pesticides/Herbicides (liquids)	*Lbs.*	6,270
Pesticides/Herbicides (solids)	*Lbs.*	2,570
Toxic chemicals n.o.s. (solids)	*Lbs.*	4,965
Used Motor Oil	*Lbs.*	6,600
Gas Cylinder	*Each*	226
Tires	*Each*	316
Fluorescent Light Bulbs	*Lbs.*	582
Batteries	*Lbs.*	4,729
Recycled Latex Paint	*Lbs.*	62,948
Total Waste Collected	***Lbs.***	**139,958**

Business Solutions

METER SERVICES

Another record setting all-time low of 36 skipped reads

The AWWA standard for skipped reads is currently two percent. This past year Meter Services achieved well below that average hitting an all-time low of only 0.17 percent beating their record set in 2017. This is the third year in a row that the meter team has beat the record they set the prior year, even with the increase of accounts year over year. This is a testament to the dedication and commitment of the Meter Services team to complete monthly maintenance on infrastructure. This continued commitment has improved reading efficiency, billing accuracy and has challenged the team to always strive for one less skipped read. *How low can they go?*

Our Meters Team
Brian Hickman, Steve Plattner, Denise Lannan, Clayton Baker, Dominc Roybal, Kris Julseth and Rob Chrestensen (left to right)

Mobile Bench Testing Capability

In 2018, the purchase of a mobile bench tester created the capability to test 1.5-inch and larger meters right in the field without replacing them. This reduces staff time and costs, reduces impact to the customer and helps identify non-revenue water loss. All 3-inch and larger meters are being tested first, with eight of the 37 completed. The team is putting together a program to test all 1.5-inch and larger meters on a scheduled basis.

Mobile bench tester checking the flow on the 6-inch Justice Center meter

METER SERVICES

Six-Inch Backflow Replacements

Meter Services/Cross Connection, along with help from Operations replaced three 6-inch irrigation main line backflow preventers in the Founders and Meadows area of town. These replacements were due to failing devices. In order to make sure that we meet our 2020 deadline for the Cross Connection regulations with Colorado Department of Public Health and Environment (CDPHE), these devices needed some attention. After a cost analysis, it was determined it would cost less and take less time to replace the devices rather than rebuild them. This year was the first year that Castle Rock Water has ever replaced a backflow device of this size.

Old 6-inch backflow in place

Removal of the 6-inch backflow

New 6-inch backflow in place

Business Solutions

CUSTOMER SERVICE

Our Customer Service Team
Kaitlin MacPherson, Jennifer Thompson, Jane Chrestensen, Debbi Davenport, Sandi Aguilar, Vicki Knopp, Nichol Bussey, and Vickie Tracy (left to right)

Statement Enhancement

In March 2018, the team added the phone number and email address on file to print on the monthly statements. This enhancement allows the customer to see what information is on file, if any. Why is it important to keep this information up-to-date? For emergency purposes, Castle Rock Water may need to contact a customer.

Automation of Bulk Hydrant Meter Calibration Fees and Service Transfer Fees

A service transfer fee is a cost of service fee to transfer water service, which includes obtaining a final meter read and submitting a final bill. A meter calibration fee is a cost of service fee to re-calibrate bulk hydrant meters when returned from a customer and prior to issuance to the next customer to ensure accurate readings.

Prior to automation of these two types of special charges, they were booked onto a customer account manually. In 2018 alone, the team processed approximately 3,500 service transfers and processed over 40 meter calibration fees. This automation annually saves approximately 60 staff hours.

Automation of AWMC Reset

Every year in April, each individual customer's Average Winter Monthly Consumption (AWMC) or indoor budget is re-calculated based on the average consumption for the months of November-February. Prior to the reset in April 2018, most of this process required manual intervention and analysis of accounts. Now the process is system generated without subjectivity and continues to ensure all individual customer accounts recalculate in a consistent and equitable manner. This automation annually saves approximately 170+ staff hours.

Identification of Fire Suppression Properties

Castle Rock Water and Castle Rock Fire Department worked together this year to identify properties with fire suppression. Why is this important? If a property is to be disconnected, then we would know to inform the Fire Department the property has a fire suppression system and is temporarily without water service.

CUSTOMER OUTREACH

H2O Access Campaign

In October and November, customers were asked to opt-in for paperless billing with a chance to be one of ten customers to win a $50 credit on their water bill. This campaign resulted in a 3 percent increase in enrollment for online statements. Having a paperless account enables customers to easily access their account and statements 24/7 while providing a cost savings to the Town.

Pursuing Excellence – Castle Rock Water Maintains Gold

The first water provider in the state to earn the highest ranking by the Colorado Department of Public Health and Environment for exemplary actions in our leadership role in the water industry. We continued as a Gold award winner for the third year in a row.

Environmental Leadership Program – Gold Award

COLORADO
Environmental Leader
Gold

The Environmental Leadership Program is awarded from the Colorado Department of Public Health and Environment for voluntarily going beyond compliance with the state and federal regulations, increasing sustainability and commitment to continual environmental improvement. After establishing an Environmental Management System in 2018, outlining all environmental impacts and actions taken to improve them, Castle Rock Water received the highest award from CDPHE.

3rd Annual Mayor's Challenge

Winning poster

The Mayor's Challenge is a friendly competition between mayors nationwide to challenge their residents to conserve water, energy and other natural resources on behalf of their city. Castle Rock again ranked in the top 10 in the nation coming in at 8th place for the number of pledges in our population category. This year middle school students participated by creating an artistic creation with the conservation theme of which the mayor chose the winning entry. This event is sponsored by the Wyland Foundation, National League of Cities and the Environmental Protection Agency, amongst others.

CUSTOMER OUTREACH

Fill the Rock

As a fun promotional event to encourage conservation, residents were asked via social media to take daily actions to conerve. Every action taken resulted in an entry for a drawing of prizes such as trampoline time at the MAC. A total 237 customers participated in the promotion with 1,271 actions logged and 81 percent of the Rock was 'filled.'

WISE Water event

To celebrate the completion of this new imported water source, WISE water project, Castle Rock Water held a community event. Along with dozens of family-friendly activities, officials also cut the ceremonial ribbon opening the waterline. The Most Hydrated Man, the star of the entertaining social media video campaign made an appearance.

FINANCIAL

WISE Financing Options

Exercised the take down option water with new growth and system development fees paying for it.

Minimal Increases for 2019

Securing the Town's long-term water future; providing great-tasting, safe drinking water; and keeping rates as low as possible are all goals for Castle Rock Water. In 2019, there is a 3 percent increase in Tier 2 (irrigation) and Tier 3 (excessive) for existing customers and an 8 percent increase in system development fees.

Plum Creek Water Reclamation Authority (PCWRA) Expansion Financing

Looked at various financing options for the $30 million expansion. Due to effective management of cash reserves, we are able to fund the expansion through an inter-fund loan from the water fund to the wastewater fund. This eliminates the need to issue debt, which comes with a higher interest rate. With an inter-fund loan the enterprises are paying each other interest rather than a third party.

Fixed Assets Database Cleanup

In November 2017, the team took on this project of reviewing and cleaning up over 2,500 active fixed assets. Many of these assets were old, in some cases more than 20 years old, and the background information had been lost over the years. In addition, many had inconsistent, vague names and descriptions, making it difficult to identify the asset. In some cases, there was little more information to identify the asset than a vague name such as "Land" with a purchase date.

The intent of this project was to identify each asset, retire assets that were out of service and update the name and description of all current assets so that they were easily searchable. The database is now more accurate with more descriptive asset names for searching and follows a standard naming convention.

Work Smarter Not Harder Initiative

The Business Solutions Team continued an initiative started in 2016 called *"Work Smarter Not Harder"* which encompassed many smaller projects intended to initiate cost savings, improve efficiencies, streamline processes, and overall produce more with less.

Here are just a few of the 2018 initiatives that were completed:

- Curb-Stop GPS – Easy of Locating Infrastructure
  Improve efficiencies, cost savings
- Parks Monthly Consumption Reporting
  Improve efficiencies, streamline processes
- Creation of a Curb-Stop Rethreading Tool (see photo)
  Improve efficiencies, cost savings, streamline processes

Certifications

The water, wastewater and stormwater utility business is highly technical and regulated. As such, Castle Rock Water has to maintain an extensive staff of professionally licensed individuals. Most of these licenses require specialized education and the passing of state testing, as well as proof of continuing education.

Below is a list of certifications held by the staff at Castle Rock Water.

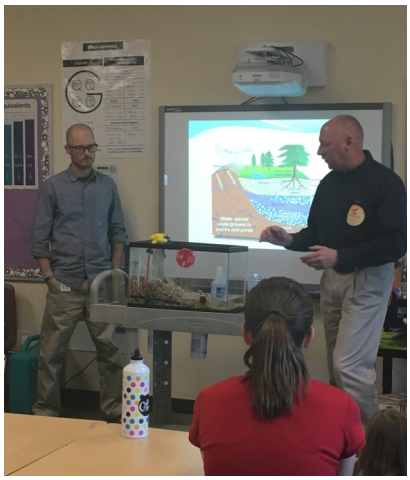
Commercial Driver's License	12
Wastewater Collection (Class 1-4)	30
Class I Plant Maintenance Technologist	3
Water Distribution (Class 1-4)	30
Class A Industrial Wastewater (National)	2
Class C Industrial Wastewater	2
Water License (Class A-D)	18
Wastewater License (Class A-D)	4
PACP - Pipeline Assessment	6
Backflow Prevention Assembly Tester	12
40-hour HAZWOPER (specialized safety training)	17
Flagger Training Certification	24
CDOT Erosion Control	4
Excavation Safety Training for Competent Persons	11
National Assn. of Sewer Service Companies; Manhole, Pipeline & Lateral Assessment Certification; and Inspector Training; and CIPP	1
Professional Engineer (Colorado)	14
Professional Engineer (TX, GA, NE,WY, OK, SD)	6
Project Management Bootcamp	5
American Water Works Association Supervisory Certificate	11
Rocky Mountain Water Quality Analyst	3
Professional Geologist	1

Community Education

Water Education in the Classrooms

One of Castle Rock Water's goals is to promote water conservation and efficiency in the classroom. To further our goal, we visited four 5th grade classes throughout the school year.

- Southridge Elementary
  80 students



These presentations include information about groundwater vs. surface water, renewable water vs. non-renewable water, the water cycle, source of our water, the importance of conservation and using our water efficiently, stormwater, water quality and the importance of keeping our water clean.

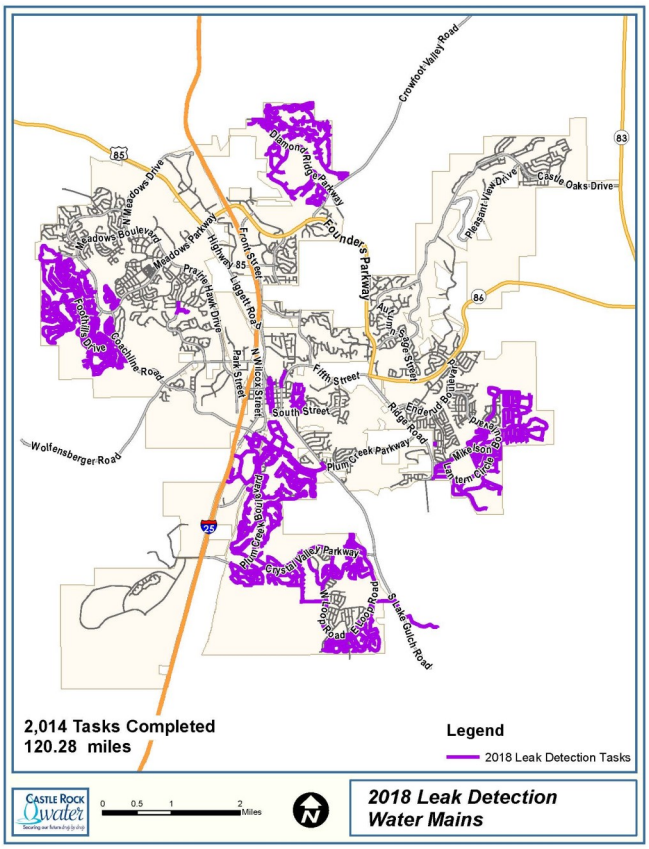
Water Plant Tours

Tours of the Plum Creek Water Purification Facility continue to be a huge success. Over 148 school children, scout groups and their parents toured the facility in 2018. In addition to touring the plant, they learn about where our water comes from, the importance of water conservation, and the impact of stormwater on water quality.

We'd like for your group to tour this state-of-the art facility. To arrange a tour, visit CRgov.com/watertours.

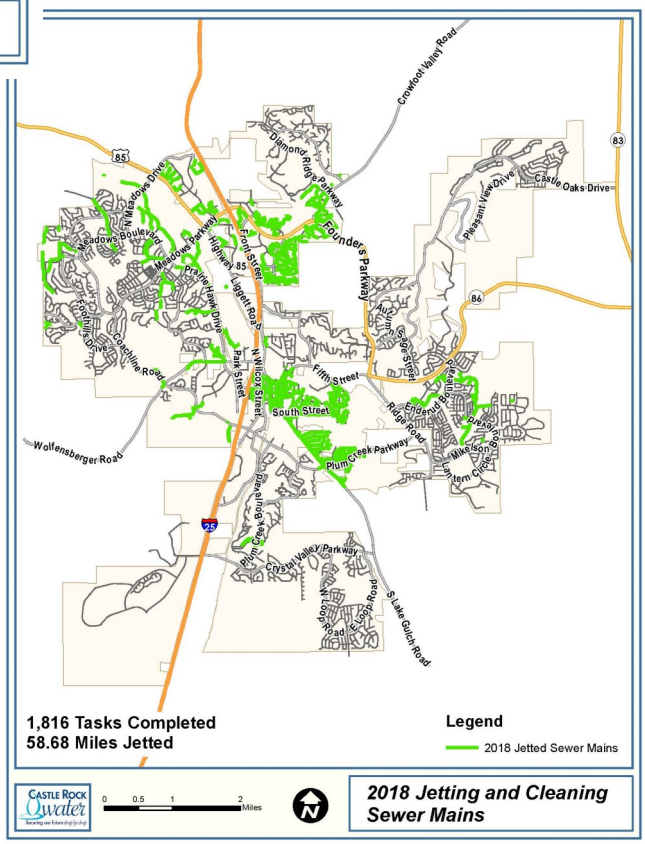
Asset Management

The Castle Rock Water Asset Management Program tracks maintenance and repairs to our assets in addition to providing maps and data.



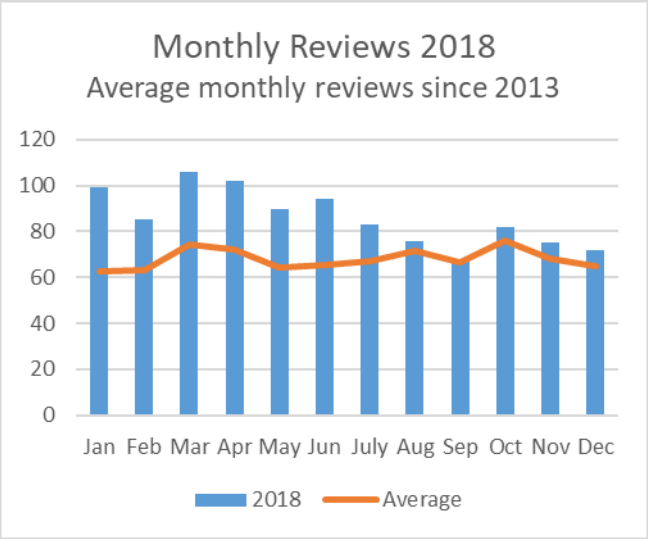
Water Main Breaks: 15
Water Main leak detection:
2,014 lines, 120.28 miles, 29% of system
Water Hydrant Inspections:
760 inspections, 19% of system
Water Valve Inspections:
2,092 inspections, 15% of system

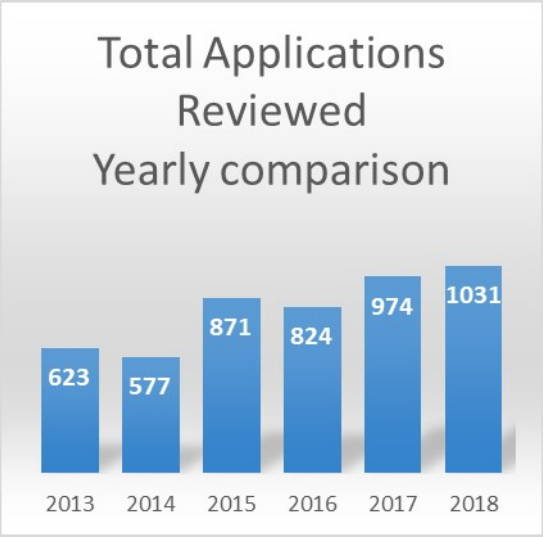
Jetting Tasks Completed:
1,816 lines, 58.67 miles, 21% of system
CCTV Tasks Completed:
651 lines, 22.3 miles, 8% of system
Stormwater Outfall Inspections:
298, 17% of system



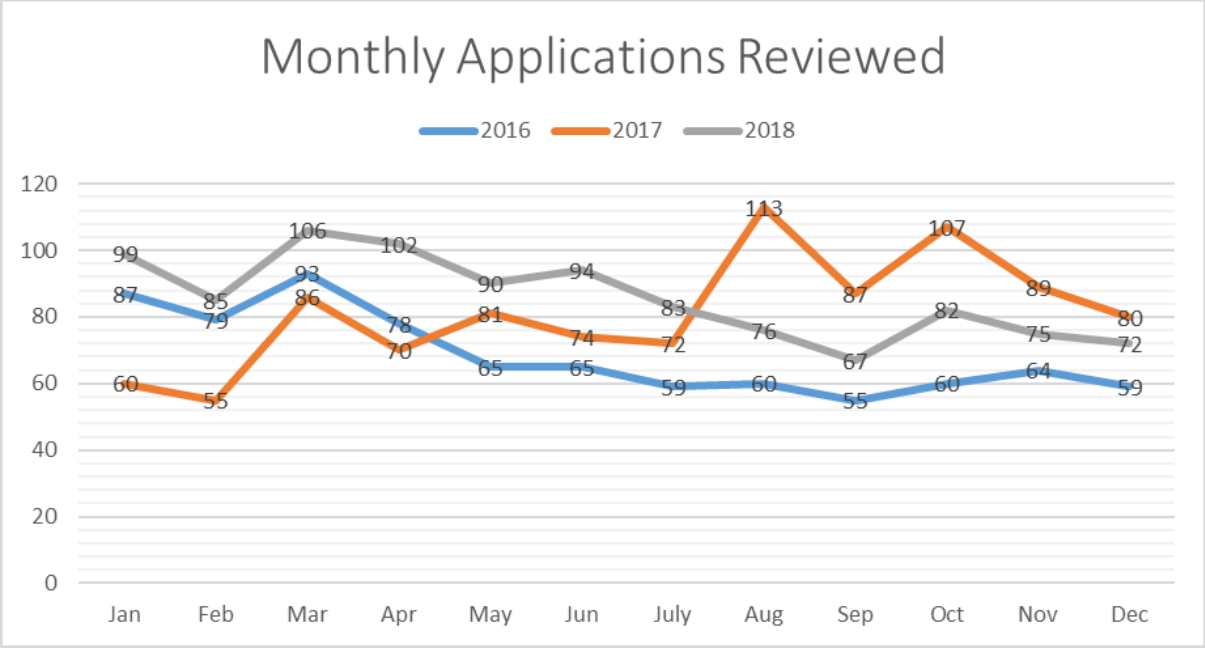
Plan Review

Castle Rock Water provides Technical Plan Review of pre-applications, site development plans, and construction documents for all water, wastewater, stormwater, and GESC (Grading, Erosion and Sediment Control). These applications are submitted through the development review process. In 2018, there were a total of 1,031 project plan reviews; average 86 plan reviews per month.





The average was calculated using applications reviewed between 2013-2018. As shown, monthly reviews in 2018 were consistently above average, in exception of a slight slowdown in September. The quantity of plan review applications continues to rise.



In addition to the technical review of 1,031 projects, Castle Rock Water Plan Review Team also completed 670 residential, commercial and irrigation water use calculations, Master Plan, Certificate of Occupancy and Temporary Certificate of Occupancy reviews for building permits.

Safety

The Safety Stand-Down for this year focused on the type of injury that Castle Rock Water has experienced most frequently. Slips, Trips, and Falls have accounted for nearly 40% of all injuries since we started keeping injury statistics in 2010. The Safety Committee spent a full hour utilizing various stations on the property to illustrate preventive techniques, procedures, and facts about the types of falls that we have experienced. The Stand-Down was well received, and we will continue to emphasize the importance of recognition and control of fall hazards.

Health and Safety Manual

The Castle Rock Water Health and Safety Manual was completed in the late summer. This document is used to guide our approach to preventing injuries and illnesses at work.

Emergency Drill

An emergency drill was carried out in the fall, and was overseen and critiqued by the Castle Rock Fire Department (FD). The drill occurred unannounced at the beginning of a planned staff meeting, and a member of the Safety Committee had the fun of pulling the fire alarm. The observations made by the FD personnel were very favorable – employees evacuated quickly, gathered at the correct assembly point, and Supervisors completed their respective head counts for the responsible person.

CIRSA Training

Castle Rock Water employees completed roughly 440 hours of CIRSA video safety training. Most of those trainings were completed in group settings rather than individually, which can lead to increased retention.

Additional trainings included:

- Ergonomics
- Emergency Action Plan – Evacuations
- Flagger Certification
- Work Zone – Traffic Control Technician
- Confined Space
- CPR

Castle Rock Water continues to be diligent on our journey to zero accidents.

Field Services

Key Performance Measures	2018 Total
Distribution	
miles of distribution lines	420
total hydrants	4,167
total valves	13,814
total valves air release valves	508
leaks repaired	28
valves repaired	5
hydrants repaired	42
miles of main line inspected leak detection	127
valves inspected	2,869/52%
hydrants inspected	739
hydrants painted	0
dead end lines flushed	0
tanks inspections	45
tanks cleaned	5
bulk water (kgals)	1,759
Collections	
miles of wastewater lines	280
miles of force main	9
manholes	8,971
lift stations	9
odor control facilities	2
sanitary sewer overflows	1
sanitary sewer stoppages	0
miles of line cleaned	61
miles of line inspected cctv	23
bulk water (kgals)	220
Stormwater	
miles of pipe	156
manholes	3,669
curb inlets	4,909
drop structures	505
detention basins	373
infrastructure inspections	907
cubic yards material removed	1,699 cu.yds.
rehab projects completed	38
bulk water (kgals)	23
bulk water used by field services (kgals)	2,023
utility locating requests	19,875

Capital Improvement Program

CASTLE ROCK water

Securing our future *drop by drop*

The following pages highlight some of the water, water resources, wastewater, stormwater and special projects completed in 2018.

Castle Rock Water Improvements Project

Project Manager: Matt Hayes, P. E.

The Castle Rock Water Improvements Project combined the improvements at four facilities into a single project. The project included the replacement of two Pressure Reducing Valve (PRV) vaults, replacement of two failed butterfly valves at the Meadows Water Treatment Plant, and the replacement of the Maher Force Main discharge manhole. The projects were combined into a single project to create a more desirable project for contractors to bid on and to gain economies of scale.

Replacement of PRV Vaults

This project included the replacement of two existing PRV vaults: The Canyons PRV located near the intersection of Canyon Drive and Oakwood Drive, and the Baldwin PRV located near the intersection of Baldwin Park Road and S. Valley Drive. Both PRV vaults were constructed in the late 1980's. The new vaults were constructed with adequate space to work in and with solid concrete floors.

Canyons PRV

Meadows Water Treatment Plant

Replacement of Butterfly Valves

This project also included the replacement of two 18-inch direct bury butterfly valves on the Meadows Water Treatment Plant discharge transmission mains. The Meadows Water Treatment Plant was constructed in 1987 and one of the 18-inch butterfly valves had failed and needed to be replaced. The valves were not accessible without excavation because they are buried. This project also included the installation of a new vault over these valves to provide access for future valve maintenance.

Castle Rock Water Improvements Project (Cont.)

Project Manager: Matt Hayes, P. E.

Replacement of Discharge Manhole

The fourth item included in this project is the replacement of the discharge manhole for the Maher Force Main, which was constructed in 2002 to serve the Sapphire Pointe subdivision. Hydrogen sulfide is formed in anaerobic environments, such as wastewater force mains. This gas is corrosive to the concrete manhole. The existing discharge manhole needs to be replaced, due to this damage. The new manhole is epoxy lined to minimize future damage from hydrogen sulfide gases.

The total project cost was $302,986 to design and construct the Castle Rock Water Improvements Project. Garney Construction constructed the project. The project was completed within the Town's budget and schedule.

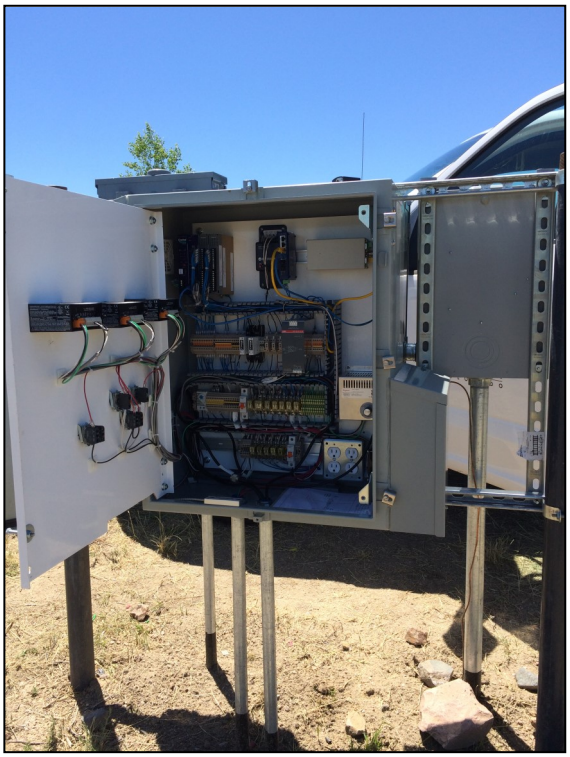
Maher Force Main

Prairie Hawk PRV Automation Project

Project Manager: Matt Hayes, P. E.

Castle Rock Water has completed the Prairie Hawk PRV Automation Project. Dewberry Engineers was the electrical design consultant and Sun Valley Electric was the electrical contractor on this project. The Prairie Hawk PRV was constructed in 2013 as part of the Plum Creek Water Purification Facility – Raw Water Transmission Pipeline Project. The PRV is designed to maintain positive pressure in the pipeline and allows the well pumps in the South Well Field to operate within their optimal pressure range. Now that the wells in the South Well Field have been operating for a few years, wells need to be taken off-line for maintenance and cleaning. When a well is started or stopped, whether by design or malfunction, the hydraulics in the transmission main change. Depending on the pressure change at the South Well Field, staff may be required to manually adjust the setting of the pressure sustaining valve.

Castle Rock Water has automated the existing pressure sustaining valve in order to be able to more promptly adjust to changing system conditions, and also to eliminate frequent confined space entries by staff. Automatic control from the SCADA office interface will offer faster response time and ensure maximum renewable water production from the South Well Field. The project added new electronic piloting to the existing valve. Castle Rock Water Operations staff also built a new panel to control the operation of the valve. This project was completed in July at a cost of approximately $26,000.



WISE Water Delivery

Project Manager: Walt Schwarz, P.E.

Securing the Town's long-term water future is a top priority for Castle Rock Water. The Water Infrastructure and Supply Efficiency (WISE) Project is a partnership between Denver Water, Aurora Water and ten south metro water providers to provide a sustainable water supply. After nine years of planning and more than $50 million in infrastructure, Castle Rock began importing WISE water on schedule in April 2018! In June 2018, the community was invited to help us celebrate this major milestone.

WISE Water Delivery (Cont.)

Project Manager: Walt Schwarz, P.E.

Construction on the local WISE infrastructure began in December 2016. Work consisted of installing, connecting and testing a potable water pipeline to convey WISE water from the Parker Water and Sanitation District (PW&SD) infrastructure, near Outter Marker Road in Douglas County, to the Ray Waterman Regional Water Treatment Center (RWRWTC) in Castle Rock. The work included installation of just over five miles of 36-inch diameter water pipe, and 1,300 linear feet of 24-inch diameter potable water pipes.

Garney Construction was awarded the nearly $14 million construction contract, and began site mobilization in January 2017. Garney completed connections and associated pipeline work at RWRWTC so the facility could be brought back online in the spring.

Every year, the American Council of Engineering Companies (ACEC) recognizes engineering firms for projects that demonstrate an exceptional degree of innovation, complexity, achievement, and value. Burns & McDonnell Engineering Company was the design engineer for this project and as such they were awarded a 2019 Engineering Excellence Honor Award by ACEC in the Water Resources Category. A team approach during the design phase, including contributions by Castle Rock Water staff, helped ensure a successful project that was constructed on schedule and under budget.

WISE Water Delivery (Cont.)

Project Manager: Walt Schwarz, P.E.

The final WISE piping connection was made to the PW&SD infrastructure at Outter Marker Road early in 2018

This project had the potential to significantly disrupt residents with noise, road and trail closures. The use of innovative design technologies minimized these impacts.

An existing Xcel Energy easement was used to build the local pipeline, which minimized costs and reduced inconveniences to residents during construction.

Castle Rock is now able to receive and process up to 14 million gallons of additional water per day through the new waterline from the Parker Water & Sanitation District. Engineering was able to complete this project at about $200,000 under budget! The Town's cost of the WISE local infrastructure project was $13.25 million. The total value of the infrastructure is $50 million.

The WISE Pipeline during Construction

Advanced Treatment Pilot Project

Project Management: SCADA, Plant Mechanics, Field Services, Plant Operations, and Walt Schwarz from Engineering

Castle Rock Water staff participated in the Advanced Treatment Pilot Project, located at Castle Rock Reservoir No. 1 in Sedalia. Two shipping containers were delivered to the site that contained advanced treatment test modules, such as ozone and Biologically Active Carbon (BAC) systems. These treatment systems tested the effectiveness of treating the new surface water source from Plum Creek. Field Services installed an access road and pad for the equipment. Staff worked with Sun Valley Electric and Intermountain Rural Electric Association (IREA) to install electric power for the six-month pilot testing. Total pilot project costs were approximately $202,000, and included costs such as renting the pilot equipment for six months, hauling and crane rental for set-up, access drive improvements, installing electric, and general operation and maintenance costs for the six-month pilot test. The containers were successfully placed, operated and maintained to simulate future advanced treatment methods planned for implementation at the Plum Creek Water Purification Facility (PCWPF). Water quality lab results obtained during pilot testing have been used to fine-tune final designs for the full-scale PCWPF Advanced Treatment Project.

Overall Project Set-up

Ozone “Breaks down Organics & CEC”

Flocculation

Advanced Treatment Pilot Project (Cont.)

Project Management: SCADA, Plant Mechanics, Field Services, Plant Operations, and Walt Schwarz from Engineering

Sedimentation

BAC Filter “Biologically Active Carbon”

Castlewood Ranch 1 Well Facility

Project Managers: Heather Justus, P. G., and Matt Hayes, P. E.

A new municipal well facility and pipeline was constructed in Castlewood Ranch, near the corner of Lantern Circle and Lost Canyon Ranch Road. The project consisted of drilling two new Denver Basin wells, a well metering and control facility, and a pipeline to connect the new wells to the Founders Water Treatment Plant. The well drilling and construction were performed by two companies. Hydro Resources drilled the Arapahoe well and Layne Christensen drilled the Denver well. Layne also supplied and installed the pumping equipment for both wells. The drilling of the Arapahoe well at this location was very challenging. Portions of the Dawson and Arapahoe formations were unstable and presented numerous challenges during the drilling process.

The well facilities and pipeline were designed by Dewberry Engineers and constructed by T. Lowell Construction. The well facility included a flow meter vault, electrical, variable frequency drive, and control panels. The facility also included the yard piping from each well and pump to waste pipe. The contractor also constructed a new 8-inch transmission main between the well facility and an existing raw water transmission main. The transmission main also included a new pressure sustaining valve vault to allow the pipeline to maintain positive pressure along the entire alignment.

Construction of the Castlewood Ranch Well Facilities began in 2017. Drilling activities began in early 2017 and continued into 2018. The well facilities and pipeline were constructed in the first half of 2018. The Denver well was put into service in July of 2018. The completion of the Arapahoe well was delayed due to the need for additional development to remove drilling muds from the well. The pumping equipment for the Arapahoe well will be installed in January of 2019 and will be put into production once Colorado Department of Health and Environment approval is obtained. The total cost for the Castlewood Ranch 1 Well Facility was approximately $5.5 million, with an expected yield of 0.67 mgd.

Setting a Vault for the Pipeline

Plum Creek Diversion Pump Station Design

Project Manager: Matt Hayes, P.E.

Castle Rock Water purchased the United Water and Sanitation District's Infrastructure, which includes the Plum Creek Diversion in Sedalia, in November of 2017. The Plum Creek Diversion has a capacity to capture up to 25.8 MGD, but is only able to pump 1.15 MGD up to the Castle Rock Reservoir 1. This project will design a new Diversion Pump Station that is capable of pumping 8 MGD up to the reservoir and will be expandable up to 15 MGD in the future. This project will also design the new Plum Creek Pump Station that will pump water from the Castle Rock Reservoir 1 to the Plum Creek Water Purification Facility. The Plum Creek Pump Station will initially be capable of pumping 6 MGD and will be expandable up to 13 MGD. Dewberry Engineers, Inc. has been contracted to design the new pump station.

The Town has partnered with Dominion Water and Sanitation District on a joint pipeline project between the Town of Castle Rock and the Plum Creek Diversion. The project team includes Providence Infrastructure Consultants for the design and Reynolds Construction for construction services. The project will include two 30-inch pipelines and a meter facility. Dominion's pipeline will be used to wheel their WISE water through Castle Rock Water's infrastructure and down to Sterling Ranch. Castle Rock Water's pipeline will be used to supply raw water from Castle Rock Reservoir 1 to the Plum Creek Water Purification Facility. The design for both projects will be completed and construction will begin in 2019.

Wells CR-15R and CR-16R Re-drill and Modifications Project

Project Manager: Heather Justus, P.G.

Castle Rock Water contracted with Hydro Resources for the construction of two new replacement Denver Basin wells that will have the capability to supply water to either the PS Miller Water Treatment Plant (Miller WTP) or Plum Creek Water Purification Facility (PCWPF). Wells CR-15R and CR-16R are located in the Plum Creek community at 2032 Champions Court, on the Town parcel adjacent to the Plum Creek Golf Course. In addition to the construction of two new Denver Basin Aquifer wells (Denver and Dawson), the project included updated controls and transmission pipe to convey the water to the existing metering header in the Miller WTP.

The team worked hard early in 2018 to get the new wells operational before irrigation season, as the older wells were nearing the end of their useful life. Prior to re-drilling, Castle Rock Water plant maintenance staff removed the old pumps and got the water plant ready to run once the wells were re-drilled. Hydro Resources completed the drilling of these facilities, and also abandoned the pre-existing Wells 15 and 16 in accordance with State regulations.

The new wells produce approximately 0.432 MGD. The total cost of the project was approximately $1.46 million dollars.

Meadows 17 Lift Station Mixer

Project Manager: Matt Hayes, P. E.

The Meadows F17 Lift Station is located in The Meadows subdivision and is responsible for pumping the wastewater generated into the gravity sanitary collection system. This facility has had an ongoing issue with fats, oil and grease (FOG) and solids accumulation within the wetwell. The solids material is able to separate from solution and float to the surface between pumping cycles where it conglomerates into a solids sludge mat.

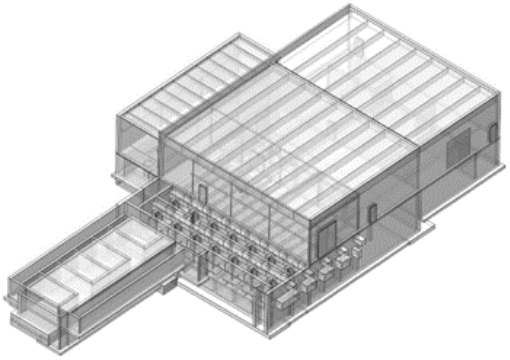
Once this material separates from solution and forms a mat, it cannot be pumped out of the wetwell. This material has to be manually broken up, worked back into solution, and the wetwell continually pumped down in manual mode until the blanket is gone. This requires a crew of three, a fire hose, and a vacuum truck for approximately four hours each time. With labor and equipment, the cost for each cleaning is approximately $1,000. The estimated annual cost to remove this material is approximately $2,000. Installing a mixing system will eliminate this labor-intensive process and will pay for itself in less than five years.

Castle Rock Water staff evaluated several different types of mixing technologies for this application in 2014 for the Mitchell Creek Lift Station (MCLS). The Phi mixing system was selected and has been operating effectively at MCLS since July of 2015. It was considered for the Meadows 17 Lift Station, but the Phi mixing system requires a large compressor and air tank for its operation. This equipment must be installed indoors or in a protective structure to prevent the equipment from freezing. The building for the Meadows 17 Lift Station is small and does not have adequate space for the compressor and air tank equipment. Staff re-evaluated other mixing systems due to the space constraint and potential cost of an enclosure at the Meadows 17 Lift Station. The Medora AP 500 Mixers use a continuous flow of air to mix the wet well. The air is supplied by a small blower that can be installed outdoors. The small mixer footprint and outdoor installation is ideal for the Meadows 17 Lift Station.

The mixer was installed in May of 2018. Town staff performed the installation of the mixer system. The total cost for this project including labor, equipment and materials was $10,000.

Plum Creek Water Reclamation Authority Expansion

Project Manager: Josh Hansen, P. E.



Ground-breaking of the Plum Creek Water Reclamation Authority (PCWRA) 3.0 million gallons per day (MGD) treatment capacity expansion began in the fall of 2018. PCWRA is located at 4255 N. Highway 85, and provides wastewater treatment services for the Town, Castle Pines Metropolitan District, Castle Pines North Metropolitan District, and some smaller sanitation districts. The Town of Castle Rock currently owns 71 percent of the existing treatment capacity at the plant. The expansion is needed to accommodate growth, and has been planned since 2015. A 2017 capacity update study revealed that the 3.0 MGD expansion was needed on an accelerated schedule as early as 2020.

The treatment plant expansion is being delivered utilizing Guaranteed Maximum Price (GMP) contracting. Design of the plant began in September 2017 by Burns & McDonnell Engineering, and thirty percent design was completed in March of 2018. The proposed improvements include a new plant headworks facility, a new tertiary filtration process, improved and expanded ultraviolet disinfection process, and a new solids handling system.

In April 2018, Moltz Construction was selected through a competitive process as the contractor for the project. Burns & McDonnell collaborated with Moltz, PCWRA, and Town staff to complete the project design in late 2018. A construction contract was executed with Moltz for Work Package #1 in the amount of $11.5 million and construction began in October. Work Package #1 included construction mobilization, procurement of new treatment process equipment, construction demo and shoring for structures, site utility work, and other site improvements. Work Package #2 contains the balance of construction work needed for the plant expansion and is being contracted in early 2019. The anticipated total project cost is $36.2 million. An expansion agreement was executed in December 2018 between the Town, PCWRA, Castle Pines Metro District, and Castle Pines North Metro District, outlining participation in the project. The Town's share of the anticipated project costs is $30.8 million (85 percent), and will be recovered primarily through system development fees from future growth. Construction is anticipated to be complete in September 2020.

Terrain-Founders Sewer Project

Project Manager: Matt Hayes, P. E.

Castle Rock Water has recently completed the Terrain-Founders Sewer Project. The new sewer main will eliminate the need for the Ray Waterman Regional Water Treatment Facility (RWRWTF) temporary lift station. Sanitary flows from the RWRWTF and Founders Marketplace will flow into the existing collection system located within the Terrain Subdivision.

The project consisted of the installation of 1,680 feet of 10-inch PVC pipe, six new manholes, modifications to two existing manholes, and the abandonment of the RWRWTF temporary lift station. The design of the new sanitary sewer main was coordinated with the Founders Marketplace Filing 1, Amendment 2 site improvements design. The alignment paralleled a new stormwater main to minimize the impact to the developer's property.

Iron Woman Construction completed the project by the end of November. The project was completed ahead of schedule and under budget. The overall project cost was $333,882.

6400 South Tributary Drainage Improvements

Project Manager: Erik Dam, P. E.

This project was undertaken to construct Stormwater Master Plan improvements to stabilize the 6400 South Tributary drainageway, which flows through Town-owned open space north of Red Hawk Ridge Golf Course. The improvements included a grouted boulder drop structure, concrete cutoff wall, riprap, and grading within the drainageway channel. This work was funded by the Town of Castle Rock Stormwater Management Program and is necessary to protect the drainageway and underground utilities from erosion, and to preserve the natural resource.

In February 2018, a construction contract in the amount of $162,665 was awarded to RMC Consultants to perform the work. A Notice to Proceed was issued on March 26th, and the project was substantially completed by April 20, 2018, on time and under budget at a final cost of $156,445.

Douglas Lane Tributary Stabilization

Project Manager: Barbara Horton, P. E.

Douglas Lane Tributary is located between the Union Pacific Railroad and Plum Creek Boulevard, near the new Fire Station 152. The primary objectives of this project were to manage stormwater runoff, minimize flood hazards and improve water quality along Douglas Lane Tributary, and provide stream stabilization improvements consistent with the Stormwater Master Plan.

Channel improvements generally included six grade control structures, with fill and riprap lining along the degraded low flow, to restore the historic channel invert, reduce erosion and protect existing foliage along the drainageway. Due to aggressive stream degradation, several trees have been lost in recent years due to undercutting and erosion in the channel. Although it was impossible to save all existing trees during construction, significant effort was made in the design process to minimize the number of trees to be removed as a result of construction. Additionally, the improvements will help restore essential root support along the drip line of existing trees to maintain ecological health along the corridor.

The project also included improvements to the existing Heckendorf Regional Detention Pond, which was frequently silted in due to channel instabilities, to ensure adequate storage volume during storm events. Storm flows are now being diverted into the northeast corner of the pond, while base flows are continuing along the original channel alignment. This diversion allowed for a new forebay to be constructed further away from the existing outfall. Along with the construction of trickle channels, a micropool with defined boulder edge and replacement of the outlet structure orifice plate and trash rack, the improvements are expected to improve the overall function of the pond and help ensure the outlet structure remains unobstructed to comply with stormwater release requirements.

Lawrence Construction Company was awarded the construction contract, which began in March and was substantially completed in August. The total construction cost for the project was approximately $800,000.

Hangmans Gulch Channel Improvements, Phase III

Project Manager: Barbara Horton, P. E.

This project is located along the Hangmans Gulch Trail, between I-25 and the confluence with East Plum Creek (EPC). The primary objective of this project was to address sediment deposits and scour along the trail system due to the incomplete infrastructure.

In accordance with the Stormwater Master Plan, Phase I and II Hangmans Gulch Channel Improvements were completed in 2011 and 2012 at the time the Hangmans Gulch Trail was constructed. Due to budget limitations, the first phases of improvements were understood to only partially stabilize the drainageway and that future improvements would be required as budget became available. Phase III drainageway improvements generally included additional grade control structures to further stabilize the channel downstream of I-25, and reduce erosion and sedimentation along the Hangmans Gulch and East Plum Creek (EPC) Trails.

Soils along the channel bottom and banks of Hangmans Gulch are highly erosive, and regular channel maintenance has been necessary since completion of the trail in 2012 to protect the safety of trail users. In addition to grade control, Phase III improvements also included construction of a larger culvert under the EPC trail and modifications at the Union Pacific Railroad crossing to minimize flooding impacts, reduce trail closures and prolong the time period between required maintenance efforts.

Hudick Excavating, Inc., dba HEI Civil, was awarded the construction contract. Construction began in June and was substantially completed in September 2018. The total construction cost for the project was approximately $615,000.

Before: 3-24” Culverts completely filled in with sediment following a June 2015 storm event

After: 10’x6’ Box culvert at the East Plum Creek Trail

Hourglass Avenue / Starry Night Loop Subsurface Edge Drain

Project Manager: Erik Dam, P. E.

This project was a collaborative effort between Castle Rock Water and the Public Works Department to address groundwater issues in the Meadows Filing 16 subdivision. A smaller scale test project was constructed on nearby Skyward Way in 2017, and proved successful in solving an identical problem.

This neighborhood experiences excessive groundwater flows within the street right-of-way on a year-round basis. As a result, saturated subsurface conditions lead to shorter pavement life and increased long-term street maintenance costs. Chase drains have been installed in various locations, but are only partially effective. The project was designed to intercept subsurface water and nuisance surface water coming from sump pump discharges at the right-of-way, by installing a subsurface edge drain system behind the sidewalk that discharges directly into the existing storm sewers.

In October 2018 a construction contract in the amount of $105,809 was awarded to Pro-West Contracting LLC to install 1,466 LF of underdrain. Despite less than favorable weather conditions, the project was completed within the thirty calendar days allowed, including restoration of all residential landscaping and driveways.

Underdrain in Trench behind Sidewalk
on Starry Night Loop

Blue Zone Pump 1 Upgrade and Blue Zone Pump 3 Rotating Assembly Replacement

Project Management: Plant Mechanics and Plant Operations Team

Pump 1 Upgrade

Pump 1 at the Blue Zone Pump Station underwent extensive improvements in order to meet increasing pumping demands. The station was originally built with two large pumps and a smaller jockey pump. Staff contracted with Water Technology Group to replace the smaller pump with a full size pump, along with the motor, piping, and variable frequency drive, circuit breaker, conduits, and wiring. After completion, the pump station will have three identical pumps serving as two primary and one backup configuration. The cost of this project was $40,271.

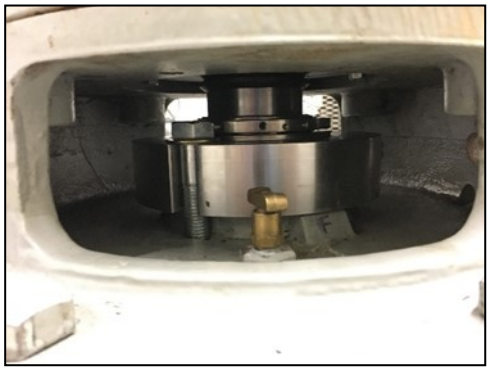
Pump 3 Rotating Assembly

The rotating assembly on Pump 3 at the Blue Zone pump station failed to meet required flows. The resulting inspection found that the equipment was worn out beyond repair. Water Technology Group was contracted to rehabilitate the pump rotating assembly with a new impeller, cast iron case wear rings, impeller wear rings, mechanical seals, and stainless steel shaft sleeves. The rebuilt pump was reinstalled by plant maintenance personnel. This rehabilitation greatly improved the performance of Pump 3 and extended the life of the pump, which is projected to last ten years. The cost of this project was $20,093.

Castle Oaks Lift Station Pump Improvements

Project Management: Plant Mechanics and Plant Operations Team

The rotating assemblies on Pump 1B and 2A at the Castle Oaks Lift Station failed to meet required flows. The resulting inspection found that the equipment was worn out beyond repair. Water Technology Group (WTG) was contracted to rehabilitate the pump rotating assemblies with new impellers, shaft seals, and wear rings. WTG also installed new tungsten carbide mechanical seals in order to fix reoccurring failures of the ceramic split seals. These pump repair and replacements returned the pumps to normal service and extended the life of the facility. The cost of the project was $37,029.



Denver Well at Bell Mountain Well Field

Project Management: Water Treatment Team

The Water Treatment Team repaired and operated the newly acquired Denver well at the Bell Mountain Wellfield. This well water is pumped into East Plum Creek and is recovered by the Castle Rock 1 Diversion (CR-1) for treatment at the Plum Creek Water Purification Facility.

Miller Water Treatment Plant Rehabilitation

Project Management: SCADA, Plant Mechanics, Field Services, and Plant Operations

The Miller Water Treatment Plant, which was disconnected from the Town's water system in 2012, underwent extensive rehabilitation to be returned to service and be ready as a peaking plant for the 2019 summer pumping season. The improvements included: replacement of the clearwell hatch, the re-drill and replacement of wells W15 and W16, the rehabilitation of the chemical feed equipment for the sodium hypochlorite and ammonia disinfectant systems, the new installation of two new chlorine analyzers, the excavation and sealing of the electrical room wall to prevent water infiltrating beneath the motor control center, and improved SCADA programming. This water treatment plant rehabilitation, which spanned 2017 into 2019, cost $209,535. Costs were kept to a minimum because much of the work was performed in-house.

Miller Water Treatment Plant Roof Replacement

Project Management: Plant Mechanics and Plant Operations Team

The Miller Water Treatment Plant shake roof slats had deteriorated beyond the point of repair and several of the skylights above the filters were failing. JSC Property Maintenance was contracted to remove the skylights and shake roofing, close up the skylight openings, and shingle the roof with durable thirty-year Owens Corning Duration asphalt shingles. These improvements enhanced the appearance of the treatment plant, which now meets the expected standards of Town facilities. The cost of the project was $13,300.

The Meadows - Six-Inch Backflow Replacement

Project Management: Meters Services, Cross Connection and Operations

Meter Services/Cross Connection staff, along with help from Operations, replaced the six-inch irrigation backflow preventer at Meadows Boulevard and Dragonfly Court. This backflow device had a failed number one check valve and was not passing the back-flow certification test. Prior to replacing the device, an attempt to repair it was made; however, it was deemed irreparable due to the age and the amount of corrosion found inside the number one check valve.

This device was replaced to ensure our level of service is met in providing irrigation water to our homeowner association (HOA) customers in The Meadows neighborhood.

BEFORE

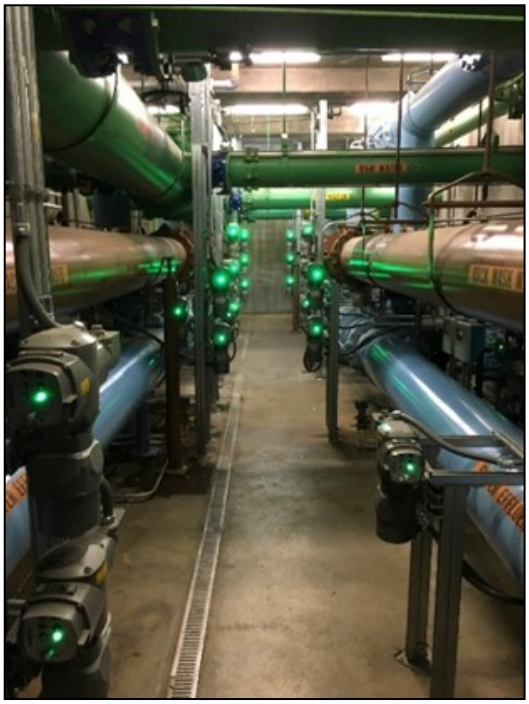
AFTER

The Meadows Water Treatment Plant Valve and Actuator Replacements

Project Management: SCADA, Plant Mechanics and Plant OperationsTeam

A critical equipment upgrade was completed at the Meadows Water Treatment Plant with the replacement of 24 obsolete valves and electric actuators on Filters 5-8. The Meadows plant operates eight filters as part of the treatment process. Each filter has six valve-actuator pairs for control of flow and backwashing of the filters. Castle Rock Water pre-purchased 24 Val-Matic valves matched to AUMA actuators from Pipestone Equipment, which Moltz Construction installed. The project required extensive pipe rigging, electrical wiring, training, startup, and testing. The work completed a two-year project to replace all 52 filter valves and actuators. These improvements ensure the Meadows plant is properly equipped to operate at full capacity and meet its eight million gallons per day demand.

The cost of the project was $205,342.



Plum Creek Diversion Intake Pump Replacements

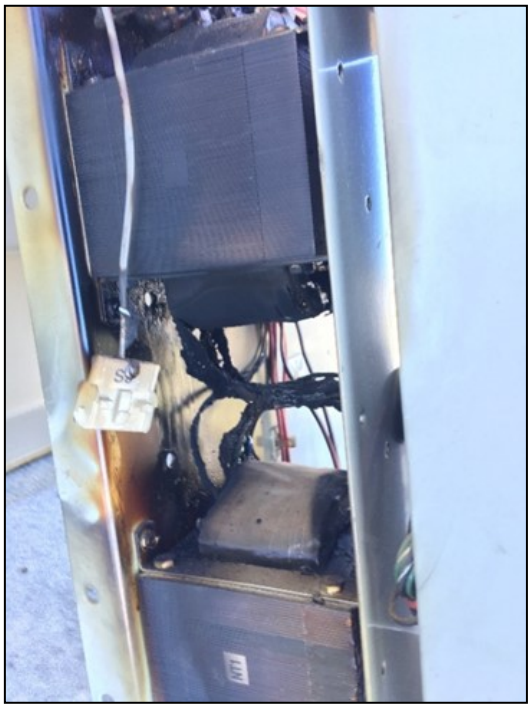
Project Management: Plant Mechanics and Plant Operations Team

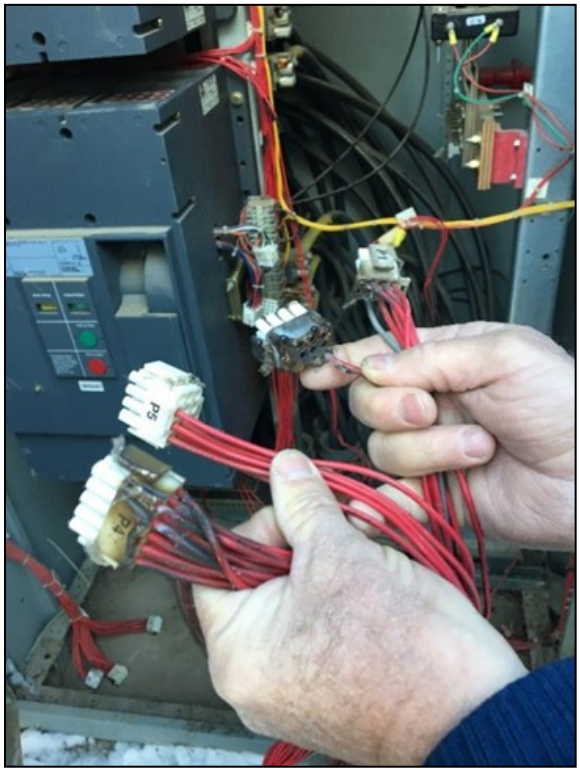
During inspections at the Plum Creek Diversion, the Gould intake pumps were found to be extremely worn out due to high sand loading. The seals and mounting hardware were completely eroded away. Colorado Water Well was contracted to purchase and install two new Gould submersible pumps and associated mounting hardware. These repairs substantially improved the performance of the raw water pumps supplying Castle Rock Reservoir 1. The cost of this project was $22,220.

Ray Waterman Treatment Plant Generator ATS Repair

Project Management: Plant Mechanics and Plant Operations Team

The Ray Waterman Water Treatment Plant experienced backup power equipment failure, which resulted in critical damage to the facility's generator power automatic transfer switch. In emergency mode, Sun Valley Electric manually switched the facility back to utility power, and subsequently contracted to coordinate repairs, which included replacement of the control transformers, wiring harness, and charging hub assembly. These repairs restored critical emergency backup power to the plant. The cost of this project was $23,100.





Siding Replacement at the Hillside and Citadel Pump Stations, and the Mitchell Creek Lift Station

Project Management: Ground and Facility Maintenance

The building exteriors at Hillside Pump Station, Citadel Pump Station and the Mitchell Creek Storage Facility were showing wear and deterioration due to a combination of weathering, woodpeckers and age. Staff hired A1 Contracting to install durable James Hardie fiber cement siding at each site. These siding improvements improved the appearance the buildings, which now meet the expected standards of Town facilities. The cost of the project was $23,750.

Citadel Pump Station
Before and After Photos

Hillside Pump Station
Before and After Photos

Siding Replacement at the Hillside and Citadel Pump Stations, and the Mitchell Creek Lift Station (Cont.)

Project Management: Ground and Facility Maintenance

Mitchell Creek Equipment Shed
Before and After Photos

Well 14 Spare Pump

Project Management: Plant Mechanics and Plant Operations Team

Lead times to procure the pump equipment, for failed deep groundwater wells, takes up to twenty weeks. Operations staff determined that having a spare pump, motor, seal section, and motor lead, in storage and on hand, would ensure a quick recovery in the event of a deep groundwater well failure. Staff purchased a spare deep groundwater well pump from Applied Ingenuity, LLC. This spare well pump can be adapted for use in ten of the Town's deep groundwater well locations. The cost of the project was $111,011.

Metzler Ranch Park Synthetic Turf Conversion

Project Manager: Walt Schwarz, P. E. (and the Parks & Recreation Dept.)

This project was a cooperative effort between Castle Rock Water and the Parks and Recreation Department. All four of the existing baseball fields are being converted from natural bluegrass turf to synthetic turf, saving over six million gallons of water annually. This will enable year-round use of the Town's signature lighted ballfield complex. The synthetic turf will significantly reduce maintenance and will also provide a public demonstration of water conservation.

Academy Sports Turf was awarded the construction contract, in the amount of $2,104,500. Construction began in November 2018 and the conversion is planned to be complete by March 2019, before irrigation season and to accommodate spring baseball.

Non-Residential SmartScape Pilot Program

Project Manager: Rick Schultz

In 2018, given the success of the residential Smartscape Renovation program, Castle Rock Water expanded the program to include non-residential customers. The initial budget was $100,000. Similar to the residential program, non-residential customers received $1 per square foot for the removal of high water use plant material and replacement with a low water landscape or hardscape.

During this first year of the program, three Homeowner Associations (HOAs) participated - Sapphire Pointe, The Woodlands and Castlewood Ranch. A total of 30,362 square feet of high water use plant material was removed and replaced with low water or no water material. In these cases, the overhead irrigation system was removed or replaced with a drip system in these areas. Other HOAs have expressed interest in the program, but were not able to participate due to budgetary restrictions. Moving forward, they plan to include this in their future budgets.

WOODLANDS

Before

In progress: High water grass was killed and aeration completed

Non-Residential SmartScape Pilot Program (Cont.)

Project Manager: Rick Schultz

CASTLEWOOD RANCH

Non-Residential SmartScape Pilot Program (Cont.)

Project Manager: Rick Schultz

SAPPHIRE POINT