Forest View Acres Water District (FVAWD)
Capital Improvement Plan

May 20, 2018 - draft

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Capital Improvement Plan (CIP)

I. GENERAL

1. Introduction

This document defines potential capital improvements for Forest View Acres Water District (FVAWD). It contains summary information on the current status of the District and its assets. The document is maintained by the District's Board of Directors, management company, operators and engineers. It is used in conjunction with the annual capital financial planning process.

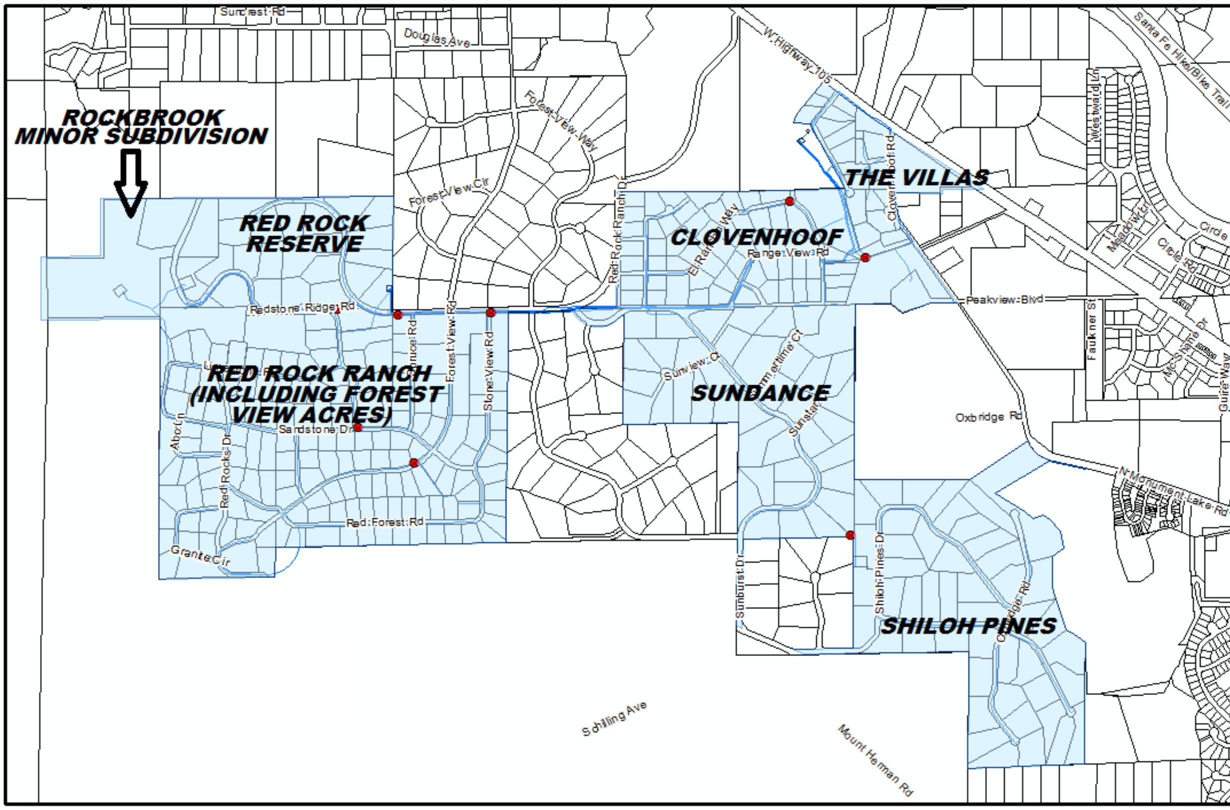
2. District Overview

Under Colorado law Title 32-1, FVAWD is a local government known as a Special District. Colorado law limits the types of services that county governments can provide to residents. Special Districts are created to fill gaps that may exist between the services counties provide and the services the residents may desire (i.e., drinking water, fire protection, wastewater treatment, etc.). The majority of districts draw their boundaries in unincorporated areas of a county, and the residents may be included in more than one special district with each district providing a different service. FVAWD was formed to provide potable water (drinking water) to its service area. FVAWD does not provide wastewater treatment. The majority of customers within the District have private septic systems, although a small number (~25 residents in "The Villas") also have wastewater treatment provided by Palmer Lake Sanitation District. As a Special District and a political subdivision of the State of Colorado, FVAWD is required to submit a number of required filings to various state agencies throughout the year; including financials, election results, water test results, and others.

FVAWD is located in the northwest corner of unincorporated El Paso County, Colorado. The District serves customers in three non-contiguous areas of land. Within the District, there are over 350 residential lots, 311 of which have houses built on them. The District does not serve any commercial customers. The District has been built over time, with additions to the service area being made in conjunction with the construction of new homes and inclusion of new subdivisions. The subdivisions served by the District are Cloven Hoof, Red Rock Ranch, Red Rocks Reserve, Shiloh Pines, Sundance, The Villas, and Rockwood Minor. See Figure 1 for a map of the service area showing the location of each of these subdivisions.

FVAWD's service area is also located between the base of Mount Herman and Colorado State Route 105. As such, it has significant changes in elevation with the "top" or highest point of the District's service area being at an elevation of 7,618' and the "bottom" or lowest point being at 6,968'. With one foot of elevation causing 0.4333 psi change in pressure, these elevation changes and corresponding pressure variations are major factors impacting how the District is operated. Well water being moved uphill needs a pump house (booster station) in order to reach the top of the District, and water flowing downhill through the distribution system needs to have pressure reduced via pressure reduction valves (PRVs).

Figure 1. FVAWD Service Area



II. ASSETS – FACILITIES

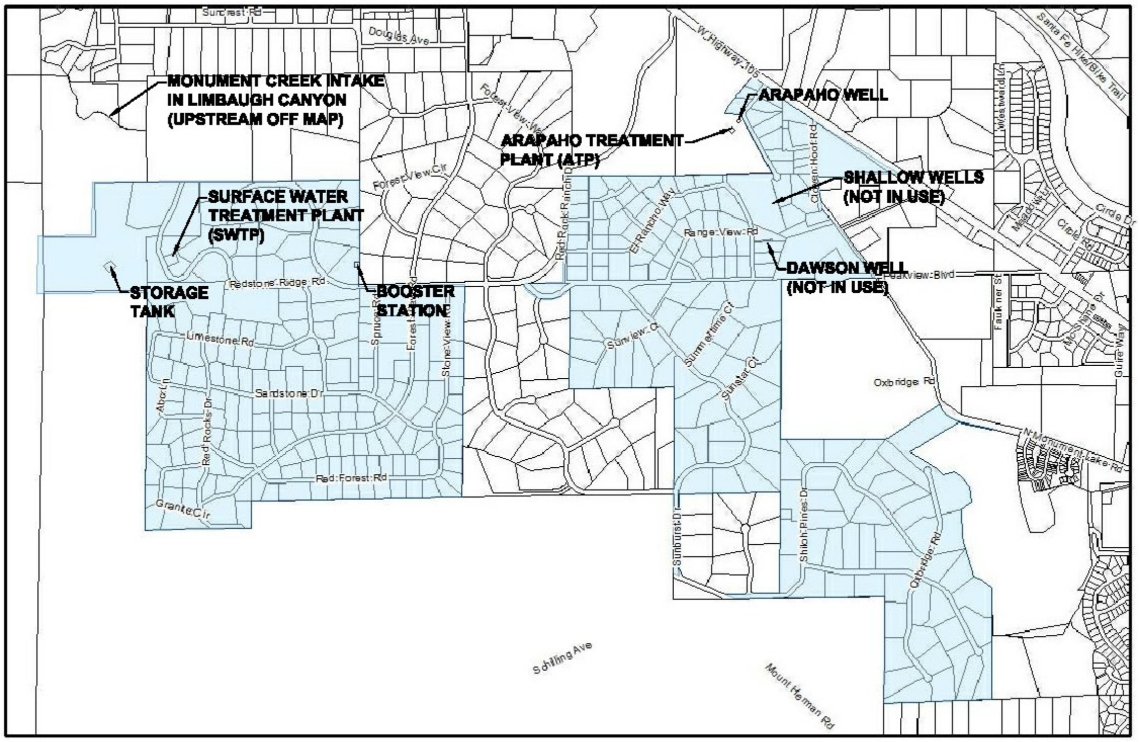
3. Summary/Scope

FVAWD owns physical assets (or facilities) that provide the capabilities to obtain water, treat it and provide it to customers. In this document, the District's facilities are divided into the following categories:

- Sources – the facilities (wells and surface water intakes) that capture and direct raw water to a treatment plant.
- Treatment – water treatment plants (i.e., the Arapaho Treatment Plant and the Surface Water Treatment Plant).
- Delivery – the facilities that move (deliver) a) untreated water to the treatment plants or b) treated water to storage (the tank) and/or the distribution system as well as interconnects between FVAWD and adjacent water systems.
- Storage and Distribution – the storage of treated water plus the distribution system used to provide water to individual homes and customers.

Figure 2 shows the locations of major FVAWD source water, treatment and transmission facilities. Details on the locations of pipes within the transmission and distribution system can be found within the District's maps.

Figure 2. Locations of Major Facilities



4. Sources

The District owns water rights to the Denver Basin aquifers (i.e., ground water) as well as water from Monument Creek (i.e., surface water). All water provided to FVAWD's customers is from one or both of these resources. FVAWD currently obtains water from two sources: a well that obtains water from the Arapaho aquifer in the Denver Basin and a surface water intake that pulls water from Monument Creek in Limbaugh Canyon. An additional well drilled into the Dawson aquifer, a lower quality water source, is inactive. The District also owns two additional shallow alluvial wells that are not in use.

Denver Basin. The Denver Basin is structural, sedimentary rock basin underlying a 6,700 square mile area that includes Denver and Colorado Springs. It is an important nonrenewable source of ground water for much of the Front Range. FVAWD is located near the southwestern edge of the Denver Basin. As illustrated in Figure 3, the Denver Basin is comprised of layered geologic formations. Within this, four aquifers are statutory defined: Dawson, Denver, Arapahoe, and Laramie-Fox Hills. FVAWD has water rights to all four aquifers. Wells in these aquifers are governed by CRS (Colorado Revised Statutes) 37-90-137, CRS 37-92-602, and the Denver Basin Rules.

Figure 3. Denver Basin

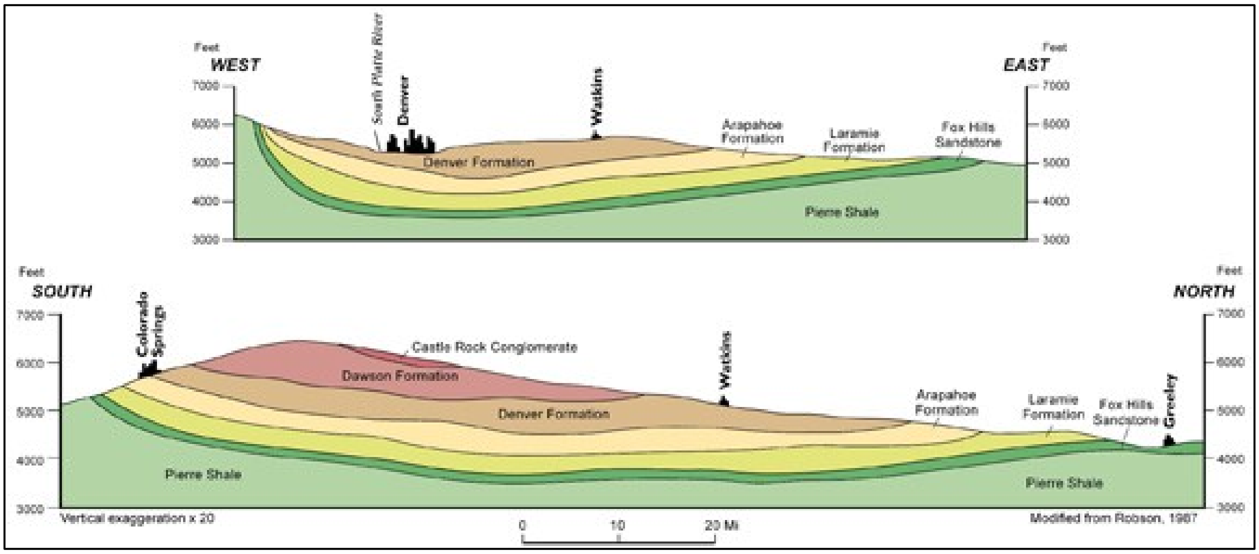
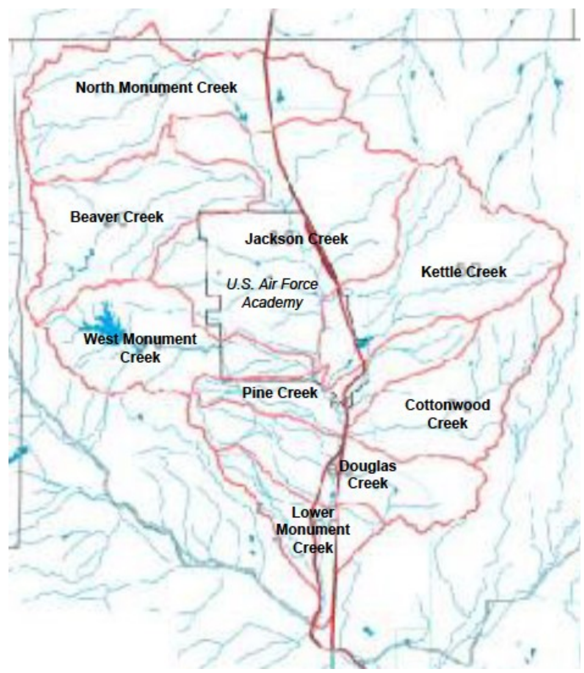


Figure 4. Monument Creek Watershed



<u>North Monument Creek Watershed</u>. The Monument Creek Watershed is located in northwestern El Paso County and encompasses approximately 151,300 acres. The Monument Creek Watershed is part of the Fountain Creek Watershed and of the larger Arkansas River drainage. In simple terms, a watershed is the area of land uphill from a point in a stream that forms a collection basin (almost like a funnel) where all the water on that land drains off to the same place. As can be seen in Figure 4 in the Air Force Academy is roughly in the center of the Monument Creek Watershed. Numerous faults run through the Monument Creek watershed.

FVAWD's surface water intake is located in Limbaugh Canyon and takes water from North Monument Creek, a sub-watershed of the Monument Creek Watershed. The area is subject to unpredictable weather patterns, and often receives over 25" of precipitation per year. Precipitation generally occurs during the summer months as part of seasonal cycles and during the winter in the form of snow. Unpredictable weather patterns can occur within the watershed, and it is prone to seasonal flooding. The upstream, mountainous and forested areas to the west are under federal management as part of the Pike National Forest.

4.1 Arapaho Well

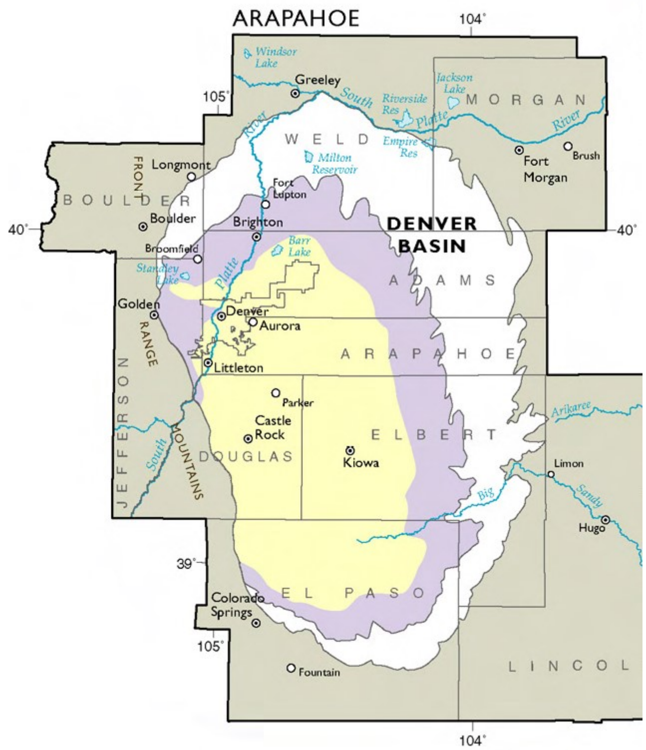
The Arapaho Well is the District's most important ground water resource, and reliably produces water year-round. The Arapaho Well is so named because it pulls water from the Arapahoe Aquifer within the

Denver Basin. Figure 5 shows the underground location of the Arapahoe Aquifer (aquifer shown in purple).

In 1991, this well was constructed under permit # 39865-F, completed to a depth of 1764 feet and at a cost of $443,363. Production is permitted for 150 GPM and limited to 85 acre feet per year. The water from this well contains iron, manganese and sulfurous compounds that are removed during treatment.

The pump within the well is installed at 1,400 feet and is controlled by a variable frequency drive (VFD). The VFD allows for smoother start-up and shut-down of the pump, provides the ability to throttle down production from the well, (thus, reducing strain on the pump and aquifer) and also provides a more consistent way to match actual production out of the well to the healthy production capability of the well. This pumping approach has a lower peak demand than the District's older approach of pumping at 100% capacity until enough water was produced and then shutting the pump off. The shorter and less intensive run times lessen the cone of depression, thereby allowing the aquifer to recover more quickly and decreasing electrical costs that would be incurred from pulling water from a greater depth.

Figure 5. Arapahoe Aquifer



Recurring maintenance on the well is needed roughly every seven years. This maintenance typically requires the well to be off-line for three to four weeks and involves pulling the pump out of the well, inspecting the casing, making any repairs necessary and installing a new pump. There is research indicating that the whole Denver Basin water resource continues to decline with no recharge. This depletion of the aquifer is a long-term consideration, and local aquifer levels need regular monitoring. During the next maintenance cycle, the District expects to lower the depth of the pump to ensure this resource is available for many years to come.

4.2 Limbaugh Canyon Surface Water Intake

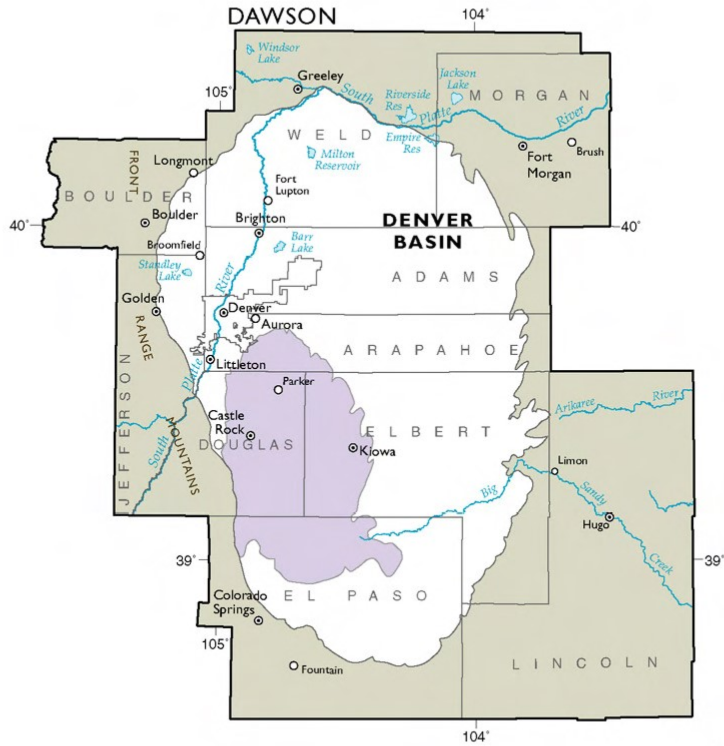
The Upper Intake is located in Limbaugh Canyon at 7,664.8' and is located in Forest Service Land. At one time, there was also a lower intake but it was destroyed by flood (year of flood uncertain). From the intake, water is piped downhill (gravity-fed) to the Surface Water Treatment Plant. This transmission line is degrading and portions of its exact location are unknown, although some of the pipe is exposed in areas near the intake and a large portion of the pipe is believed to run down the west side of the access road that runs from the intake area to the SWTP.

4.3 Dawson Well – Not in Use

The Dawson Well (also known as Nevins Well #1) is located at SW1/4 SE1/4, Sec. 9 Twp.11 S, Range 67 W. The Dawson Well is named for the Dawson aquifer (shown in Figure 6 in purple), from which it can produce water. The well was originally drilled under well permit #16327-F. It produced reliably for several years and then, due to declining productivity, was abandoned. In 2005, it was relocated under permit #40213-F & #40213-FR in 2005 and completed to a depth of 690' at a cost of $149,940. Production is permitted for 100 GPM and limited to 106 acre-feet per year. It tested at a production rate of 45 GPM at that time. The replacement well was partially outfitted, but never brought into production in part because the District was producing an adequate supply of water from its other sources.

Should the District decide to bring this well into production, additional water treatment capacity would also be needed; this could be achieved by building a new facility for the Dawson well or by piping untreated water to an upgraded Arapaho Treatment Plant.

Figure 6. Dawson Aquifer



4.4 Other Water Resources – Not in Use

Other ground water resources owned by the District and classified as "Tributary" resources, (meaning they are part of the surface water scheme), include two other wells along Monument creek. These are called Nevins Well #'s 2 and 4. Currently, these wells are both inactive. If needed, they have potential for being used as alluvial wells (i.e., wells that draw water closer from the surface and from the sedimentary bed surrounding Monument Creek). This would require research into their suitability for this purpose, development of an augmentation plan, potential filing for additional water rights, engineering work, redevelopment of the wells and development of transmission and treatment capacity. Augmentation simply means that since a large portion of all water used in the District returns to the watershed, the District can draw as much water as it wants from alluvial wells as long as it replaces the portion not returned from its non-tributary sources or wells.

Nevins Well # 2 is located at SE 1/4 SE 1/4, Sec. 9 Twp. 11.0S, Range 67.0W and is recognized under well permit #20930-F. Nevins Well # 4, located at SE 1/4 SE 1/4, Sec. 9 Twp. 11.0S, Range 67.0W, 6PM (and close to Well #2) is recognized under well permit # 5723-FR.

5. Treatment

The District owns two treatment plants, one that processes ground water and a second that processes surface water. These two plants are the Arapaho Treatment Plant (ATP), which is used for ground water processing, and the Surface Water Treatment Plant (SWTP). The District has worked in the recent past to fully automate both treatment facility processes with integration and communication from the storage tank.

5.1 Ground Water Treatment Plant (Arapaho Treatment Plant)

Built circa 1995, the Arapaho Treatment Plant (ATP) is housed within a metal building located on Rockbrook Road near the bottom of the District and at an elevation of 6,987'. The building is 20x40' and is divided into an office section where maps and records are kept and an operating plant section. The initial plant was designed and built by Pure Water Solutions. Improvements to automation were made in December 2010 with the installation of a Programmable Logic Controller (PLC) that is used to control most operational sequences within the ATP.

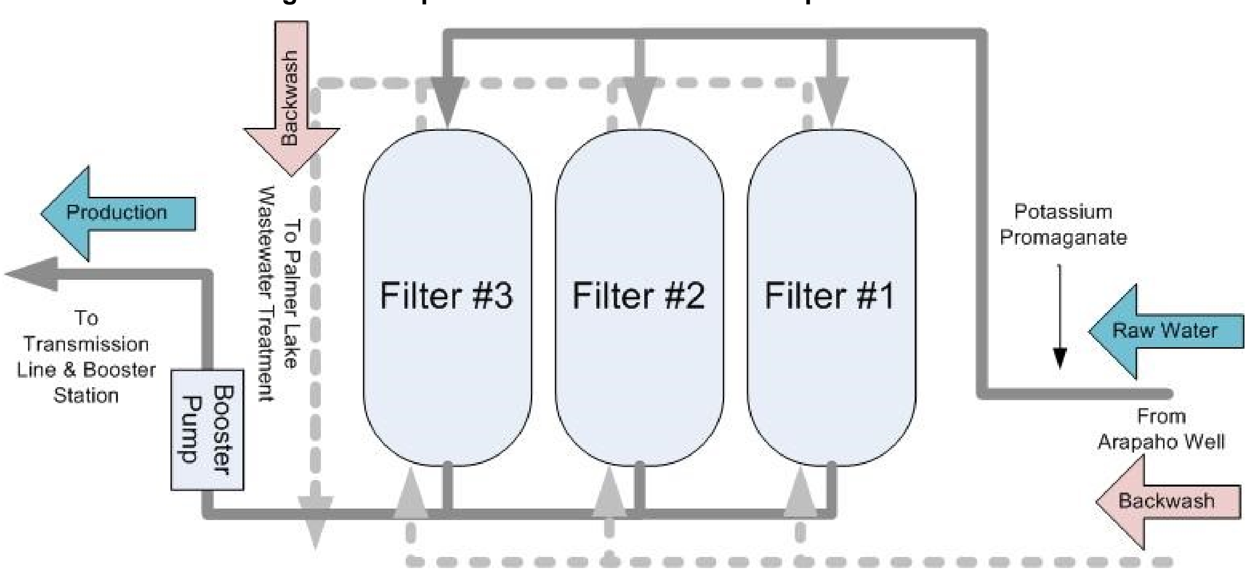
The raw well water enters in from the well on the NW corner of the building. The plant is controlled automatically via tank level controls in the main storage tank and remote transmittal to the ATP Program Logic Controller (PLC). The raw water has aesthetically objectionable amounts of iron and manganese, so it is pre-treated with sodium hypochlorite (chlorine) and potassium permanganate solutions (injected via a metering pump) and then processed through three manganese greensand pressure filters, entering the top of the filters and coming out of the bottom. After that, a VFD-controlled booster pump is used to move the treated water up the hill through a 4" transmission line and to the booster station (which then pumps the treated water further uphill).

Plant backwash is initiated automatically. Backwash sequences performed by the pneumatic control system are initiated by a pressure differential across the filters. Backwash is done to filters in sequence (not all three being backwashed simultaneously) by pushing raw water from the well backwards through the filters, and is done to remove iron and manganese build-up from the filters. The iron sludge backwash is piped from the plant and is treated by Palmer Lake Sanitation.

The plant has safety and fail-over features. The plant was originally designed with a series of timers, later removed and controlled via the PLC, that will shut down the plant if failure occurs somewhere in the sequence of operations. If pressures exceed the plants design, a pressure relief valve blows off high pressure. Key readings and alarms are tied into an alarm panel and an auto-dialer that calls the District operators in case of a problem.

Figure 7 shows a simplified drawing of the ATP. This drawing is conceptual only and omits important details of the plant's control points, various valve locations (i.e., for check valves, pressure relief valves, or control valves), pressure meters, compressor, mixers, recorders, etc.

Figure 7. Arapaho Treatment Plant – Conceptual Overview



5.2 Surface Water Treatment Plant

The Surface Water Treatment Plant (SWTP) is located on Redstone Ridge Road near the top of the District at an elevation of 7,430'. Operation of this plant is a priority because of the high quality of the surface water and the lower costs of operating this plant (in comparison to the ATP). However, this plant cannot be operated 365 days a year with current equipment. During some points of the year, there may be insufficient water in Monument Creek to supply the plant. At other times (e.g., spring runoff), the water has a higher turbidity (particulate) level that the plant is currently capable of processing in compliance with state regulation.

Raw water is collected from Monument Creek at an elevation substantially higher than the SWTP, and is carried (gravity fed) via a raw water transmission line to the SWTP. Pressure is reduced prior to filtration due to the limitations of the filter vessel pressure rating. A blow-off valve can be automatically operated in summer/winter mode to allow a constant throttled flow of raw water through the delivery pipe to prevent freezing in the winter or to flush highly turbid water out of the transmission line.

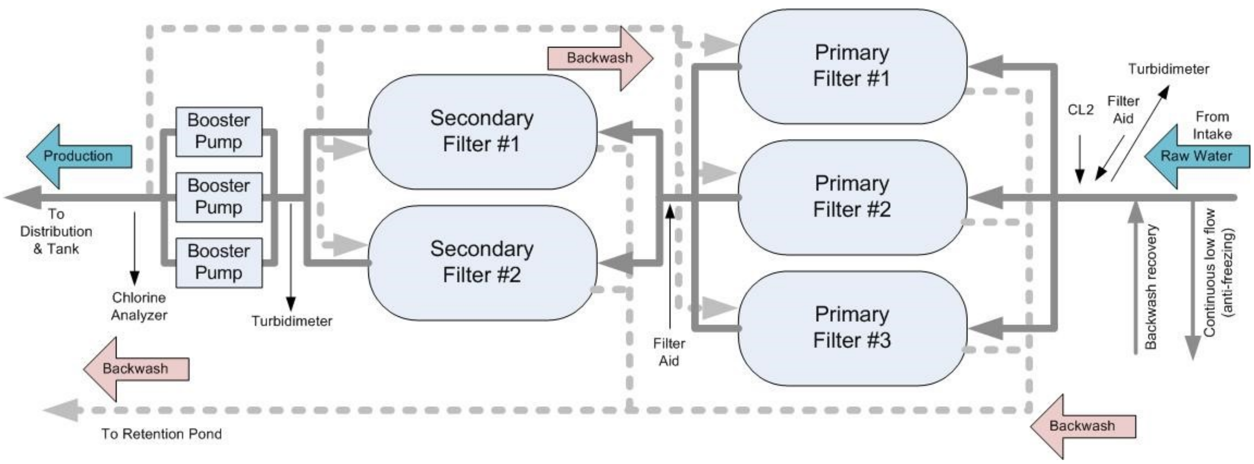
Raw water enters the SWTP at the northwestern corner of the plant. Plant start-up is initiated automatically via communication with the main storage tank through the PLC. The surface water is high-quality with little pollution or foreign substance, although it sometimes has a higher particulate content (turbidity) than the plant can readily process. After water enters the SWTP, its turbidity is measured, chemical filter aid is injected to aid in coagulation and removal of impurities, and CL2 (chlorine) is injected to disinfect the raw water. Water passes through three primary filters (garnet), and then through two secondary or polishing filters (finer grade garnet). Turbidity is measured again as the processed water exits each of the secondary filters. Control systems are a mix of pneumatic and electronic controls. Once treatment is completed, booster pumps covey water from the plant into a chlorine contact loop within Redstone Ridge Road to the distribution system and the storage tank.

Plant backwash is initiated automatically via PLC and based on input from the pressure differential across the filters and/or turbidity monitoring equipment, with backwash sequences managed by the control system and based on timing. Water flow for backwash is driven by head pressure from the storage tank through a backflow preventer and pressure regulating valve. Backwash of primary and secondary trains are controlled separately. Sequencing of backwash allows one filter to be backwashed at a time, with backwash water being sent to a retention pond. The retention pond experienced a complete overhaul in 2013 to add capacity, liner and return pumping equipment and controls. The return line from this pond is added to the raw water feed at a rate consistent with regulatory requirements. The plant has been subject to pressure spikes, surges and hammer effect; these occur primarily during the backwash cycle and have been somewhat controlled by manual operation techniques during the backwash cycle.

The plant has a number of controls with feedback and alarm capability with the addition of automation installed in 2010. Parameters for operation, shutdown, alarms and reset are controlled via an operator interface with the PLC. An auto-dialer alerts the operations staff of any operational inconsistencies.

Figure 8 shows a simplified drawing of the SWTP. As with the drawing for the ATP, this drawing is conceptual only and omits important details of the plant’s operational components.

Figure 8. Surface Water Treatment Plant – Conceptual Overview



5.3 Controls and Telemetry

Placeholder – For future addition.

6. Delivery

Once treated, water must be moved to storage and distribution. The time water spends in transition from treatment plants to the storage tank or to the distribution system is also considered as part of calculations used in the treatment process. Most notably, this includes dispersion of chemicals used during treatment (e.g., potassium permanganate) adequate contact time for chlorine to inactivate any potential bacteria.

Water is delivered into the distribution system at three points: at the intersection of Pixie Park Road and Redstone Ridge Road, by the SWTP near the cul-de-sac on Redstone Ridge Road, and into upper Limestone Road (primarily fed from the storage tank). More details of these connections can be found on system maps.

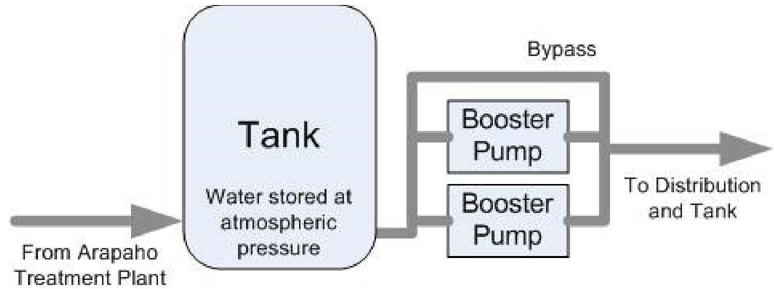
6.1 Ground Water Delivery

A transmission line is used to carry treated water from the Arapahoe Well and to the distribution system (via a Booster Pump Station).

Transmission Line – ATP to Booster Pump Station. The transmission line allows water to be pumped from the Arapahoe well and treatment plant (ATP) at 6,987’ to the booster station at 7,217’. This 230’ head represents approximately 104 psi. The PVC pipe is rated at 200 psi. There are no interconnects between the transmission line and the distribution system prior to the booster station. After the booster station, the transmission line connects to the distribution system near the intersection of Pixie Park Road and Redstone Ridge Road. The transmission line totals xxxx’ in length. The section from the Arapaho Treatment Plant to the booster station and a short segment from the booster station to Red Rock Ranch Road was entirely replaced in 2010 and 2011.

Booster Pump Station. The booster station provides additional pumping capacity to pump water into the distribution system as well as to the storage tank. Water is pumped from the ATP into a 4,000 gallon

Figure 9. Booster Station – Conceptual Overview



atmospheric polyethylene storage tank within the booster station. When the tank level reaches the maximum set point, the pumps turn on and are slowly ramped up to the required pressure by a VFD. The elevation gain from the booster station at 7,205' to the water in the storage tank at approximately 7,630' is 425'. This is equivalent to 184 psi. The booster station contains two redundant 25 HP pumps which allows one pump to be serviced if necessary while the other pump remains in service. Each 25 HP pump produces approximately 186 psi pumping pressure when flowing at 130 gpm. They are set up in a lead lag fashion so both pumps can run at the same time if needed. When the water in the 4,000 gallon tank within the station reaches the minimum set point, the pumps turn off. The system is equipped with controls that can communicate with the ATP and the storage tank to determine when to run. The control system can also send an alarm if the system detects water on the floor or an interior building temperature below the set point. A pressure relief and surge anticipator valve is installed to protect the piping system from overpressure or pressure surges. Water from the booster station is pumped through another segment of transmission line and into the distribution system on Pixie Park Road. A check valve on the inlet to the tank prevents water from draining back down the transmission line to the ATP on the inlet to the tank.

6.2 Surface Water Delivery

From the Surface Water Treatment Plant (SWTP), the effluent line from the plant connects to a chlorine contact loop where the water remains in contact with a calculated chlorine residual to achieve adequate giardia and virus inactivation. The water is then transmitted to the distribution system and/or to be stored in the tank. This loop is located under the road by the SWTP. It is a large 12" diameter pipe that runs north on the road for approximately 300', does a U-turn, is increased to a 16" and runs 350 feet back to the south where it connects to the piping to the tank and distribution system. The contact loop was designed to support full build-out of homes within the District (i.e., 350 houses) and to provide a minimum of 30 minutes chlorine contact time at a maximum flow of 130 gpm. After treated water leaves the contact loop it either moves into the distribution system or into the tank for storage.

6.3 Interconnects

Monument and Palmer Lake are the two water districts that share boundaries with FVAWD. Interconnections between districts provide the ability for water districts to cross-supply one another, and especially to support one-another in case of water outage or fire emergency. If an agreement between jurisdictions can be reached, FVAWD currently has the parts and equipment to create a temporary interconnection with Palmer Lake that can be implemented in emergency situations. This would involve installing a connection point inside the booster station, then using a FVAWD-owned fire hose to create a connection between a Palmer Lake fire hydrant and the FVAWD Booster Station. There is no interconnection with Monument.

7. Storage and Distribution

Treated water is delivered to customers through a network of pipes known as the distribution system. Water not immediately needed for use is stored in a single water tank. Treated water is fed into the distribution system, either on Red Rocks Ranch Road (for ground water) or into a line between the tank and the upper end of Limestone Road (for surface water).

7.1 Tank

The 250,000 gallon water tank is located at an elevation 7,609 at the base of the tank, and stored water is gravity-fed to the District as needed. The tank is a floating tank, with water filling and emptying through the same line. The tank only fills when flow from one or both of the treatment plants into the distribution system exceeds demand. The tank has high water shutoff sensors (26 feet high) and a low level alarm. Currently, the tank can hold a four-day supply of water for the 311 customer taps, or approximately 50K gal/day. The tank was built in approximately 1975. Typically, tanks of this type are typically estimated to have a minimum service life of 50 years with well-maintained tanks sometimes lasting over 100 years. FVAWD's storage tank was sandblasted and recoated in 2010 and 2012. In 2010 the coating failed due to inadequate cure time and was warranty repaired. The finished water storage tank is on a periodic quarterly and comprehensive (5 year) inspection cycle. The last comprehensive video inspection occurred in 2017. Current estimates are that the storage tank will remain in good condition and in service for several decades.

7.2 Distribution System

Because the District is located at the base of a mountain and has elevation changes, water is fed through the distribution system using gravity, starting at the higher elevations in the District and flowing to the lower elevations. At selected points within the District, pressure reducing valves (PRVs) are used keep water pressure from exceeding the design limits of the distribution system, thereby dividing the distribution system into four pressure zones (see Figure 1Figure 10). These PRVs require periodic maintenance to ensure that they remain in good working order; well working PRVs result in reduced strain on the distribution system and thereby a reduced number of distribution system leaks.

There is a total of xxxx' of pipe (water main) within the FVAWD distribution system. During 2015, 2016 and 2017 much of the water distribution system was replaced. Prior to this time, the District had an extremely high leak rate, as measured by a percentage of water produced (i.e., treated) vs. water used by customers (i.e., billed), as well as a number of water main breaks requiring emergency repair. Figure 11 shows water main locations and highlights water mains replaced between 2015 and 2017. Currently, the District is monitoring leak rates and water main breaks to determine when water mains may need replacement in other areas of the District. Detailed information on water main sizes and materials are contained within the District's maps.

Figure 11. FVAWD Pressure Zones

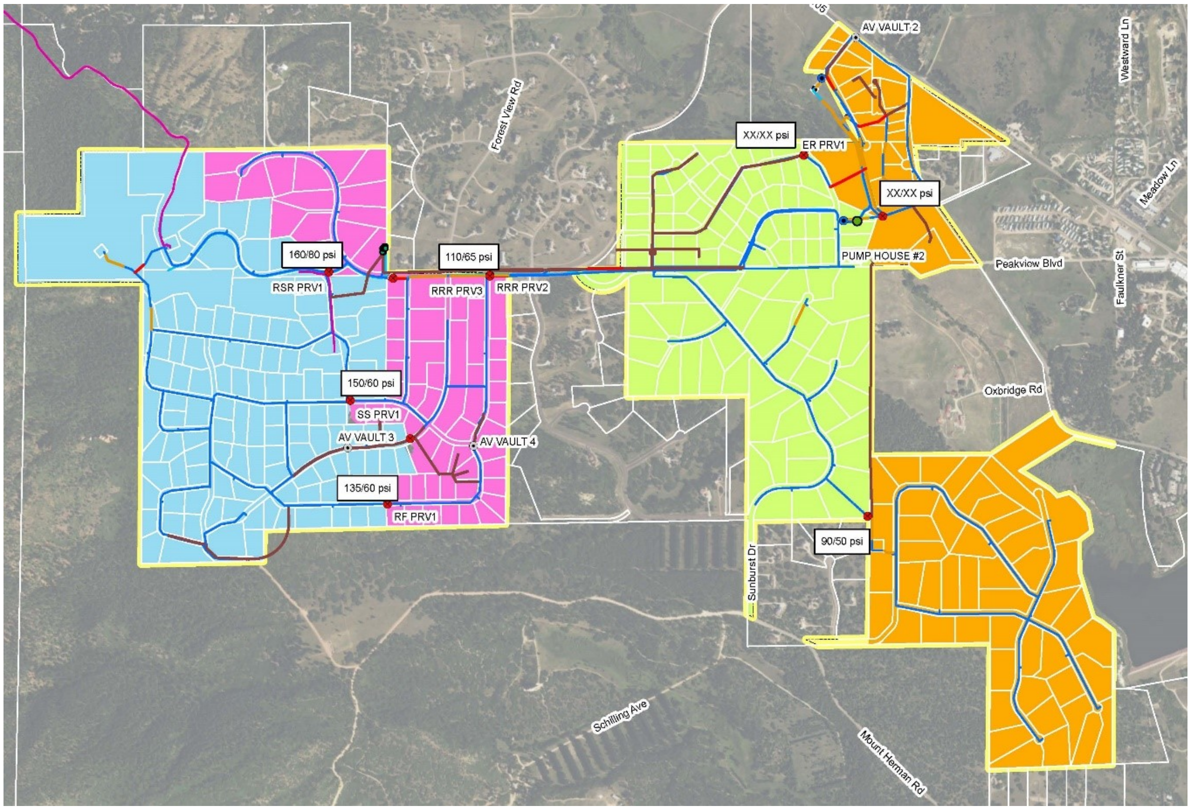
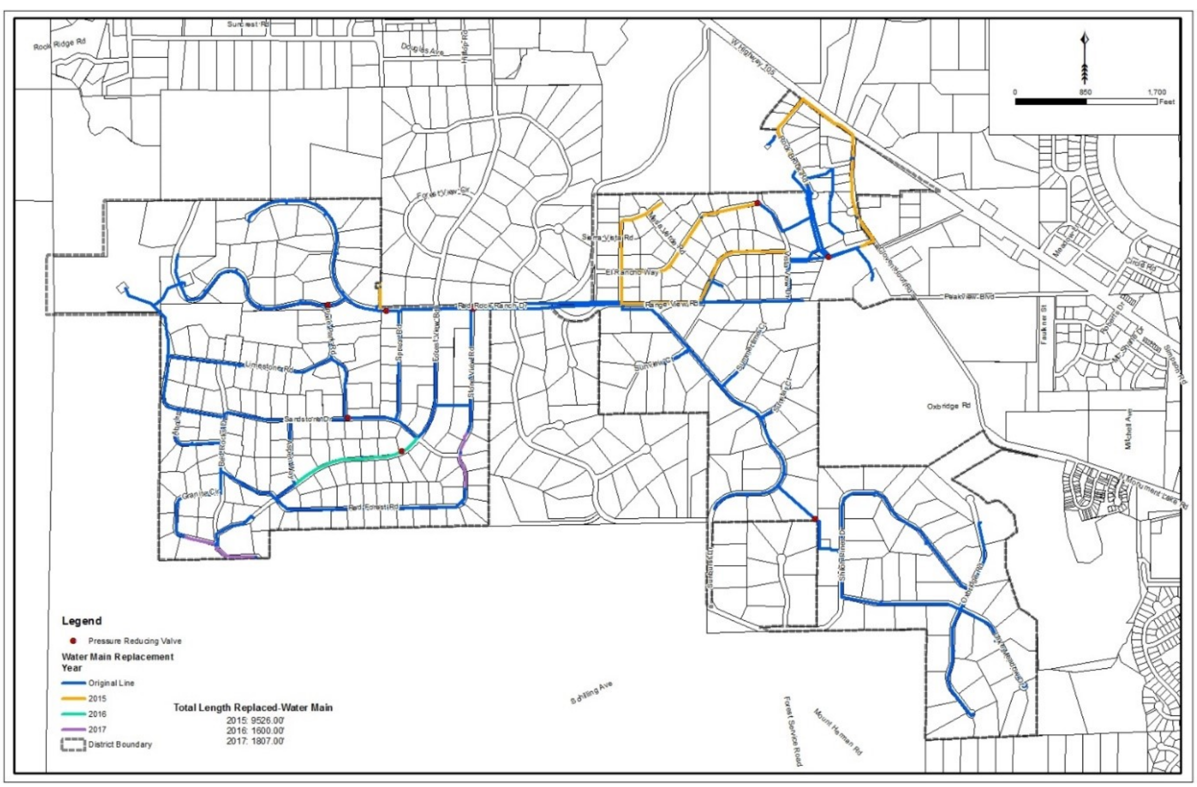


Figure 11. FVAWD Distribution System



III. ASSETS – OTHER

8. Land and Buildings

The District owns the parcels of land shown in the following table. Legal descriptions and additional information can be found on the website for El Paso County Assessor's Office. All properties are recorded in District maps.

Table 1. District Owned Land & Buildings

Assessor's Schedule #	Location	Market Value*		Square Feet	Use
		Land	Building		
7116403002	Shiloh Pines Dr.	$43,100		25,500	Not in use. Former tank site.
7109007006	Vista View Dr.	$13,700		1,200	Dawson well, old Dawson pump building (demolished) and access.
7109000088	Rockbrook Rd.	$620		900	Arapaho well site
7109014004	Rockbrook Rd.	$1,000	$33,050	3,528	Arapaho/ground water plant building.
7109000045	Rockbrook Rd.	$6,100		8,500	Not in use. Former tank site.
7108300002	Above Redstone Ridge Rd.	$10,788		10,450	Tank site.
7108300001	4656 Redstone Ridge Rd.	$205,00		19,602	Surface treatment plant site.
7100000277	4466 Red Rock Ranch Dr.	$31,767	$1,356	6,000	Booster Station/Pump site.

*All market values are for 2017 and are as estimated by the Assessor's office.

9. Easements

El Paso County allows a "standard" utility easement along all roads. FVAWD has also acquired a number of additional easements over time. The District has an inventory of these easements and they are shown in the District's maps.

10. Water Rights

In Colorado, the ability to access water is based on three things: the availability of water, the facilities to collect water (e.g., wells), and the legal right to that water. Water rights establish ownership of the right to use water and are subject to a body of law meant to govern allocation and distribution of water as a scarce resource and to establish priority use in cases when there is an inadequate supply of water to meet all desired needs (e.g., during drought). FVAWD's water rights portfolio is more than sufficient to meet the potential demand of residents and contains both surface and ground water rights. The district's water attorney maintains records of the District's water rights.

11. District Maps

Accurate maps of the water District are an essential operations and management tool. Furthermore, the District is required to submit District boundary maps to the Colorado Department of Local Affairs (DOLA) and the El Paso County Assessor's office, on an annual basis. The District maintains its maps in Geographic Information System (GIS) format. Maps are updated on an as-needed basis and in conjunction with construction projects. Maps currently show District boundaries, water mains, hydrant locations, District-owned land, and District-owned easements. FVAWD supplies the GIS locations of fire hydrants to El Paso County emergency services, which in turn makes this data available to the Tri-Lakes Monument Fire Protection District. As needed, additional information can be added to the maps and special purpose maps can be generated.

12. Administrative Systems

FVAWD currently has a website (https://www.colorado.gov/fvawd). Billing, accounting and customer management systems are provided via contract with the District's management company. District records are stored in the Arapaho Treatment Plant or in the offices of the District's management company, operations company, lawyers, and/or engineers.

IV. PROJECTS (IMPROVEMENTS TO ASSETS)

13. Project Considerations

13.1 Capital Improvements Defined

Capital assets are tangible assets having long lives that are used in the production or sale of other assets or services. In accounting, capital assets are also known as "plant assets" or "plant and equipment." Examples of capital assets include equipment, buildings, and land (but not land held for future use). Except for land, capital assets wear out and depreciate over time. FVAWD's capital assets include the wells, water plants, transmission system, tank, and distribution system.

***Capital Assets and Capital Expenses*.** A capital expenditure is an expenditure that increases net assets. The District uses the all of the following definitions and criteria to determine if expenditures qualify as capital expenditures or not:

- The initial cost of acquiring a capital asset includes all normal, necessary, and reasonable costs needed to get the asset in place and ready to produce (e.g., insurance needed in order to put the asset in place is counted in the cost of the asset; however, insurance needed after the asset is in place is not). The initial cost of acquiring a capital asset is treated as a capital expense. When an existing capital asset is fully replaced, the expense of creating the new asset is a capital expense.

- Ordinary repairs and replacements are expenditures made to maintain an asset in its normal operating condition and good state of repair. Maintenance costs (e.g., cleaning, lubricating, or adjusting) are often treated as ordinary repairs and replacement from an accounting perspective.

- Extraordinary repairs and replacements are major repairs made, not to keep an asset in its normal good state of repair, but to extend its useful life beyond the number of years originally estimated. Expenditures for extraordinary repairs are treated as capital expenditures.

- A betterment may be defined as replacement of an existing asset (or portion of an asset) with an improved or superior asset. Examples include replacing manual controls on a machine with automatic controls; removing an old motor and replacing it with a larger, more powerful one; replacing a wood shingle roof with a tile roof. Usually, a betterment results in a better, more efficient or more productive asset, but not necessarily one having a longer life. Expenditures for betterments are treated as capital expenditures.

***Service Life and Depreciation*.** One key goal of capital planning is to estimate the remaining life of existing capital assets, and then to use that information in estimating when the asset will need replacement and in track the value of the asset in the District's financial records. Service life is the period of time a capital asset is used in the production and sale of other assets or services (i.e., water). A capital asset's service life is predicted at time of purchase or installation. A productive life longer than a single accounting period (i.e., longer than one year) distinguishes a capital asset from an item of supplies.

Depreciation is used to allocate the cost of a capital asset to the time periods over that benefit from its use. From an accounting perspective, depreciation is nothing more than the expiration of a capital asset's quality of usefulness. Depreciation only begins after the asset is put into use. Because depreciation is a cost allocation process, balance sheets do not show market value of the assets. The balance sheet assumes that the District is a going concern and will be in operation long enough to recover the costs of capital assets through the delivery and sale of water. When an asset's accumulated depreciation becomes equal to its cost, the asset is said to be fully depreciated.

Sooner or later a capital asset wears out, becomes obsolete, or becomes inadequate. When this occurs, the asset is discarded, sold or traded in on a new asset. Entries will be made to the books showing the disposal of the asset, and the asset's costs and accumulated depreciation will be removed from the books.

13.2 Project Evaluation

The District's board has found that the most effective way to establish project priorities is to have a board-wide discussion that also includes the operators, engineers and management company. Discussion includes agreement on where the District should focus time and energy, as well as the issues associated with each project. This discussion should occur no less than once a year in conjunction with the budget cycle, and may occur more often. Experts and engineers may also be included.

The District's current project focus is:

- Give priority to making production-side facilities stable and robust
- Give early attention to items that may reduce operating costs or delay capital replacement costs
- Perform preventive maintenance to extend the life of facilities.
- Implement monitoring programs to help detect failures before they occur.

Some issues that may be relevant in evaluating and implementing projects are included in Table 2.

Table 2. Project Evaluation Considerations

Urgency	Impact Summary	Special Circumstances	Planning Considerations
1) Failure or Imminent Failure (highest priority) 2) Situations causing degrading conditions (e.g., chemicals, building foundations, high pressures in pipes) 3) Items that help reduce operational costs or increase operational efficiencies	Availability of alternatives (including emergency solutions) Number or percent of customers impacted Utility to operators Others?	Regulatory, Legal, Safety, Public health, Security, Environmental, Seasonality, Animal habitat, Others?	Major tasks and responsibilities Project-specific dependencies or predecessor activities (e.g., easements, water rights, construction standards) Coordination with other agencies Cross-project risk Funding availability Cost savings possible from timing or project sequencing Ability to manage multiple, simultaneous projects Vendor availability

Urgency	Impact Summary	Special Circumstances	Planning Considerations
4) Functioning items near the end of their expected life (lowest priority)			Others?

13.3 Operations, Monitoring and Maintenance

Good preventive maintenance and operations prolongs the life of the District's facilities. Monitoring programs help predict potential problems or failures before they occur. The District performs the following preventive maintenance items:

- *Arapaho Well*:
  - Monitoring of aquifer depth and post-pumping recovery.
  - Semi-annual Megger testing (to help anticipate potential failure of the well's pump).
  - Periodic hydro pneumatic valve repair
  - Annual calibration of online monitoring equipment
  - Continuous monitoring of equipment and process

- *Surface Water Intake:*
  - Periodic inspection and clearing of sand and debris

- *Treatment Plants:*
  - Periodic Backwash pond dredging and pumping (surface plant only)
  - Periodic inspection/replacement of filter media
  - Quarterly calibration of online monitoring equipment
  - Continuous monitoring of equipment and process
  - Replacement of wear components in hydro pneumatic valves.

- *Storage Tank*:
  - Periodic (quarterly) and comprehensive inspections every 5 years (also required by CDPHE)

- *Distribution System*:
  - Periodic PRV Maintenance
  - Leak Rate Monitoring
  - Mapping of Leak Locations
  - Valve Exercising Program
  - Hydrant Flushing Program

14. Projects

This section contains discussion of improvements and work needed, including issues, research to be done, philosophies, trade-offs, etc. Inclusion of a project in this section does not represent a commitment to implement that project.

14.1 Analysis and Planning

Analysis and planning efforts are always needed for large projects, when complex issues are being addressed, or when new technology is being explore. This is particularly important for efforts that are capital-intensive. The following potential projects have been identified:

- ***Alternative Energy.*** FVAWD's electrical costs are high enough to justify consideration of alternative energy sources. Past investigations found that operations and maintenance costs prevented the use of alternative energy from being cost effective; as technology improves this may change. Candidate energy sources include:

  - ***Micro-Hydro***: small electrical generators installed inside pipes to take advantage of downhill (i.e., gravity fed) water flow.

  - ***Solar Power:*** solar collection panels to take advantage of Colorado's many sunny days.

  - ***Wind Power:*** small wind turbines to take advantage of local wind conditions.

- ***Sale of Excess Water*****:** The District currently has access to more water than it needs – particularly for raw water, but also for treated water. Ideally, excess capacity could translate into revenue generation and lower long-term costs for District residents and property owners. To date, an effective strategy has not been identified.

- ***Inadequate Water Availability***: FVAWD's excellent water rights portfolio does not guarantee that water will physically be available; this is also referred to as "paper water" vs. "wet water," and the District needs both. Changing conditions such as climate change and lowering aquifers require identification of and access to long term "wet" water sources.

14.2 Target Configuration of Treatment Plants

Periodically, the District is presented with ideas for changing the configuration of its treatment plants. These have ranged from moving the surface plant from its current location to a higher location near the tank (in order to reduce electricity costs) to consolidating both plants into a single treatment facility at the Arapaho Treatment Plant (in order to simplify operations). Prior to making any decision that would impact District operations at such a fundamental level, a fuller evaluation of viable alternatives should be made. The following alternatives should be considered:

- Current plant configuration with surface and ground water treatment plants remaining at their current locations

- Moving the surface water treatment plant to a higher elevation

- Consolidation of treatment plants at one of the following locations; current Arapaho Treatment Plant, current Surface Water Treatment Plant, and current Booster Station.

The evaluation should include capital costs (e.g., permitting, engineering, construction, and land or easement acquisition), changes in operating costs (e.g., utilities and simplicity/complexity of operations), robustness of operations in case of an emergency (e.g., would plant consolidation introduce a single point of failure), and potential impact of introducing additional water sources (e.g., bringing the Dawson well online or introducing the use of alluvial water).

14.3 Arapaho Water Collection, Treatment and Transmission

Water from the Arapaho aquifer is pumped from the Arapaho well, treated at the Arapaho Treatment plant, pumped uphill to the Booster Station and, from there, pumped into the distribution system. Both the Transmission line and the booster station have been recently replaced and do not currently need further improvement.

14.3.1 Arapaho Well – Periodic Inspection and Pump Replacement

The cost to replace the Arapahoe well pump should be budgeted for every seven years. The general life expectancy for deep well pumps and motors is between five and 14 years. This effort costs between $70,000 and $90,000 and includes inspection of the well casing and bore hole, installation of a new pump, and any needed repairs. Regular monitoring of the cable/motor degradation can give some indication of impending failure but an older pump and motor can experience sudden, unexpected failure. Potential decreases in aquifer levels also pose a long-term risk to water availability. The Arapaho Well pump was replaced in 2011 and 2012 after a catastrophic failure of down-hole equipment. Warranty replacement occurred in 2012 based on defect.

14.3.2 Arapaho Treatment Plant (ATP) Upgrades

The ATP has performed well and can process all the water that is pumped from the Arapaho Well. Life expectancy of equipment is indefinite based on maintenance and replacement schedule of wear items such as valves, meters, chemical metering pumps, online chlorine residual monitoring equipment, pressure relief valves, booster pumps and filter backwash controller. The plant is capable of treating wells classified as groundwater but major upgrades would be needed should the plant need to process water from sources classified as groundwater under the influence of surface water (e.g., alluvial wells). Some smaller upgrades can improve the plant's performance.

- *Current Upgrades Required*:
  - Backwash filters with treated water. Filters are currently cleaned by backwashing them with raw water from the Arapaho well. An upgraded backwash would use treated water; this upgrade would require additional piping and controls. When the water main was replaced along Rockbrook Road in 2015, a tap for a future connection to bring treated water to the plant for this purpose was installed but the connection to the plant has not been completed.

14.4 Surface Water Collection, Treatment and Transmission

Water is collected from upper Monument Creek in Limbaugh Canyon, gravity feed through a transmission line, processed in the Surface Water Treatment Plant, and then pumped into the distribution system and/or to the tank.

14.4.1 Infiltration Gallery in Limbaugh Canyon

A second surface water intake in Limbaugh Canyon could improve surface water reliability. During drought, water may be flowing under the surface even when not visible. Development of an infiltration gallery, or alluvial well structure, would require locating "sweet spot" in sand (alluvium) within the canyon at the specified point of diversion, building the well structure and connecting piping to the surface water transmission line. [No costs yet estimated.] Improvements to the existing surface water intake and construction of the existing infiltration gallery was complete in November of 2012. The existing structure is subject to periodic maintenance which is difficult to complete due to the location.

14.4.2 Replacement of Surface Water Transmission Line

The transmission line carrying water from Limbaugh Canyon to the SWTP has multiple leaks and is in generally poor condition. There is approximately one mile of line. The line can be replaced in sections. Due to the remote location of the line, replacement cost is estimated at $800,000. Deficiencies of the transmission line include inadequate cover in many locations, variable and unknown pipe materials of questionable quality and freezing issues (i.e., if the surface water plant is down for even a few days in the winter, the line may freeze and become useable until warmer weather).

14.4.3 Surface Water Treatment Plant (SWTP) Replacement & Interim Upgrades

The SWTP is near the end of its life and may not meet increasing CDHPE regulations in the near future. It will need replacement within the next several years. There are a number of variables that will impact design and costs. Water treatment technology continues to improve, with costs seeming to drop. State regulation is continues to become stricter. Replacement of the plant could costs between $400,000 and $1,000,000. There are a large number of unknowns, including whether the building itself will need replacement or can be reused. This will be a multi-year design and construction project.

- *Current Upgrades Required*:
  - Residual Chlorine Measurement at the Entry Point – Currently chlorine measurements take place prior to the contact loop. Measurement location after the contact loop is required per regulations. The CDHPE is systematically reviewing the disinfection systems at water treatment plants as part of their Disinfection Outreach Verification Effort (DOVE). At some point the CDHPE will complete this review for FVAWD and require the District to complete this upgrade.
  - Primary filters are needed for Turbidity Mitigation – Pretreatment required for seasonal variation in water quality with current filtration capabilities.

14.5 Alternative/Additional Water Sources

Dawson Well. The District is already being supplied by two other water sources, but may decide to bring this well online at some point in the future. This well is also impacted by decreases in aquifer levels. Potential treatment facilities would be piping raw water from the Dawson well to the current Arapaho treatment plant (plant upgrades might be required) or building new treatment facility adjacent to the Dawson well.

Alluvial and Other Water Sources. Alluvial wells or an alluvial field in Monument Creek may provide a viable water supply.

14.6 Storage Tank

The water storage tank was sandblasted and recoated in 2011 and 2012. At that time, small rust areas were repaired and no significant problems were discovered with the tank. In 2017 a comprehensive tank inspection occurred and confirmed that the condition of the tank is acceptable. Internal inspections are performed every five years, and periodic (quarterly) inspections are required and performed per state health department regulations.

Surface Water Delivery. In Redstone Ridge Road west of the SWTP, there is a tee where water may flow to the distribution system or to the tank directly from the end of the contact loop. There has been discussion of moving the end of this line so that it feeds treated water directly into the tank. This option needs evaluation, and could result in more frequent turnover of water within the tank. It is possible that this alternative could be evaluated in conjunction with a master plan and evaluation of additional storage requirements. No project has been established for this.

From an operational perspective, the District should maintain a 2X water demand overhead of its water storage at all times and water storage should not drop below a two-day usage average.

Tank Maintenance. The tank needs periodic inspection and maintenance, both internally and externally. In 2011 and 2012, the tank was relined and the exterior was painted. Internal inspections are typically done using divers going inside the tank, then inspecting, filming and evaluating the internal condition of the tank. The tank was last inspected in 2017 and will next need inspection in 2022.Minor repairs should be planned and anticipated with a full recoat scheduled in 2031.

14.7 Distribution System

In 2015, 2016, and 2017, the District replaced significant portions of the distribution system. Major problem areas were addressed. At this point in time, no additional replacement of water mains is planned. The District monitors its leakage rate and tracks locations where leaks have occurred.

The District is also in process of upgrading its water meters to Badger remote-read meters. Whenever the District replaces water main, it also moves meters from inside homes to street side meter pits. For areas that are not having new water main installed, new remote-read meters are being installed inside homes.

14.8 Land and Buildings

The District does not currently expect to acquire land or construct new buildings. Existing properties need periodic inspection and ongoing maintenance, including:

- Electrical inspections
- Foundation, roof, and structural inspections
- Road maintenance
- Landscape maintenance
- Painting.

An inspection schedule and accountability table needs to be implemented.

14.9 Operational Improvements

Improving the efficiency of internal operations can provide cost savings and can allow existing staff to spend a greater proportion of time on capital projects. Two projects are under discussion:

- ***Preventative Maintenance Program.*** Establishing a formal preventative maintenance program would make this more efficient and provide for continuity of service in new or temporary operators needing to run the District. An improved, effective preventive maintenance program could also extend the life of equipment, more efficiently manage maintenance items that are only done once every several years, and improve the accuracy and stability of the maintenance budget.

- ***Operations Manual*****.** The District has operations manuals for individual pieces of equipment, but there is no manual that addresses running the District as a whole or optimization within each treatment plant. In addition to providing for continuity of service, an operations manual would help provide a single place for identifying changes current operators have made to tune plant operations, would assist operators in troubleshooting, and would include details on items that occur infrequently.

Completion of these items would also be useful in board member education and in easing the ability for board members or other experts to look more closely at operations and identify potential improvements for discussion.

15. Capital Project List

Table 3 contains a list of capital projects proposed or being discussed. The inclusion of a project in this table does not represent a commitment to perform the project at some time in the future.

Table 3. Capital Project Summary

Para	Project Title & Description	Estimated Cost	Rough Priority	Target Implementation	Planning Considerations & Notes
	General				
14.1	Analysis and Planning		As needed		Targeted studies to address specific questions
14.2	Target Configuration of Treatment Plants		High		Should be done prior replacement of or major upgrade to either treatment plant.
	Arapaho Water				
14.3.1	Arapaho Well Inspection and Pump Replacement	$70-80K		2018-2020	
14.3.2	ATP Backwash with Treated Water				
	Surface Water				
14.4.1	Infiltration Gallery in Limbaugh Canyon				
14.4.2	Replacement of Surface Water Transmission Line		High		
14.4.3	SWTP Replacement	$400K-$1M	High		
14.4.3	Residual Chlorine Measurement at Entry Point (DOVE)	$5K			
14.4.3	Turbidity Mitigation				
	Alternative Water Sources				
14.5	Dawson Well and Alluvial Wells				
	Storage Tank				
14.6	Tank Inspections			2022	
14.6	Tank Repairs			As needed	
	Distribution System				
14.7	Complete installation of remote-read Badger meters			2018 & 2019	$30K budgeted for each year
	Land and Buildings				
14.8	Building Inspection Program				
	Operational Improvements				
14.9	Preventive Maintenance Program				
14.9	Operations Manual				

APPENDICES

A. Acronyms

ASCG
ATP = Arapaho Treatment Plant
CAD = Computer-Assisted Design
CDPHE = Colorado Department of Public Health and Environment
CI = Cast Iron
CRS = Colorado Revised Statutes
DOLA = Colorado Department of Local Affairs
FVAWD = Forest View Acres Water District
GPM = Gallons per Minute
HP or Hp = Horse Power
IGA = Intergovernmental Agreement
LF = Linear Feet
MOU = Memorandum of Understanding
PLC = Programmable Logic Controller
PRV = Pressure Reducing Valve
PSI = Pounds per Square Inch
PVC = Polyvinyl chloride
ROI = Return on Investment
SCADA = Supervisory Control and Data Acquisition
SWTP = Surface Water Treatment Plant
VFD = Variable Frequency Drive

B. Resources

Colorado Geological Survey -- http://coloradogeologicalsurvey.org/
Colorado Department of Natural Resources. *Ground Water Atlas of Colorado*, Special Publication 53. 2003. Available for purchase at: http://coloradogeologicalsurvey.org/water/groundwater-atlas/
U.S. Geological Survey. Groundwater Availability in the Denver Basin Aquifer System, Colorado: Professional Paper 1770. 2011. Available for download at: https://pubs.usgs.gov/pp/1770/
Colorado Division of Water Resources – http://water.state.co.us
Colorado Division of Water Resources, Denver Basin Rules – http://water.state.co.us/DWRDocs/Rules/Pages/DenverBasinRules.aspx
El Paso County Assessor's Office – http://land.elpasoco.com/
El Paso County Clerk and Recorder – http://recordingsearch.car.elpasoco.com/rsui/opr/Search.aspx
State of Colorado Well Permit Search – http://www.dwr.state.co.us/WellPermitSearch/

C. History of Capital Improvements

This list of capital improvements has been manually compiled. It is based on the 2005 facilities inventory, with many of the improvements made added, and other information it has been identified. A goal should be to replace this manual list with a list generated from an asset management system; an automated list could include expected service life and depreciation and could be used to as part of the budget process and for preventive maintenance.

Table 4. Summary of Major Improvements and Capital Investment (History)

Date	Item Performed	Cost	Comments
	Arapaho Well		
1991	Arapaho Well Drilled	$443,363	This cost may include all drilling, outfitting and rehab work.
1995	Well Outfitted		
2005	Major Rehab, including pump replacement		
June 2012	New pump and motor installed		Well pump lowered 200' to 1,400'
Sept 2012	New motor for well pump	Warranty repair	
	Dawson Well		
1973-2005			A previous "Dawson Well" was in production.
2005	Well drilled, casing and screen installed	$149,940	Well permits: 40123-F and 40213-F-R
Fall 2010	Well capped, old Dawson pump building demolished		Done in conjunction with Arapaho Transmission Line replacement
	Monument Creek (Limbaugh Canyon) Intake(s)		
?	Intake and Pipe	$108,766	
?	Lower Intake destroyed by flood.		
2004	4" SS screen installed		
Summer 2010	Survey and easement work	$2,000	Includes surveyed locations of both upper and lower intakes, the line from the intake, easements and elevations.
Nov 2012	Screened surface water intake improved, infiltration gallery constructed.	$23,328	
	Ground Water Treatment Plant (Arapaho Treatment Plant)		
1995?	Plant initially built		
2000	Effluent side pressure relief valve – thorough cleaning		
2001	- Influent pressure gauge – replaced - DP pressure gauges X 2 – replaced		
2002	- Potassium permanganate pump – rebuilt pump side - Production meter – rebuilt & tested		

Date	Item Performed	Cost	Comments
	- Pump control valve – thorough cleaning		
2003	- Filter pressure reducing valve – thorough cleaning - Well side pressure relief valve – thorough cleaning		
2004	- Blow-off/waste meter installed - Backwash meter – rebuilt - Effluent pressure gauge – replaced - Effluent line pressure gauge – replaced		
2005	- Chlorine pump – rebuilt pump side - Chlorine tank – small bucket tank replaced - Tank level microwave receiver unit – replaced - Air compressor – rebuilt & repaired		
2007 or 2008	Backwash controller replaced		
2011	- VFD Replaced - Some automation added		
2012	PLC Controls added to ATP for automation		
May 2011	New VFD on booster pump	$4000	Replaced constant speed starter
July 2013	20 HP booster pump replaced		
	<u>Surface Water Treatment Plant (SWTP)</u>		
?	Initially built	$930,000	
2000	Pressure reducing valve on backwash line replaced		
2001	- Backwash meter installed, tested - Pressure reducing valve for Cl2 analyzer installed - Effluent pressure gauge replaced		
2002	- Backwash pressure relief valve new - First stage filter #3 (steel) replaced - First stage backwash check valve installed - First stage backwash butterfly valve installed - Second stage backwash check valve installed - Second stage backwash butterfly valve installed - Production meter rebuilt, tested - Amperometric chlorine analyzer installed - Chlorine chart recorder installed (not being used??) - Influent pressure gauge replaced		
2003	- Chlorine tank new		

Date	Item Performed	Cost	Comments
	- First stage polymer pump tested, calibrated - Second stage polymer pump tested, calibrated - Polymer tank installed		
2004	Second stage NTU printer replaced		
2005	Chlorine pump – rebuilt pump side		
2010/2011	- Some automation added - Electrical Panel upgraded (new breaker box) - Some piping & fittings replaced		
May 2012	Major SWTP Rehab – Relay controls upgraded to PLC with automation of SWTP, new valves, PRV, booster pumps, meters installed	$100,000	
Oct 2012	New inlet installed with trough and grate	$16,000	
Dec 2014	Backwash pond modifications complete	$250,000	
Jan 2015	Addition of 3rd booster pump and controls for low flows	$12,000	
	Transmission Line – ATP to Distribution System		
Fall 2010/ Jan 2011	New 4" Transmission line completed from the Arapahoe well to the Booster Station. New 4" line from BS to 4" CL distribution Line (DL) on Red Rocks Ranch Dr.	$362,400 (estimated)	
	Booster Pump Station		
	Initially built	$31,000	
1997	Recharge meter installed		
1999	Pressure relief valve (20hp pump) repaired		
2003	Air relief valve - torn down and reassembled		
2004	- Blow-off valve (ball type) - installed - Inline strainer installed - New impeller stacks (both pumps) - Replaced influent pressure gauge, pressure gauges for both pumps, effluent pressure gauge		
Fall 2010	- Re-plumbed pipes to provide bypass flows (recirculation), added control valves for future SCADA system. - Added plumbing to provide an emergency hookup into the Palmer Lake Water system.		
Spring 2015	Replaced Transmission Line to Booster Station from Dist. System	$12,465.85	
2016	New transmission line installed		
Spring 2017	Replaced Booster Station	$366,491	

Date	Item Performed	Cost	Comments
	Red Rock Reserve Transmission Line		
2007/2008	Built Transmission Line for Future Use	$51,610	This 6" PVC line was built in conjunction with the Red Rock Reserve inclusion and is located on Redstone Ridge Road.
2014	Connected transmission line to distribution system West of RSR LV4		
	Interconnects – Palmer Lake		
2012	Connection fittings installed at booster station	n/a	
2014	Temporary connection point to FVAWD transmission line removed	n/a	Done as part of transmission line replacement.
2017	Connection fittings installed in new booster station		
	Transmission Line – SWTP to Distribution System		
?	Initial installation		
2007/08?	Chlorine Contact line installed		
	Distribution System		
As of 5/11/2006	Distribution system rapidly aging, with many types of materials and an increasing leak rate.	As of 5/11/2006	Materials used for water mains have now been recorded in maps.
2008	PRV & Fire Hydrant Rehab and Maintenance	2008	Need to schedule recurring maintenance.
Fall 2011	Flow meter installation		Flow meters installed in order to divide the District into "zones" and detect high leak areas.
Fall 2011	New water main on Vista View Rd.		A new water main was constructed on Vista View Rd as a result of a contractual agreement with the Nevins.
2015	The Villas. 3,975 feet of 6" water main replaced along with associated service lines, new meter pits and hydrants in the Villas	$564,704	Cost includes engineering and construction.
Nov 2015	Begin smart meter installation for homes		
Nov 2015	Clovenhoof. 3,555 feet of 6" water main replaced along with associated service lines, new meter pits and hydrants in Clovenhoof.	$802,920	Cost includes engineering and construction.
2015	5 PRV vaults replaced	$115,475	Construction costs only.
2016	Phase 3. 1600 feet of 6" water main replaced along Forest View Road along with associated service lines, new meter pits and hydrants. PRV vault on Forest View also replaced.	$239,133	Cost includes engineering and construction.
2017	Phase 4. 1807 feet of 6" water main replaced along Stone View Road along with associated service lines,	$410,385	Cost includes engineering and construction.

Date	Item Performed	Cost	Comments
	new meter pits and hydrants. Included an air/vac vault.		
	Tank		
1975?	Tank installed		Expected service life = 50 years
1997	Tank cleaned and inspected		
Fall 2010/ Winter 2011	Tank refurbished internally Fall of 2010. This included rust removal and painting. Outside of the tank was also painted.		Interior failed and warrantee repairs are being scheduled for early 2012
April 2012	Tank coated again due to failure of 2011 job	Warranty	
	District Maps		
6/2008?	Baseline Electronic Map Set	?	The 1992 maps were redrawn in electronic format. These maps allow for regular correction and update. The initial set was built in layers w/ that include an aerial photograph, roads, and FVAWD water lines and facilities. Selected elements of the 1992 maps are yet to be incorporated into the new map set.
1/2010	District Boundary Map	$2,400	For 2010, DOLA's electronic submission requirements become more rigorous. Additional work was required to develop these maps. While 2008 map set had been created to assist in the operations and management of the District, the boundary maps were required to be based on legal description.
2012	System maps created in AutoCAD	?	
2015, 2016, 2017	GIS maps created and updated	$13,835 (2015) $4988.75 (2016) $3,490 (2017)	District GIS maps created utilizing 2008 and 2012 system maps data and field location. Added easements, parcel data and District owned land. Maps updated to include all new construction.