CITY OF FIRCREST

Comprehensive Water System Plan

March 2021

AGENCY REVIEW

Comprehensive Water System Plan

City of Fircrest

March 2021

Murraysmith

1145 Broadway Plaza
Suite 1010
Tacoma, WA 98402

In Association with:
Katy Isaksen & Associatiates

City of Fircrest
Scott Pingel, City Manager
Tyler Bemis, Public Works Director

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Chapter 1

Introduction

1.1 Authorization and Purpose

In May 2020, the City of Fircrest (City) authorized Murraysmith to prepare a comprehensive water system plan (Plan) as required by state law under Washington Administrative Code (WAC) 246-290-100. In accordance with WAC 246-290-100, the Plan shall be updated and submitted to the Washington State Department of Health (DOH) every six or ten years, depending on approval type. The previous comprehensive water system plan was prepared for the City in 2014 and approved by DOH in May 2014 for six years. A 10-year approval period is desired for this Plan, and therefore the Plan analyzed 10-year and 20-year planning periods. The purpose of this updated Plan is as follows:

- To evaluate historical growth and water usage for use in projecting future water demands.
- To inventory, describe, and analyze the existing water system to determine if it meets minimum requirements mandated by DOH and the City's own policies and design criteria.
- To prepare a capital improvement program (CIP) that identifies water system improvements which resolve existing system deficiencies and accommodate future needs of the system for at least 20 years into the future.
- To prepare an implementation schedule of improvements and financing plan that meets the goals of the financial program.
- To review and update the water use efficiency program, water quality program, cross-connection program, and wellhead protection program.
- To document the operations and maintenance program.
- To comply with all other water system plan requirements of DOH.

1.2 Background

The City's existing Plan was approved by DOH in May 2014. Several changes to water system regulations, as they apply to comprehensive water system plans, have occurred since 2014. The City has continued to improve and update their water system since 2014. This Plan addresses these changes and improvements and states the City's plans for the next 10- and 20-year planning periods.

1.3 Water System Ownership and Management

The City is a municipal corporation that owns and operates a public water system within its corporate boundaries. Water system data on file at DOH for the City is shown in Table 1-1.

Table 1-1
Water System Ownership Information

Information Type	Description
System Type	Group A – Community – Public Water System
System Name	City of Fircrest
County	Pierce County
DOH System ID Number	25150T
Owner Number	001924
Address	115 Ramsdell Street Fircrest, WA 98466
Contact	Scott Pingel, City Manager
Contact Phone Number	253-564-8900

1.4 Water Service Area

The City's Retail Water Service Area (RWSA), which encompasses the Fircrest City Limits, a portion of the City of Fircrest's Urban Growth Area (UGA), and a small portion of City of Tacoma (Tacoma) residents, is shown in Figure 2-1. The city limits comprise an area of approximately 1.58 square miles and the existing retail water service area is approximately 1.60 square miles. For future expansion, the system is mainly developed and is surrounded by Tacoma Public Utilities' service area, so the service area is unlikely to grow. The 2019 population within the city limits was 6,770 per the Washington State Office of Financial Management (OFM)'s April 2019 population report.

1.5 Overview of Existing System

In 2019, the City provided service to approximately 2,783 customer connections, or 3,024 equivalent residential units (ERUs). All water supply to the City is provided by five ground water wells directly to its High Zone, then the zone fills the reservoirs that gravity feed the Low Zone. The city also utilizes another well as an emergency water source. All water supplied by the City is fluoridated and chlorinated by the City. Water storage is provided by three reservoirs that have a total maximum storage capacity of 1.8 million gallons (MG). In addition, the City's water system has three pressure zones with three pressure reducing stations, one booster pump station, and 38 miles of water main. A summary of 2019 water system data for the City's system is shown in Table 1-2.

Table 1-2
2019 Water System Data Summary

Description	Data
Population (2019)	6,770
City Limits	1.58 sq ml
Existing Retail Water Service Area	1.60 sq ml
Future Water Service Area	1.60 sq ml
Total Connections (2019)	2,783
Total ERU's (2019)	3,024
Demand per ERU (2019)	214 gal/ERU
Demand per Capita (2019)	98.6 gal/capita
Annual Supply (2019)	244 MG
Unaccounted for Water (2017-2019)	5.2%
Max Day/Average Day Demand Factor	2.24
Peak Hour/Max Day Demand Factor	1.69
Number of Pressure Zones	3 Zones
Number of Wells & Total Capacity	5 Active & 1 Emergency (5,145 gpm)
Number of Pump Stations & Total Capacity	1 BPS (1,190 gpm)
Number of Reservoirs & Total Capacity	3 Res (1.8 MG)
Number of Pressure Reducing Stations	3
Total Length of Water Main	38 miles

1.6 SUMMARY OF PLAN CONTENTS

A brief summary of the content of the chapters in the plan is as follows:

- Chapter 1 - Introduction: Provides an overview of the City's water system, the objectives of the plan, and the plan organization.
- Chapter 2 - Water System Description: Presents the water service area, describes the existing water system, and identifies the adjacent water purveyors.
- Chapter 3 - Land Use and Population: Presents related plans, land use, and population characteristics.
- Chapter 4 - Water Demands: Presents historical water use patterns, existing water demands, and projected future demands.

- Chapter 5 - Policies and Design Criteria: Presents the City's water service policies, water system operation policies, and water system design criteria.
- Chapter 6 - Water Supply Quantity and Quality: Discusses the City's water source and the results of past water quality monitoring.
- Chapter 7 - Operations and Maintenance: Discusses the City's operations and maintenance program.
- Chapter 8 - Water System Analyses: Presents the results of the water system analyses and summarizes existing system deficiencies.
- Chapter 9 - Water System Improvements: Presents the proposed water system improvements, their estimated costs, and implementation schedule.
- Appendices: Contain additional information and plans that supplement the chapters listed above.

1.7 DEFINITION OF TERMS

The following terms are used throughout this plan:

Connection Charge: A one-time fee paid by a property owner when connecting to the City's system and is made up of both the General Facilities Charge and Meter Installation Charge.

Consumption: The true volume of water used by the water system's customers. The volume is measured at each customer's connection to the distribution system.

Cross-Connection: A physical arrangement that connects a public water system, directly or indirectly, with anything other than another potable water system and, therefore, presents the potential for contaminating the public water system.

Demand: The quantity of water required from a water supply source over a period of time necessary to meet the needs of domestic, commercial, industrial, and public uses, and to provide enough water to supply firefighting, system losses, and miscellaneous water uses. Demands are normally discussed in terms of flow rate, such as million gallons per day (MGD) or gallons per minute (gpm) and are described in terms of a volume of water delivered during a certain time period. Flow rates pertinent to the analysis and design of water systems are:

- Average Day Demand (ADD): The total amount of water delivered to the system in a year divided by the number of days in the year.
- Maximum Day Demand (MDD): The maximum amount of water delivered to the system during a 24-hour time-period of a given year.

- Peak Hour Demand (PHD): The maximum amount of water delivered to the system, excluding fire flow, during a one-hour time-period of a given year. A systems peak hour demand usually occurs during the same day as the peak day demand.

Distribution System Leakage (DSL): The annual amount of water calculated from the difference between the measured amount of water supplied into the system and the measured amount of water taken out of the system for consumption and other authorized uses. Authorized uses include both metered and unmetered water uses. Water use that is unmetered must be estimated to be classified as an authorized use. Examples of common unmetered water uses include the use of hydrants for flushing, firefighting, and construction. The calculated DSL volume consists primarily of water loss through leaks in the water system, but may also include meter inaccuracies, meter reading errors, water theft, and reservoir overflows.

Equivalent Residential Units (ERU's): One ERU represents the amount of water used by one single family residence for a specific water system. The demand of other customer classes can be expressed in terms of ERU's by dividing the demand of each of the other customer classes by the demand represented by one ERU.

Existing Retail Water Service Area (RWSA): Includes all areas where the water system already provides direct service, remote service, or where service connections are currently available, and may include areas where new service is proposed.

Fire Flow: The rate of flow of water required during firefighting, which is usually expressed in terms of gpm.

Future Water Service Area: Includes all areas outside of the existing retail water service area where the City has the duty to provide water service to future customers.

General Facilities Charge: A one-time fee paid by a property owner when connecting to the water system. This fee pays for the new customers' equitable share of the cost of the existing system. This fee offsets the costs of providing water to new customers and recognizes that the existing water system was largely built and paid for by the existing customers.

Head: A measure of pressure or force by water. Head is measured in feet and can be converted to pounds per square inch (psi) by dividing feet by 2.31.

Head Loss or Pressure Loss: Pressure reduction resulting from pipeline wall friction, bends, physical restrictions, or obstructions.

Hydraulic Elevation: The height of a free water surface above a defined datum; the height above the ground to which water in a pressure pipeline would rise in a vertical open-end pipe.

Maximum Contaminant Level (MCL): The maximum permissible level of contaminant in the water that the purveyor delivers to any public water system user, measured at the locations identified under WAC 246-290-310.

Meter Installation Charge: The installation charge or hook-up fee is a fee paid by a property owner to reimburse the City for the cost incurred to make the physical connection to the water system. This cost includes both direct and indirect cost for installing the service line off the system's water main to the customer's water meter.

Potable: Water suitable for human consumption.

Pressure Zone: A portion of the water system that operates from sources at a common hydraulic elevation.

Purveyor: An agency, special purpose district, subdivision of the state, municipal corporation, firm, company, mutual or cooperative association, institution, partnership, or persons or other entity owning or operating a public water system. Purveyor also means the authorized agents of such entities.

Supply: Water that is delivered to a water system by one or more supply facilities which may consist of supply stations, booster pump stations, and wells.

Storage: Water that is "stored" in a reservoir to supplement the supply facilities of a system and provide water supply for emergency conditions. Storage is broken down into the following five components which are defined and discussed in more detail in **Chapter 7**: operational storage, equalizing storage, standby storage, fire flow storage, and dead storage.

Unaccounted-for Water: Water that is measured as going into the distribution system but not metered as going out of the system.

1.8 ABBREVIATIONS

The abbreviations listed in **Table 1-3** are used throughout this plan.

Table 1-3
Abbreviation Summary

Abbreviation	Description	Abbreviation	Description
A		O	
AC	Asbestos Cement	OFM Ch1	Washington State Office of Financial Management
ADD	Average Day Demand	P	
AF	Acre Feet	PCCWSP Ch3	Pierce County Coordinated Water System Plan
ANSI	American National Standards Institute	pCi/L Ch6	Picocuries Per Liter

Abbreviation	Description	Abbreviation	Description
AWWA	American Water Works Association	PFAS Ch6	Per- and Polyfluoroalkyl Substance
C		PFBS	Perfluorobutanesulfonic Acid
CCR	Consumer Confidence Report	PFHxS	Perfluorohexanesulfonate Acid
CIP	Capital Improvement Program	PFNA	Perfluorononanoic Acid
City	City of Fircrest	PFOA	Perfluorooctanoic Acid
CMU	Concrete Masonry Unit	PFOS	Perfluorooctanesulfonic Acid
County	Pierce County	PHD	Peak Hour Demand
CPP	Pierce County Countywide Planning Policies	Plan	Comprehensive Water System Plan
D		PN	Public Notification
D/DBPR	Disinfectants/Disinfection By-products Rule	PNWS	Pacific Northwest Section
DBP	Disinfection By-products	ppb	Parts Per Billion
DOH	Washington State Department of Health	PRV	Pressure Reducing Valve
DSL	Distribution System Leakage	psi	pounds per square inch
E		PSRC	Puget Sound Regional Council
Ecology	Washington State Department of Ecology	PVC	Polyvinyl Chloride
EPA	Environmental Protection Agency	Q	
ERU	Equivalent Residential Unit	Qa Ch6	Annual Rights
F		Qi Ch6	Instantaneous Rights
FF	Fire Flow	R	
fps	feet per second	RCW	Revised Code of Washington
G		RTCR Ch6	Revised Total Coliform Rule
GMA	Washington State Growth Management Act	RTU	Remote Telemetry Units
GMPC	Growth Management Planning Council	RWSA	Retail Water Service Area
gpm	gallons per minute	S	
GWI	Groundwater sources under the direct influence of surface water per DOH	SAL	State Action Level

Abbreviation	Description	Abbreviation	Description
GWR	Ground Water Rule	SCADA Ch2	Supervisory Control and Data Acquisition
H		SDWA	Safe Drinking Water Act
HAA5	Haloacetic Acids	SEPA	Washington State Environmental Policy Act
HGL	Hydraulic Grade Line	SMA	Satellite Management Agency
I		T	
IBC	International Building Code	Tacoma	City of Tacoma
IDSE	Initial Distribution System Evaluation	TCR	Total Coliform Rule
M		THM	Trihalomethane
MCL	Maximum Contaminant Level	TTHM	Total Trihalomethanes
MCLG	Maximum Contaminant Level Goal	U	
MDD	Maximum Day Demand	UGA	Urban Growth Area
MG	Million Gallons	UPC	Uniform Plumbing Code
µg/L	Micrograms Per Liter	USC	University of Southern California
mg/L	milligrams per liter	V	
MGD	Million Gallons per Day	VFD	Variable Frequency Drive
MRDL	Maximum Residual Disinfectant Level	VOC	Volatile Organic Chemical
mrem/yr	Millirems Per Year	W	
MTU	Master Telemetry unit	WAC	Washington Administrative Code
N		WFI	Water Facilities Inventory
ng/L Ch6	Nanogram per liter	WUCC	Water Utility Coordinating Committee
NSF Ch5	National Sanitation Foundation	WUE	Water Use Efficiency

Chapter 2

Water System Description

2.1 Introduction

This chapter describes the City's existing and future water service areas, water service agreements, and existing water system components. The system components described in this chapter were analyzed to identify system deficiencies. The results of these analyses are described in Chapter 8.

2.2 History

Fircrest was settled in the early 1900s, originally as a subdivision and residential park. It was later incorporated as a town in 1925 and eventually grew large enough to become a city in 1990. By the end of 2019, the City provided water service to 2,795 customer connections.

2.3 Water Service Area

The City is in northwestern Pierce County, Washington, surrounded by Tacoma. The City's corporate boundary encompasses an area of approximately 1.58 square miles, as shown in Figure 2-1. The existing water system extends as far north as Columbia Avenue, west to Mildred Street West, south to approximately Fordham Street, and east to Orchard Street West.

The City's retail water service area is defined by DOH (331-432) as:

> *The Retail Service Area is the specific area, defined by the municipal supplier, where the supplier has a duty to provide service to new service connections as set forth in RCW 43.20.260.*

The existing retail water service area boundary is generally located within the city limits, as shown in Figure 2-1. There is a small, northwest portion of the Fircrest that is served by Tacoma Public Utilities. The City is responsible for providing public water service, utility management and water system development within this area.

The existing service area is surrounded by the Tacoma Public Utilities service area, which limits the boundary of the service area. There is no anticipated expansion of the service area.

2.3.1 Topography

Fircrest's service area is situated between Tacoma and University Place. The topography of the area served by the City's water system varies greatly in elevation. Much of the City is hilly and varies between 191-410 feet in elevation. The City generally slopes down towards the southeast section of the City, near Whittier Park and Leach Creek.

2.4 Water Agreements and Contracts

The City has no water service agreements. The City is not considering providing water to other utilities on a wholesale basis. Aside from requests for bulk amounts of water, no formal supply agreements exist between the City and other water users. Information on the City's long-term water supply planning is presented in Chapter 6.

2.5 Satellite System Management

A Satellite Management Agency (SMA) is defined as a person or entity that is certified by the DOH to own or operate more than one public water system without the necessity for a physical connection between such systems.

The City of Fircrest is not currently an SMA. If the City were to consider providing SMA services, then these policies would follow the requirements set by the satellite management program developed by DOH.

2.6 Existing Water Facilities

This section provides a detailed description of the existing water system and the current operation of the facilities. The analysis of the existing water facilities is presented in Chapter 8.

General water system facility data is summarized on the Water Facilities Inventory (WFI) form. A copy of this form is contained in Appendix B.

2.6.1 Pressure Zones

The City serves customers within an elevation range of approximately 191 feet near the Leach Creek to 410 feet in the southwestern section of the City, west of Thelma Gilmur Park. The wide elevation range requires that the water pressure be increased or reduced to maintain pressures that are safe and sufficient to meet the flow requirements of the system. This is achieved in the City's system by dividing the water system into three different pressure zones, as shown in Figure 2-1. The pressure in each pressure zone is regulated by reservoir levels, pressure reducing valve (PRV) station settings, pump station settings or a combination of these as illustrated in the hydraulic profile, Figure 2-2, and summarized in Table 2-1.

Table 2-1
Pressure Zone Data Summary

Zone Name	Maximum Hydraulic Elevation (above MSL)	Storage Facilities	Supply Facilities
Low	235-ft	1.0 MG Low Reservoir	(3) High/Low Zone PRVs
High	442-ft	0.2 MG High Reservoir Golf Course Reservoir	Wells 4-9
Weathervane	497-ft	None	Weathervane BPS

The High Zone is supplied with water from the 0.2 MG High Zone Reservoir and the five primary wells. During fire flow events or when the reservoir is out of service, the High Zone is supplied by an additional emergency well. The High Zone was originally separated as two zones: High and Golf Course. In 2008, The Golf Course Zone was consolidated into the High Zone and isolated from the Low Zone. The High Zone is located west of Alameda Avenue, north of Regents Boulevard, and west of Magnolia Drive; additionally, there is a small section along Orchard Street. The zone serves customers within an elevation range of approximately 250 feet to 360 feet.

The Low Zone is the lowest pressure zone and is predominately located between Alameda Avenue and Orchard Street, and south of Regents Boulevard. Elevations range from approximately 190 feet to 310 feet. The Low Zone is supplied from three PRVs connecting it to the High Zone, and stores water in the 1.0 MG Low Reservoir.

The Weathervane Zone is a closed zone (i.e., a zone without storage), which is supplied via the Weathervane Booster Pump Station, which pumps water from the High Zone to the Weathervane Zone. This zone serves customers within an elevation range between approximately 330 feet to 410 feet and is primarily located in the southwest corner of the service area, south of Claremont Street, and generally west of the intersection of Emerson Street and Magnolia Drive.

2.6.2 Supply Facilities

The City utilizes groundwater as its primary source of water supply. The active wells include wells FW-4, FW-6, FW-7, FW-8, and FW-9. Wells FW-1 and FW-2 were previously abandoned, and FW-3 is used solely as a monitoring well and does not contribute to the water supply system. All water supply to the City's system is pumped from its wells directly to the High Zone.

Well FW-4 is located south of Ramsdell Street and west of Orchard Street. Well FW-9 is located to the north between Cornell Street, Orchard Street, Ramsdell Street, and San Juan Avenue. These wells directly supply the High Zone up to 1,775 gpm and an additional 1,100 gpm in case of emergencies. Well FW-9 can directly feed the low zone through a manually actuated gate valve.

Wells FW-6 and FW-7 are located south of Claremont Street and east of Paradise Parkway. Well FW-8 is located southeast between Alameda Avenue and 60th Avenue Court West. These wells previously served the Golf Course Zone and were later incorporated into the High Zone. These

wells directly supply the High Zone up to 1,450 gpm. They indirectly service the Weathervane Zone through its pump station.

Table 2-2
Source Data Summary

Source Name	Supply Type	Capacity (gpm)	Zone Supplied
FW-1	Inactive well	n/a	Unconnected
FW-2	Inactive well	n/a	Unconnected
FW-3	Monitoring well	n/a	Unconnected
FW-4	Active well	525	High Zone
FW-5	Emergency well	1100	High Zone
FW-6	Active well	750	High Zone
FW-7	Active well	800	High Zone
FW-8	Active well	720	High Zone
FW-9	Active well	1250	High Zone

2.6.3 Water Treatment

The City's water is chlorinated to disinfect and kill harmful bacteria that may be present in the water and fluoridated to assist in the prevention of tooth decay. The hypochlorite system includes a bulk liquid sodium hypochlorite system that injects a 12.5 percent sodium hypochlorite solution into the main water system piping at each well house. Metering pumps will then run when the well pumps turn on and will be turned off when the well pumps turn off assuring no overdosing of the system occurs. Sodium hypochlorite dosages are manually adjusted based on testing results for chlorine residual in the system. Chlorine residual analyzers monitor chlorine residuals and alert City staff in the event of a low or high chlorine residual detection. This is similar to the current operation of the City's fluoridation system.

All well houses are equipped with fluoride injection systems which inject fluoride immediately after the well casing for each well. The injection system is automatically called on and off in tandem with each well pump. The objective of the fluoride injection system is to provide the water system with a residual fluoride concentration of 0.5-0.9 milligrams per liter (mg/l). The system is tested daily at each water source and the injection system is adjusted as needed to achieve proper residual fluoride concentrations.

Additional information on the City's source of supply, water treatment, and water quality monitoring is contained in Chapter 6.

2.6.4 Pump Station Facilities

The City's water system has one (1) pump station, the Weathervane Booster Pump Station, as summarized in Table 2-3. A more detailed description of the pump station is provided below.

Table 2-3
Weathervane Booster Pump Station Pump Data Summary

Number of Pumps	Pumps From	Pumps To	Motor (hp)	Pump Station Design Flow (gpm)	Pump Type	Variable Frequency Drive
(2) 95 gpm (2) 500 gpm	High Zone	Weathervane Zone	7.5 hp & 25 hp	1,190 gpm	(2) Horizontal & (2) Vertical Turbine	Yes

The Weathervane Booster Pump Station is located south of Emerson Street and is accessed through Evergreen Drive. The station pumps water from the High Zone to the Weathervane Zone to meet the demand requirements of the Weathervane Zone.

A concrete masonry unit (CMU) block building houses the booster pump station's mechanical and electrical equipment. The station has a total capacity of approximately 1,190 gpm, which is delivered by two 95 gpm vertical turbine pump with a 7.5 horsepower motor and two 500 gpm horizontal turbine pumps with 25 horsepower motors. All four pumps have variable frequency drives (VFDs), allowing the City to adjust the pump station to meet the demand needs more efficiently of the Weathervane Zone.

2.6.5 Storage Facilities

The City's water system has three (3) active storage facilities: 0.2 MG High Reservoir, 0.6 MG Golf Course Reservoir, and the 1.0 MG Low Reservoir. These reservoirs are summarized in Table 2-4 and a more detailed description of each reservoir of each storage facility is provided below.

Table 2-4
Tank Data Summary

Facility Name	Overflow Elevation (ft)	Zone Served	Water Storage Height (ft)	Diameter (ft)	Total Volume (MG)	Tank Type	Year Constructed
High Tank	470-ft	High	24	39	0.21	Elevated	1951
Golf Course Tank	470-ft	High	91	34	0.60	Standpipe	1966
Low Tank	425-ft	Low	48	60	1.0	Reservoir	1980

2.6.5.1 High Zone - 0.2 MG High Reservoir

The 0.2 MG High Reservoir, which is located at the east end of S 25th Street, provides water storage directly to the High Zone and can indirectly provide water to the Low Zone through the

Low Reservoir. The reservoir site is shared with the City's Low Reservoir. This elevated tank is a six-post steel tank. The tank bowl is approximately 39 feet in diameter and 24 feet high. The base of the bowl is 60 feet above ground. The total height is 84 feet. The tank capacity is 210,000 gallons and was built in 1951. The reservoir's base elevation is at approximately 386 feet and the overflow elevation is at 470 feet.

2.6.5.2 High Zone - 0.6 MG Golf Course Reservoir

The 0.6 MG Golf Course Reservoir is located on the Fircrest Golf Club property approximately 400 feet north of 35th Street W. The reservoir provides storage for the High Zone and can provide supplemental storage to the Low Zone when supplied through the pressure reducing stations. The 91-foot tall, 34-foot in diameter standpipe was constructed in 1966. The reservoir has a base elevation of approximately 379 feet and overflow elevation of 470 feet.

2.6.5.3 Low Zone - 1.0 MG Low Reservoir

The 1.0 MG Low Reservoir is located at the east end of S 25th Street and shares a site with the High Reservoir. The reservoir provides storage for the Low Zone. The Low Reservoir receives water from the High Reservoir through an altitude valve with pressure transducers. When the Low Reservoir hits the set low water level, then the High Reservoir is signaled to provide water. The 48-foot tall, 60-foot diameter reservoir was constructed in 1980. The reservoir has a base elevation of approximately 377 feet and overflow elevation of 425 feet.

2.6.6 Distribution and Transmission System

The City's water system contains more than 38 miles of water main ranging in size from 2 inches to 16 inches. As shown in **Table 2-5** most of the water main (approximately 30 percent) within the service area is 4-inch diameter, and over 90 percent of all water main is 4-inch diameter to 1-inch diameter.

Table 2-5
Water Main Inventory

Diameter (inches)	Total Length (feet)	% of Total
2	6,085	**3%**
3	1,385	**1%**
4	59,550	**30%**
6	45,620	**23%**
8	40,560	**20%**
12	38,205	**19%**
16	8,720	**4%**
Total Length	**200,125**	**100%**

% of Total	100%

All of the water main in the City's system is constructed of asbestos cement (AC), polyvinyl chloride (PVC), and ductile iron. All new water main projects are required to use ductile iron water main in accordance with the City's development and construction standards.

2.6.7 Pressure Reducing Stations

Pressure reducing stations are connections between adjacent pressure zones that allow water to flow from the higher-pressure zone to the lower pressure zone by reducing the pressure of the water as it flows through the station, thereby maintaining a safe range of pressures in the lower zone. The Fircrest water system has a total of 3 pressure reducing stations, as shown in Figure 2-1 and Figure 2-2. These three PRV stations actively supply water from the High Zone to the Low Zone. All of the City's PRV stations are located in underground vaults and are not equipped with pressure relief valves.

2.6.8 Water System Interties

Water system interties are physical connections between two adjacent water systems. In 1994, the City completed an emergency intertie with Tacoma's water system. It is located on the east side of Orchard Street across from Stanford Street. A copy of the agreement and its amendment is contained in Appendix A.

2.6.9 Telemetry and Supervisory Control System

Successful operation of any municipal water system requires gathering and using accurate water system information. A telemetry and supervisory control system gather information and can efficiently control a system by automatically optimizing facility operations. A telemetry and supervisory control system also provide instant alarm notification to operations personnel in the event of equipment failure, operation problem, flood, fire, or other emergency situations.

The City's telemetry system was replaced with a supervisory control and data acquisition (SCADA) system in 2009. The system consists of a new master telemetry unit (MTU) at the Fircrest Public Works Building, existing communications equipment, and new remote telemetry units (RTU) at the wells and reservoir sites. The Reservoir RTU transmit the reservoir levels to the MTU along with the status of the doors, hatches, valves, and ancillary alarm conditions. The SCADA RTU controls the well pump motors via setpoints input by the operator. Well levels, pump status, control settings, alarm setpoints, and station alarms can be viewed and tracked.

2.7 Water System Operation

All water supply is provided through the five active wells, as shown in Figure 2-1. Wells FW-4 and FW-9 provide water to the High Zone and indirectly fills the High Reservoir through an altitude control valve at the reservoir site. Water from these wells can also indirectly fill the Low Zone

through an isolation valve. The High Reservoir fills the Low Reservoir through an altitude control valve with pressure transducers at the reservoir site, then the Low Reservoir gravity feeds the Low Zone. Wells FW-6, FW-7, and FW-8 provide water directly to the High Zone and the Golf Course Reservoir. The settings of the supply facilities and water usage throughout the system dictate the amount of water either flowing into or out of the reservoirs. The Weathervane Zone Booster Pump Station draws water from the High Zone and pumps it into the closed Weathervane Zone (i.e., no storage within the zone) to meet the zone demands.

2.8 Adjacent Water Systems

The area surrounding Fircrest's existing water service area is served by Tacoma's water system. This large water system is adjacent to the City's system. The following provides a brief description of the Tacoma's water system.

2.8.1 Tacoma Public Utilities

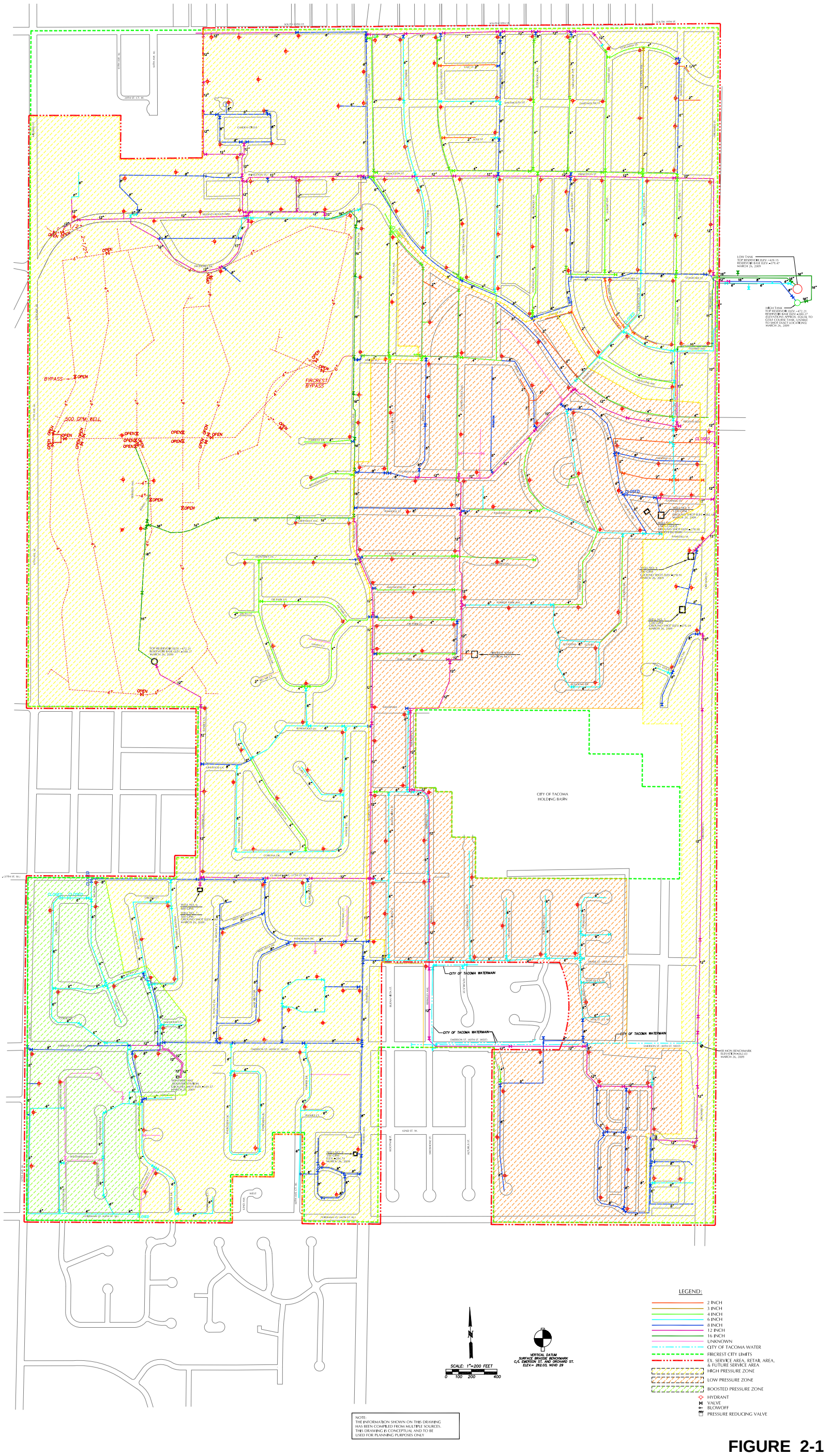
Tacoma's RWSA surrounds the Fircrest's water service area. Tacoma is a regional water supplier that serves more than 300,000 customers in Pierce and King Counties. Tacoma Water provides water to 24 parcels within the Fircrest city limits, which are located in the northwest corner of the City.

Tacoma's raw water supply originates in the Green River Watershed, which covers approximately 148,884 acres on the west flank of the Cascade Mountains between Chinook and Snoqualmie passes, and supplies up to 167 MGD. Tacoma can supplement its Green River supply with water from seven wells located along the north fork of the Green River. This well field can produce 84 MGD in the winter and spring months. These wells are used only when the water in the river is too turbid to be used as a supply. This usually occurs in the fall and winter when rain and snow melt washes soil sediment into the river. The raw water supply for this system is stored in the Howard Hanson Reservoir which was created after the U.S. Army Corps of Engineers installed the Howard Hanson Dam in 1961. The water from the reservoir is then diverted into Tacoma's pipeline for treatment and distribution.

In 2005 Tacoma finished installing 34 miles of transmission main increasing the water supply to Tacoma and South King County. Due to this increase in supply an expansion of the Howard Hanson Dam was required to increase storage capacity. This 2007 expansion added 6.5 billion gallons of storage capacity to the water system. New water treatment facilities were also constructed in 2005 and 2007 and include ozone disinfection.

In addition to the North Fork Wells, Tacoma has several wells in its service area that can be used to meet peak summer water demands. The South Tacoma Wells have a maximum capacity of approximately 59 MGD.

THE CITY OF FIRCREST



NOTE:
THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM MULTIPLE SOURCES. THIS DRAWING IS CONCEPTUAL AND TO BE USED FOR PLANNING PURPOSES ONLY

FIGURE 2-1

NO	DATE	BY	APPR	REVISIONS
1	1/28/13	R.W.	S.S.	REVISED BASE MAP PER AS-BUILT DRAWINGS
2	2/14/14	R.W.	S.S.	REVISED BASE MAP PER CITY AS-BUILT DATED 01/29/14

JWM&A Civil • Municipal • Geotechnical • Land Surveying
Jerome W. Morrissette & Associates Inc., P.S.
1700 Cooper Pt. Road S.W. #B-2, Olympia, Wa. 98502-1110 Ph 360.352.9456 Fx 360.352.9990

Approved By

T.#L
DESIGNED BY DATE
S.S., R.W. C.A.D.D. BY DATE
CHECKED BY DATE
1-23-2013 DATE PLOTTED

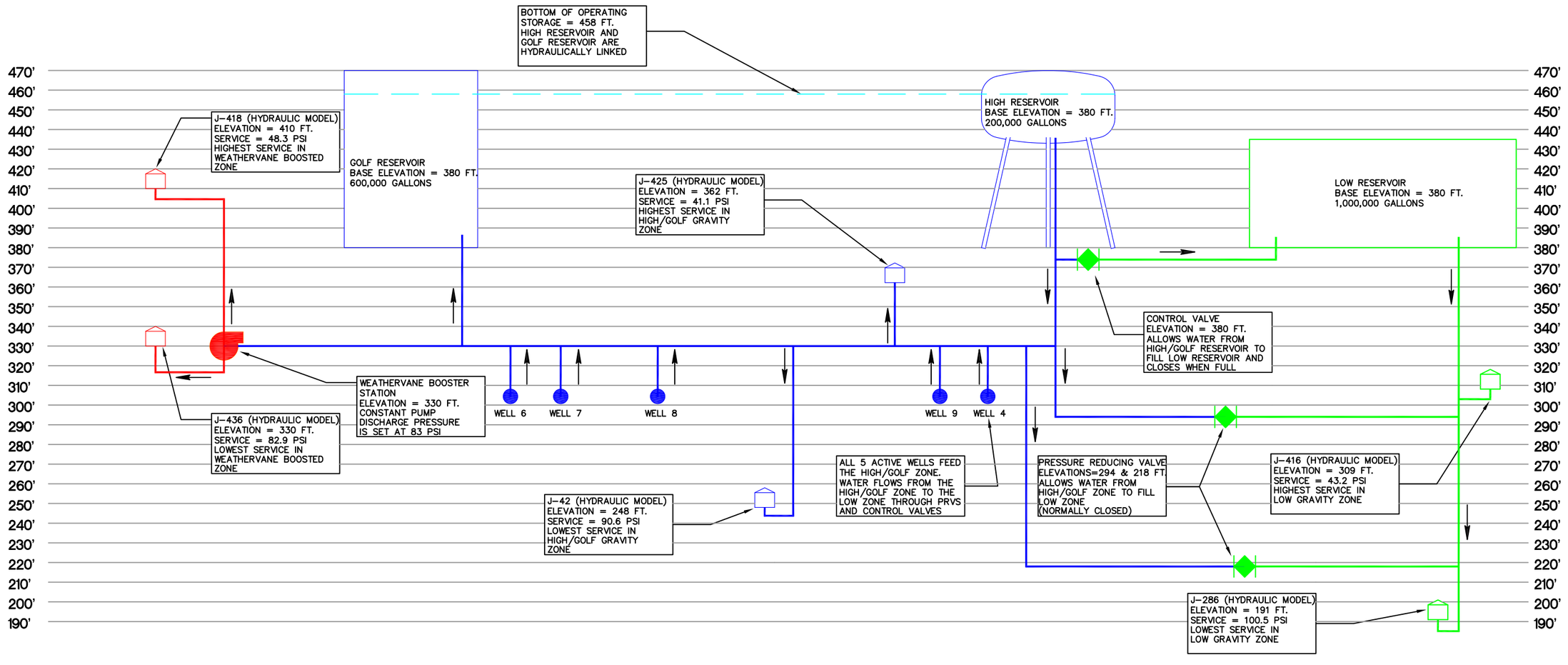
2014
WATER SYSTEM
BASE MAP

CITY OF FIRCREST

00403/08 Water/Water 2013 Basemap.dwg

SHT 1 OF 1

THE CITY OF FIRCREST



CONDITIONS ARE DURING PEAK HOUR DEMAND

FIGURE 2-2

NO	DATE	BY	APPR	REVISIONS

JWM&A Civil • Municipal • Geotechnical • Land Surveying

Jerome W. Morrissette & Associates Inc., P.S.

1700 Cooper Pt. Road S.W. #B-2, Olympia, Wa. 98502-1110 Ph 360.352.9456 Fx 360.352.9990

C.D.M. DESIGNED BY	01/22/2010 DATE	
C.D.M. C.A.D.D. BY	01/22/2010 DATE	
	02/14/2014 DATE PLOTTED	

THE CITY OF FIRCREST

FIRCREST WATER SYSTEM HYDRAULIC PROFILE

00445 HYDRAULIC PROFILE SCHEMATIC | SHT 1 OF 1

Chapter 3

Land Use and Population

3.1 Introduction

This chapter demonstrates the compatibility of the Plan with the City Comprehensive Plan and other planning documents, identifies current land use designations, and presents population data. The City's Comprehensive Plan was completed in January 2016 and was last updated in 2019. The plan was developed to meet the requirements of the Washington State Growth Management Act (GMA). The GMA requires, among other things, consistency between land use and utility plans and their implementation.

3.2 Compatibility with Other Plans

The following planning documents were examined to ensure the Plan is consistent with the City's land use policies and other related plans.

- Growth Management Act
- City of Fircrest Comprehensive Plan
- Pierce County Countywide Planning Policies
- Pierce County Coordinated Water System Plan
- Puget Sound Regional Council (PSRC) VISION 2040

3.2.1 Growth Management Act

The GMA was passed in 1990 and amended as required over the years. It defines four goals relevant to water system planning:

1. Focus growth in urban areas and reduce sprawl
2. Ensure consistency between land use and utility plans
3. Ensure adequate public facilities and services, concurrent with growth
4. Designate and protect critical areas

Through the GMA all counties, cities, and towns were required to develop comprehensive plans, which address issues of land use, transportation, housing, capital facilities, utilities, and rural lands.

3.2.1.1 Urban Growth Area

The GMA requires that Pierce County (County) and the City cooperate in designating a UGA. As part of the development of its Comprehensive Plan, the City designated a UGA that would accommodate the City's projected population growth and facilitate resource conservation.

3.2.1.2 Consistency

The plans and policies of the City and County must be consistent in accordance with GMA, per Revised Code of Washington (RCW) 36.70A.100. All comprehensive plans for communities within the PSRC planning area are also required to be consistent with its multi-county plan. The GMA also requires consistency with the implementation of water system plans and comprehensive plans, per RCW 36.70A.120.

The Municipal Water Law, which became effective in 2003, also requires consistency of water system plans with local plans and regulations. Confirmation of consistency under this law is achieved by means of completing the Consistency Statement Checklist, which must be included with all water system plans. A signed copy of this checklist is included in Appendix C.

3.2.1.3 Concurrency

Concurrency means that adequate public facilities and services are provided at the time growth occurs. For example, growth should not occur where schools, roads, and other public facilities are overloaded. Concurrency ensures that public dollars are used efficiently, and that quality of life is preserved. To achieve this objective, the GMA directs growth to areas already served or readily served by public facilities and services (RCW 36.70A.10). It also requires that, when public facilities and services cannot be maintained at an acceptable level of service, the new development should be prohibited (RCW 36.70A.100).

3.2.1.4 Critical Areas

The GMA requires that critical areas be designated and protected. Critical areas include areas at high risk for erosion, landslides, earthquakes, or flooding; coal mines; wetlands or lands adjoining streams, or rivers and other water bodies. Appendix D contains a Washington State Environmental Policy Act (SEPA) checklist that was prepared for this Plan that addresses environmental issues.

3.2.2 City of Fircrest Comprehensive Plan

The City's most recent Comprehensive Plan was published in 2015, adopted in January of 2016, and amended in November of 2019. The Land Use Element of this Comprehensive Plan states the City's vision of how growth and development should occur over a 20-year horizon and includes goals and policies to achieve this vision. The Future Land Use Map, which is included as Figure 3-1, shows the different types of land uses that are planned throughout the City.

The Land Use Element of the Comprehensive Plan articulates many of the same goals and concerns of the GMA. Like the GMA, the Land Use Element seeks to accommodate growth while maintaining the City's high quality of life, cherished natural features, distinct places, and character. It seeks to promote an attractive residential neighborhood and enhance public recreational services by focusing economic development within them and establishing development guidelines. The Transportation and Capital Facilities Elements ensure that new development will be adequately serviced without compromising existing levels of service, similar to principal of concurrency as defined in the GMA.

The Comprehensive Plan also states its City Limits and updates its UGA boundary. The City encompasses an area of approximately 1,011 acres (1.58 square miles), and a total UGA of approximately 1,011 acres (1.58 square miles). Some undeveloped lots still exist within the City and infilling is expected and encouraged.

3.2.3 Pierce County Countywide Planning Policies

The Pierce County Council adopted the Pierce County Countywide Planning Policies (CPPs) in 1992. Since this time, the plan has been amended several times with the last amendment occurring November of 2018. The CPPs serve as the comprehensive plan framework for the County and cities within the County, including the City of Fircrest. Consistent with the GMA's goals, it establishes a UGA within the County to encourage growth in urban areas and to reduce urban sprawl. The CPPs also guide development in rural, unincorporated Pierce County. Similar to the City's Comprehensive Plan, the County's policy goals seek to reduce urban sprawl, protect rural areas, provide affordable housing throughout the County, and coordinate protection of environmentally sensitive areas.

The Growth Management Planning Council (GMPC) is in the process of updating the CPPs. The intent of the update process is threefold: 1) to ensure consistency with current state law, state agency guidance and recent hearings board decisions; 2) to align the CPPs with the newly adopted regional growth strategy found in VISION 2040; and 3) to modernize the CPP narrative to reflect the ongoing and evolving implementation of the GMA and countywide policies.

3.2.4 Pierce County Coordinated Water System Plan

The Pierce County Coordinated Water System Plan (PCCWSP) was prepared in 1988 and updated in 2001. The PCCWSP was prepared under the direction of the Pierce County Council and the Water Utility Coordinating Committee (WUCC). The WUCC periodically reviews and advises the County on updating the Plan. The group also assesses whether the plan policies are being implemented as anticipated. Recommended revisions to the plan are forwarded to the DOH, the County Executive and County Council for review and adoption.

The purpose of the PCCWSP is to assist the area's water utilities in establishing an effective process for planning and development of public water systems and restricting the proliferation of small public water systems. The plan accomplishes this by establishing service area boundaries;

minimum design standards; service review procedures; appeals procedures, long-term regional water supply strategy; water conservation program and goals; and the satellite system management program. The City has established policies, design criteria and goals that meet or exceed the requirements and goals of the PCCWSP.

3.2.5 Puget Sound Regional Council

The PSRC provides data and long-term forecasts for transportation, population, jobs, and housing to help the Puget Sound area plan for the future. The PSRC is directed by local elected leaders of King, Pierce, Snohomish, and Kitsap counties, the region's cities and towns, ports districts, transit agencies, and tribes. All these local jurisdictions work together to create a cohesive plan for the future of the Puget Sound region.

The PSRC's multi-county planning document, Vision 2040, is a policy-based growth projection that provides a planning vision for the area including King, Snohomish, Kitsap, and Pierce Counties. Vision 2040 has several goals and policies with regards to domestic water systems, such as the City of Fircrest. These policies and goals include:

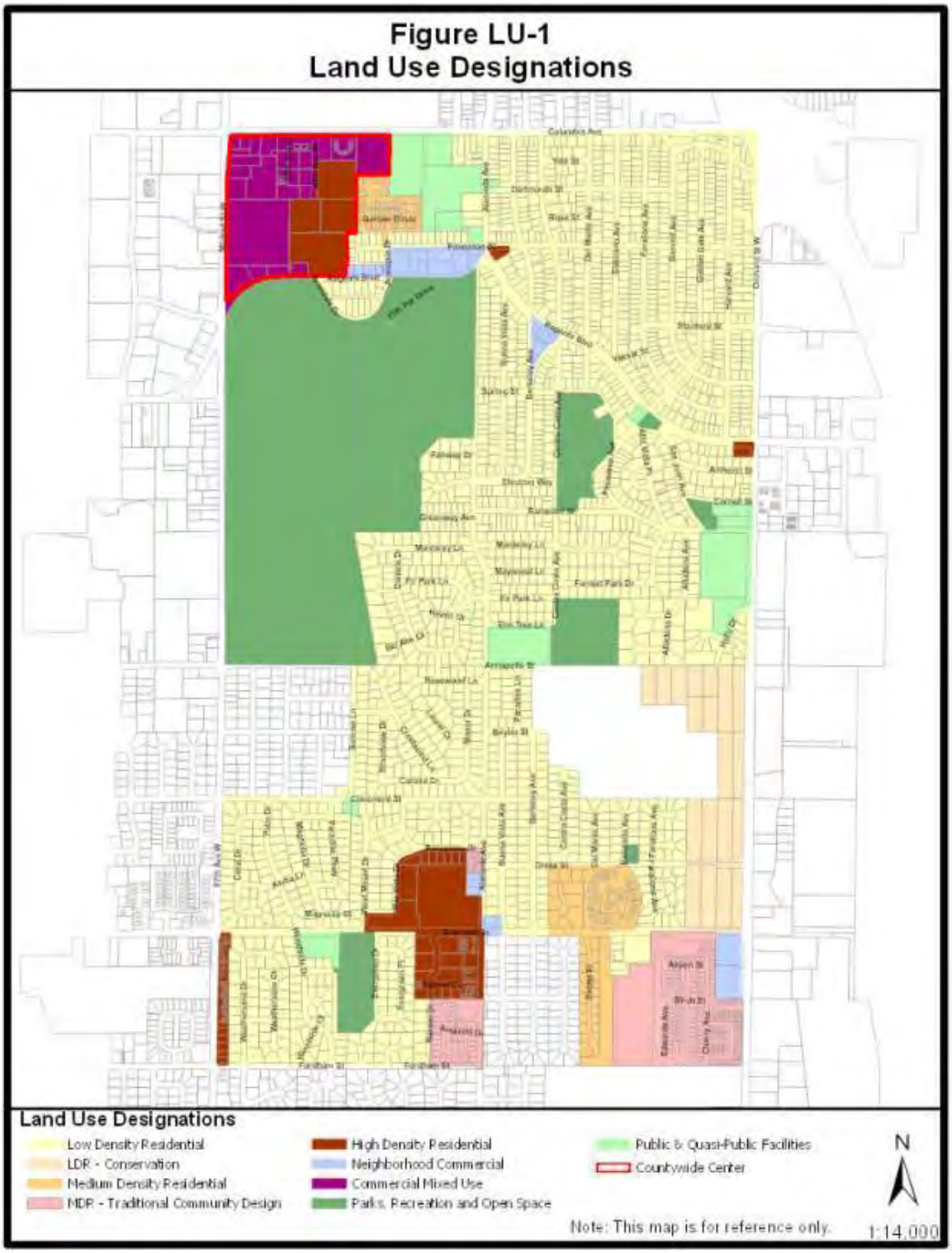
- Ensuring residents of the region have access to high quality drinking water that meets or is better than federal and state requirements.
- Identifying and developing additional water supply sources to meet the region's long-term water needs, recognizing the potential impacts on water supply from climate change and fisheries protection.
- Promoting coordination among local and tribal governments and water providers and suppliers to meet long-term water needs in the region in a manner that supports the region's growth strategy
- Reducing the per capita rate of water consumption through conservation, efficiency, reclamation, and reuse.

Vision 2040 was initially adopted by the PSRC General Assembly in 2008 before being amended by the PSRC executive board in 2009.

3.3 LAND USE

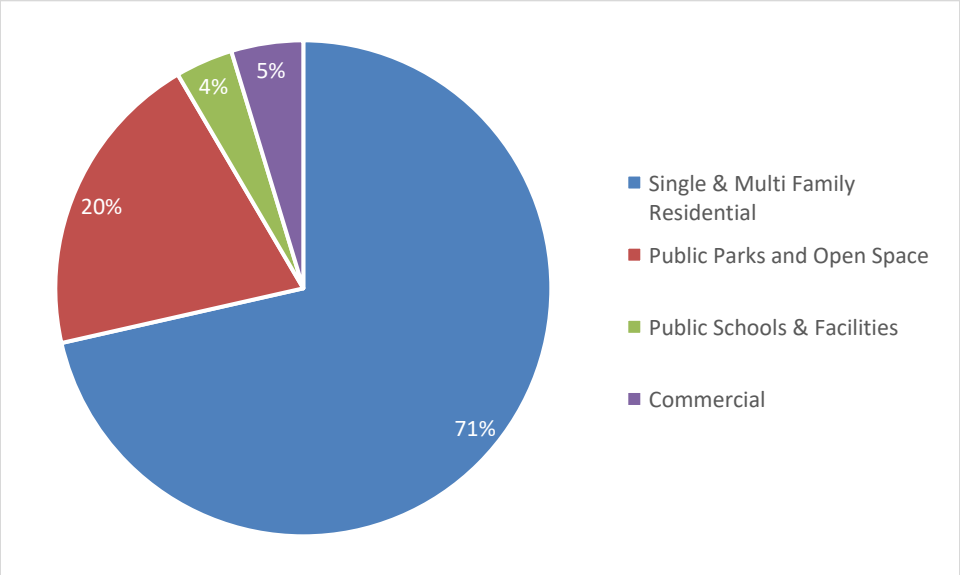
The city limits currently encompass an area of approximately 1,011 acres. The City's UGA encompasses no additional acreage outside of the current city limits. The City's land use designations, as shown in the Future Land Use Map on Figure 3-1, guide development in Fircrest. Land use outside of the city limits is designated by the County.

Figure 3-1
City of Fircrest Future Land Use Map



The area served by the City is primarily residential, comprised largely of single-family residents. Currently single- and multi-family residential make up about 71 percent of the land use. A variety of other uses make up the remaining 29 percent, as summarized in Figure 3-2.

Figure 3-2
Existing Land Use in Fircrest City Limits



The majority of Fircrest is low density residential and parks. There are portions of the City that are part of historical conservation efforts. Portions of the mixed-use commercial area within the northwest corner of the City, known as the Countywide Center area, may have the maximum building height increased allowing seven stories and maximum density restrictions would be removed to allow for future growth, as shown on Figure 3-1.

3.4 POPULATION

Population projections for the City's water system review historical population trends and make projections for the 20-year planning period (2020 – 2040). Because the City's water system mostly serves customers within the City limits, the historical trends and population projections presented here are consistent with the City's 2016 Comprehensive Plan.

3.4.1 Household Trends & Historical Population

The City is primarily a residential community comprised largely of single-family residences with most of the population commuting to nearby cities for employment. There were approximately 2,898 residential units within Fircrest in 2019. Of the residential units, approximately 76 percent of these residences were single family and 24 percent were multi-family. Since 1980, Fircrest has experienced a slow trend towards providing an increasing number of multi-family housing units and it is expected that this trend will continue.

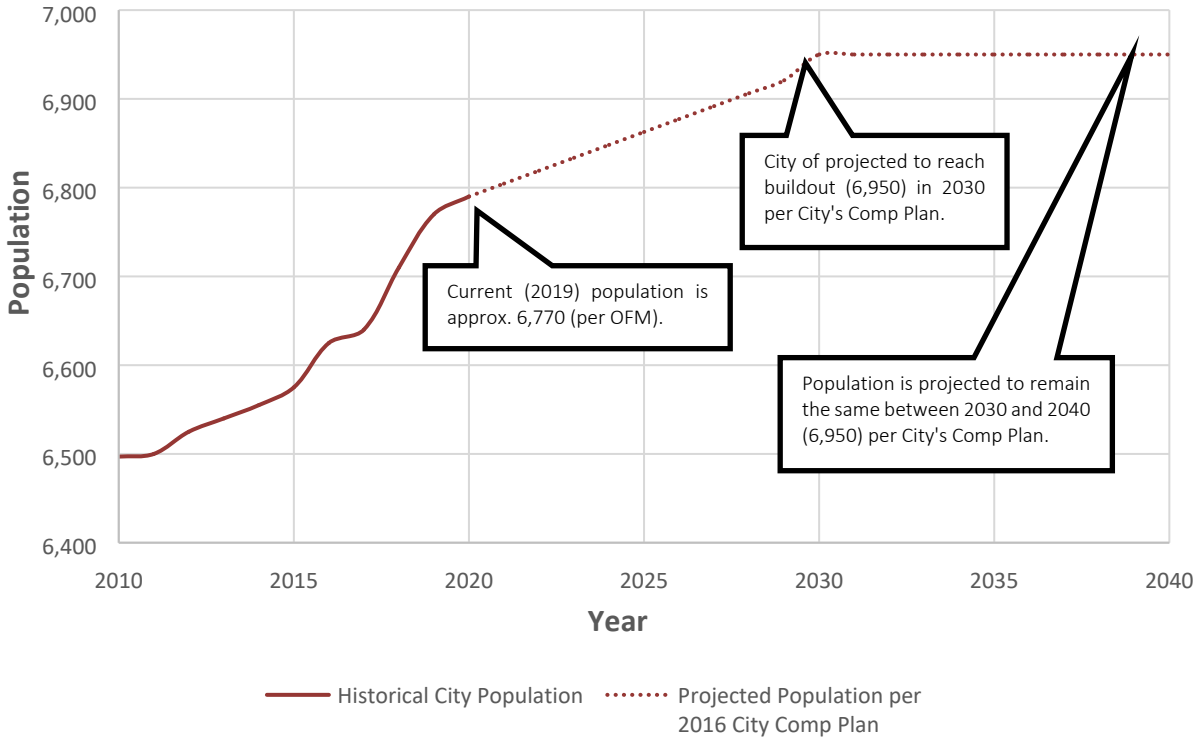
The City had a population of approximately 6,770 in 2019 per the OFM's April 2019 population report, which equates to a calculated average of 2.34 residents per household. Historically, the City has seen the average household size hover around two people for the last decade, and this trend is expected to continue per the City's 2016 Comprehensive Plan until the City reaches its Adopted Population Target of 6,950. This average household size is lower than what is seen in the County as a whole (2.5 residents per household).

The City was settled in the early 1900s, originally as a subdivision and residential park. It was later incorporated as a town in 1925 and a city in 1990. From 1980 to the late 1990s the City population was slightly declining followed by a rapid rate of growth between 1995 and 2000. Since 2000, the City population has steadily increased at a modest rate.

The City's Comprehensive Plan, written in 2016, provided a population projection consistent with the County's population projections. This projection estimated an average annual growth of approximately 2 percent. The City is expected to continue at this rate until reaching full build out in 2030 as stated in the 2016 Comprehensive Plan. After 2030, the City expects population growth to be negligible. Figure 3-3 illustrates the City's historical and projected population through the twenty-year planning period (2040).

To ensure that the City plans enough water resources for the expected growth, the City has elected to continue with the projected population per the 2016 Comprehensive Plan. These population projections, along with the historical per capita water use data presented in Chapter 4, form the basis for determining the future water demands of the City's water system.

Figure 3-3
Historical Population and Future Projection



3.5 SUMMARY

This chapter reviewed relevant planning documents for the area as well as the existing land use and current planned development for the area. Comparing the populations shown in the 2016 City Comprehensive Plan to the currently planned developments in the area showed that the City will reach its Adopted Population Target by 2030. This projection assumes there will be no further growth as the City will be at full build-out. This population projection will be used to estimate future water demands in Chapter 4.

Chapter 4

Water Demands

4.1 Introduction

The planning efforts of the City rely on a thorough analysis of its system's water demands. This analysis reviewed the historical water supply and demand data from 2014 to 2019. Using this data, the City's demand per ERU, the ADD, and the MDD were calculated for each year. The analysis then looked at the historical trends of these values and determined "planning" values to use in forecasting the system's future water demand.

These planning values, along with the population projections presented in Chapter 3, were used to forecast the future water supply and demand needs for the system for the next 10- and 20-year planning periods. The future water supply and demands determined by this analysis are used in Chapter 8 to analyze the water system facilities and form the basis for sizing future water system improvements described in Chapter 9.

4.2 Historical Water Demands

This section summarizes the City's historical water consumption and supply trends between 2014 and 2019. Using this data, the average ERU and ADD vales were calculated for the last five years.

4.2.1 Historical Water Consumption

Water consumption is the amount of water that customers use as measured by their water meters. For planning purposes, all water customers have been combined into six groups: single-family residential, multi-family residential, commercial and industrial, irrigation, and non-retail. The consumption analysis that follows will summarize the water use patterns of these six user groups in the following columns listed in Table 4-1:

- Single Family Residential, includes data for "residential" customer class
- Multi-Family Residential, includes data for "multi-unit residential" customer classes
- Commercial and Industrial, includes data for "commercial" and "industrial" customer classes
- Irrigation, includes data for "irrigation only" meters.
- Non-retail, includes water sold at hydrants.

Table 4-1 shows the average number of connections, average annual consumption, and average daily consumption per connection for each customer group between 2014 and 2019.

Table 4-1
Average Annual Metered Consumption and Service Connections

Year	Customer Group					Totals
	Single Family Residential	Multi-Family Residential	Commercial & Industrial	Irrigation	Non-retail[1]	
Number of Connections						
2014	2146	477	97	22	0	2,741
2015	2153	477	97	25	0	2,751
2016	2164	478	102	24	0	2,768
2017	2174	475	104	24	0	2,777
2018	2,179	474	104	25	0	2,782
2019	2,181	474	104	24	0	2,783
Annual Consumption (1,000 gallons)						
2014	167,786	24,948	12,871	14,283	433	220,321
2015	179,054	25,240	12,829	16,675	463	234,261
2016	176,674	26,044	13,097	15,517	331	231,663
2017	171,100	26,914	13,293	16,974	286	228,566
2018	174,807	27,639	11,764	16,232	232	230,674
2019	164,984	24,868	10,571	14,764	250	215,436
Average Daily Consumption per Connection (gal/day/connection)						
2014	214	143	363	1,774	0	219
2015	228	145	363	1,865	0	233
2016	223	149	353	1,767	0	228
2017	216	155	350	1,911	0	225
2018	219	159	309	1,798	0	226
2019	207	144	278	1,662	0	212
Average	218	149	336	1,796	0	224

[1]Non-retail connections accounts for water sold at hydrants and could not be attributed to connections, so the average daily consumption per connection is not applicable and is left blank.

Most of the water consumption is from single-family residential customers. Single-family residential accounts for approximately 78 percent of the City's customers. Commercial and Industrial and Irrigation have the highest consumption per connection because these customer classes serve the system's largest water users. Consumption attributed to the Non-retail customer class includes water sold at hydrants for construction and other temporary uses.

4.2.2 Largest Water Users

Table 4-2 shows the City's top 20 highest demand water customers in 2019. The total water consumption of these customers represents approximately 2 percent of the total consumption in 2019. The list comprises City facilities, businesses, schools, multi-family complexes or single-family communities with one connection, and irrigation.

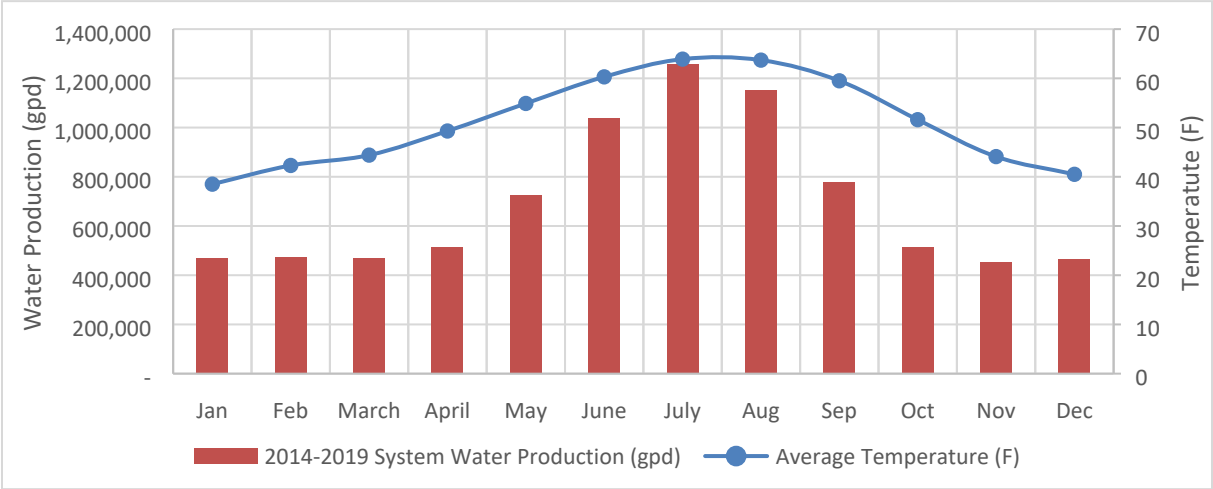
Table 4-2
2019 Largest Water Users

Service Address	Consumption (gal)
Weathervane Dr 1432	381,944
Broadview Dr 1037	368,757
Panorama Dr 1103	357,342
Monterey Lane 1058	325,178
Coral Dr 1212	324,976
Paradise Parkway 1113	310,046
Alpine Lane 1290	303,576
Fir Park Lane 1019	300,419
Paradise Parkway 1128	300,210
Alta Vista Pl 659	281,876
Delta Ct 1054	275,638
Farallone Ave 447	271,187
Regents Blvd 112 1-6	270,103
Coral Dr 1326	264,882
Altadena Ave 906	264,867
Del Monte Ave 1200	258,030
Alpine Lane 1280	253,490
Amherst St 117	249,810
Altadena Dr 981	248,358
Del Monte Ave 435	247,581
Total (gal)	**5,858,269**
% of Total Usage	**2.4%**

4.2.3 Seasonal Variations in Consumption

Water consumption is affected by seasonal variables such as temperature and precipitation, influencing the system's peaking factors. **Figure 4-1** shows the relationship between the average monthly temperature in the City and the average system production between 2014 and 2019. In general, as temperature increases, so does system demand. The system demand shown in the chart below includes all customer demands as well as system leakage and non-revenue demands.

Figure 4-1
Seasonal Variation on System Demand



4.2.4 Equivalent Residential Unit

The demand of each customer class can be expressed in terms of ERUs for demand forecasting and planning purposes. Rather than expressing water demand in terms of use per connection, the data is normalized by ERU which represents a typical single-family residence.

Table 4-3 uses the annual demand and number of single-family residential connection as well as the annual distribution system leakage to calculate the system's ERU value from 2014 through 2019. The average annual demand is scaled up by system's annual distribution system leakage, to account for water loss in the system, and then divided by the total number of connections.

Table 4-3
System Equivalent Residential Unit (ERUs) Summary

Year	Number of Single-Family Connections	Average Annual Demand (gallons per day)	Demand ERU (gpd/ERU)	Annual Distribution System Leakage[1]	Supply ERU (gpd/ERU)[2]
2014	2,146	458,431	214	6.0%	226.50
2015	2,153	490,558	228	4.6%	238.41
2016	2,164	482,715	223	6.2%	236.95
2017	2,174	468,767	216	5.8%	228.10
2018	2,179	477,614	219	6.4%	233.23
2019	2,181	452,010	207	3.3%	214.14
		2014 – 2019 Average	**218**	**5.4%**	**229.55**

[1]Annual Distribution System Leakage is described in further detail in **Section 4.3**
[2]Supply ERU includes the demand ERU plus distribution system leakage and is used in the system capacity analysis described in **Chapter 8**.

Table 4-4 shows the number of ERUs per customer class, which is calculated by dividing the average water demand per connection, shown in Table 4-1, by the system's demand per ERU, shown in Table 4-3.

Table 4-4
Number of Equivalent Residential Unit (ERUs) per Customer Class

Year	Supply/ ERU[1]	Single Family Residential	Multi-Family Residential	Commercial & Industrial	Irrigation	Non-Retail	Non-Billed Authorized Consumption[2, 3]	Total System ERUs
2014	227	2,024	301	155	172	5	0	2,658
2015	238	2,058	290	147	192	5	0	2,692
2016	237	2,037	300	151	179	4	0	2,671
2017	228	2,055	323	160	204	3	172	2,918
2018	233	2,048	324	138	190	3	482	3,184
2019	214	2,111	318	135	189	3	265	3,021
						2014 – 2019 Average		**2,857**

[1]These values come from the "Supply ERU" column in Table 4-3.
[2]Non-Billed Authorized Consumption is described in further detail in Section 4.3.
[3]Unmetered consumption was not tracked for 2014-2016, and therefore, Non-Billed Authorized Consumption is shown as zero.

4.2.5 Average Day Demand

The ADD is calculated based on water supply rather than water consumption. Water supply is the total amount of water delivered to the City's water system, as measured through the meters at both supply facilities. Water supply is different than water consumption in that water supply is the amount of water delivered into the system and water consumption is the amount of water taken out of the system. For any given year, the amount of water supply will be greater than the amount of water consumption, due to water system leaks and non-metered water uses, which will be further described in the next section.

Table 4-5 summarizes the total amount of water that was supplied to the City's system from 2015 through 2019, the average population within the City's RWSA, and the computed per capita demand for each year. The ADD is determined from historical water use patterns of the system and can be used to project future demand within the system. The ADD data is typically used to determine standby storage and other requirements for water systems.

Table 4-5
Average Annual System Demand

Year	Average Metered Supply (gpd)	City Population	Average Day Demand (gpd/capita)
2015	671,647	6,575	102.2
2016	674,259	6,625	101.8
2017	706,486	6,640	106.4
2018	795,705	6,710	118.6
2019	669,114	6,770	98.8
		Average	105.5

As shown in Table 4-5, average demand per capita fluctuates from year to year, but an overall trend shows per capita water demand has been steady despite population growth. Monthly supply from active wells is included in Appendix E.

4.3 Water Use Efficiency

The Water Use Efficiency (WUE) Rule, which became effective in January 2007, established a distribution system leakage standard that all public water systems were required to meet by July 1, 2010. To comply with the WUE Rule, the City implemented its first WUE Program in 2007, and has continued to update it at least every six years and will be updated again as part of this Plan. A copy of the City's current WUE Program is included in Appendix F.

The City's WUE Program focuses on reducing DSL and encouraging water conservation. Its current goal is to reduce customer water demand by 0.2 percent per year. The DSL is defined as the difference between authorized consumption and total water supply. The DSL may include water system leaks, inaccurate supply metering, inaccurate customer metering, unknown fire hydrant usage, illegal water service connections, and unknown reservoir overflows. According to the WUE Rule, DSL must not be more than 10 percent of supply, based on a 3-year rolling average, or a water loss control action plan must be prepared and implemented.

Authorized consumption is the amount of water authorized for use. There are two types of authorized consumption, billed and non-billed. Billed authorized consumption generally includes consumption tracked by customer meters. Non-billed authorized consumption is consumption that is tracked or estimated, but not billed. Some examples of non-billed authorized consumption are firefighting activities, water main flushing, cleaning tanks and reservoirs, and street cleaning. Non-billed authorized consumption makes up a small part of the total authorized consumption.

The difference between the amount of water supplied to the City and the amount of metered water consumption from 2014 through 2019 is shown in Table 4-6.

Table 4-6
Water Use Efficiency Analysis (1,000 gallons)

Year	Total Supply	Billed Authorized Consumption	Non-Billed Authorized Consumption	Total Authorized Consumption[1]	Distribution System Leakage	Percent DSL	3-Year Rolling Average
2014	233,915	220,321	0	219,873	14,042	6.0%	10.6%
2015	245,151	234,261	0	233,810	11,341	4.6%	6.0%
2016	246,779	231,663	0	231,394	15,385	6.2%	5.6%
2017	257,867	228,566	14,342	242,908	14,959	5.8%	5.6%
2018	290,432	230,674	41,136	271,810	18,623	6.4%	6.1%
2019	244,227	215,436	20,710	236,145	8,082	3.3%	5.2%

2014, 2015, and 2016 total authorized usage values differ slightly than what was reported in the City's WUE reports. These differences are minor and can be attributed to rounding and reporting differences.

The 3-year rolling average of distribution system leakage in 2019 is 5.2 percent, which is less than 10 percent of total supply. Therefore, the City does not need to implement a water loss control action plan. The City will continue to collect data, monitor all uses of water, and report annually the amount of distribution system leakage.

4.4 Peaking Factors

Peaking factors are used to estimate a MDD and a PHD for a water system. For the City MDD and PHD peaking factors were estimated using DOH recommendations as discussed below.

The MDD is the largest amount of water consumed and used throughout the system during a 24-hour period of a given year. The MDD typically occurs on a hot summer day when outdoor water use for lawn watering and other purposes is occurring throughout much of the system. The MDD is used in fire flow availability reporting and in sizing supply facilities (e.g., supply stations, booster pump stations, interties) capacity analyses.

The PHD is the amount of water used (excluding fire flow) during the largest use hour of the year. In accordance with WAC 246-290-230, new public water systems or additions to existing systems shall be designed to provide domestic water at a minimum pressure of 30 psi during PHD conditions. Low pressure analysis and equalizing storage are typically based on PHD data. The system's PHD was estimated based on Equation 3-1 in the DOH Water Design Manual, which is largely based on population size.

Table 4-7 shows the MDD and PHD factors for 2015 through 2019. The five-year average MDD/ADD and PHD/MDD peaking factors will be used in future water demand projections.

Table 4-7
Peaking Factor Analysis

Year	Average Metered Supply (gpd)	Max Day Demand (gpd)	MDD:ADD Peaking Factor	Calculated PHD (gpm)	PHD:MDD Peaking Factor
2015	671,647	1,580,802	2.35	1,866	1.70
2016	674,259	1,593,178	2.36	1,881	1.70
2017	706,486	1,558,338	2.21	1,833	1.69
2018	795,705	1,708,557	2.15	2,000	1.69
2019	669,114	1,391,178	2.08	1,636	1.69
Five-Year Average (2015-2019)			**2.23**		**1.69**

4.5 Future Water Demands

This section uses the projected population data from **Chapter 3** and the historical water supply and demand data discussed in **Section 4.2** of this chapter to estimate the City's future water demands. The peaking factors discussed in **Section 4.4** were used to estimate future maximum day and peak hour demands.

4.5.1 Projected Demands

The projected water demands for the system were calculated from the population projections in **Chapter 3** and the planning values shown in **Table 4-8**, below. Future demand projections are shown with and without a further reduction in demand from water use efficiency efforts, assuming the City meets its current WUE goal.

Table 4-8
Planning Values for Water Demand Projections

Type	Planning Value	Reference Section
Average Day Demand	106 gpd/capita	Table 4-5
Maximum Day Demand Factor (MDD/ADD)	2.23	Table 4-7
Peak Hour Demand Factor (PHD/MDD)	1.69	Table 4-7
WUE Goal	0.2% reduction per year	Section 4.3

Table 4-9, at the end of this chapter, presents the estimated water demands of the system each year for the next 20 years. The actual 2019 demand and the estimated 2020 demand are also shown in the table for comparison purposes.

The future average day demands were projected based on the estimated per capita demand and population estimates for the given years. The future MDD and PHD were computed from the

projected average day demands and the existing system peaking factors shown in Table 4-8. Table 4-9 also shows the projected demands, assuming the City meets its WUE goal.

The 20-year (2040) projected demand data without conservation reductions were used for the evaluation of the planned improvements presented in Chapter 9 to ensure that the future system will be sized properly to meet all requirements, whether or not additional water use reductions from conservation are achieved. However, the City will pursue further by implementing the Water Use Efficiency Program elements (see Appendix F).

4.6 Summary

The water consumption and use data presented in this chapter includes historical water production and consumption, distribution system leakage, and demand projections. This data will be used in Chapter 8 to analyze the effectiveness of water system facilities and procedures. In addition, this data will be used in Chapter 9 to decide the future improvements needed to meet the design criteria presented in Chapter 5.

Table 4-9
Future Retail Water Demand Projections (gallons per day)

Description	Base Year[1]	Planning Year[2]	Ten-Year Planning Period										20-Yr Period
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2040
Population in Water Service Area	6,770	6,790	6,805	6,819	6,834	6,848	6,863	6,877	6,892	6,906	6,921	6,950	6,950
Estimated Number of ERUs	2,916	3,128	3,134	3,141	3,148	3,154	3,161	3,168	3,174	3,181	3,188	3,201	3,201
Average Day Demand Projections (gpd)	669,114	719,740	721,282	722,824	724,365	725,907	727,449	728,991	730,533	732,075	733,616	736,700	736,700
w/ WUE Efforts		718,301	718,394	718,478	718,553	718,619	718,676	718,724	718,762	718,791	718,811	720,330	705,132
Maximum Day Demand Projections (gpd)	1,492,125	1,605,020	1,608,458	1,611,897	1,615,335	1,618,773	1,622,211	1,625,650	1,629,088	1,632,526	1,635,964	1,642,841	1,642,841
w/ WUE Efforts		1,601,810	1,602,018	1,602,206	1,602,373	1,602,521	1,602,647	1,602,754	1,602,839	1,602,905	1,602,949	1,606,335	1,572,444
Peak Hour Demand Projections (gpm)	1,751	1,884	1,888	1,892	1,896	1,900	1,904	1,908	1,912	1,916	1,920	1,928	1,928
w/ WUE Efforts		1,880	1,880	1,880	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,885	1,845
Annual Demand Projections (1,000 gal)	244,227	262,705	263,268	263,831	264,393	264,956	265,519	266,082	266,644	267,207	267,770	268,896	268,896
w/ WUE Efforts		262,180	262,214	262,244	262,272	262,296	262,317	262,334	262,348	262,359	262,366	262,920	257,373

Based Year data shows historical retail supply for that year. Maximum day and peak hour demands are estimated using the peaking factors discussed in Section 4.4. Water use efficiency (WUE) projections are not relevant for historical data, and therefore, not included.
Planning Year data represents the projected information for the current planning year

Chapter 5

Policies and Design Criteria

5.1 Introduction

The City provides potable water service for its customers according to the laws, policies, and design criteria that originate from seven Regulatory Agencies as summarized in Table 5-1. The listed agencies are in descending order from those with the broadest authority in setting the laws, policies, and design criteria that guide the development of this Plan to the narrowest authority.

Table 5-1
Regulatory Agency Summary

Agency	Origin and Type of Design Criteria, Laws, and/or Policies
U.S. Department of Health & Human Services	Federal Regulations
U.S. Environmental Protection Agency	Federal Regulations
Washington State Department of Health	State Regulations
Washington State Department of Ecology	State Regulations
Fircrest City Council	Administrative Policies
American Water Works Association	Design Criteria

These laws, policies, and design criteria guide the City's operation and maintenance of the water system daily, and in planning for meeting future growth needs and required improvements. The overall objective is to ensure the City provides high quality water service at a minimum cost to its customers, while also setting standards that the City must meet to ensure the water supply is adequate to meet existing and future water demands of the system. The system's ability to meet these demands is detailed in Chapter 8 and recommended improvements are identified in Chapter 9.

The highest three governmental entities establishing policies and laws (U.S. Government, Washington State, and Pierce County Council) establish requirements in statutes, regulations, or ordinances. The City Council and Mayor adopt policies that cannot be less stringent or in conflict with those established by governments above them. The City's policies take the form of ordinances, memoranda, and operation procedures, many of which are summarized in this chapter.

Policies associated with the following categories are presented in this chapter:

- Water Service
- Water Supply
- Facilities
- Finance
- Organization

5.2 Water Service Policies

The City has created water service policies to maintain quality water supply for existing and future customers. These policies reference new water services, temporary services, emergency services and planning boundaries.

5.2.1 New Water Service

In order to provide safe, reliable drinking water within the City's retail water service area, the City has adopted the following policies:

1. The City will provide potable water service to all people within city limits and designated water service area, provided all policies related to service can be met.
2. All proposed developments within city limits and designated water service area will connect directly to the City's existing water system, unless deemed infeasible by the City at the time of the request.
3. Water system improvements required to provide water service to proposed developments must be approved by the Public Works Department and conform to the City's adopted design criteria, and construction standards and specifications, as shown in the City's Development Design Standards contained in Appendix G. The Applicant shall install new water main to the limits of the property. All costs of the permits and water system improvements will be paid by the Applicant. Recovery contracts (latecomers fees) may be recorded against adjacent frontage.
4. Requests for new water service will be processed by the City's permit coordinator in accordance with City Municipal Code. Applications must be received at least one week prior to connection of water service. Once applications are received by the permit coordinator, the location of the proposed service will be reviewed to ensure it is within the City's retail water service area and will be evaluated to determine fire flow availability, meter size and other associated improvements necessary for adequate water pressure, fire flow, looping or extensions. The adequacy of water system capacity to serve the applicant's property will also be evaluated at that time. New water service applications will be processed within one week of receipt of application and associated fees.
5. The City will determine whether adequate water system capacity is available to serve the applicant's property, based on available capacity from supply, storage, and transmission systems. This will be accomplished through the ongoing tracking of ERUs served by the City in comparison to the maximum number of ERUs that can be served by the system, as computed in Chapter 8 of this Plan.

6. Water service applications will expire at the time that the associated building permit expires or in the event that the water service is not made ready by the applicant for connection by the City within 120 days of the approval of the water service application.
7. Time extensions regarding water availability will be granted in accordance with the associated building permit requirements. When extensions are denied, a written notice of appeal, together with an appeal filing fee, may be submitted in person to the Permit Center. Appeals must be made within the time-period specified under the requirements of the associated permit and in accordance with City Municipal Code.
8. Delays resulting from non-technical conditions that affect the City's ability to provide new water service will be the responsibility of the Applicant. These conditions include, but are not limited to, environmental assessments and local ordinances procedures.

5.2.2 Temporary Service

No temporary service is allowed, unless there are approved plans for permanent water service that meet all City standards.

5.2.3 Emergency Service

The City has adopted the following policies regarding emergency water service:

1. Compliance with standards may be deferred for emergency water service.
2. Policy criteria may be waived for emergency service.

5.2.4 Planning Boundaries

For planning purposes, the City will use water service boundaries established by agreement as a result of the regional coordinated water system plan (PCCWSP) and as has been modified or further described by the City.

5.3 Water Supply Policies

The City follows water supply policies to protect water quality and sustainability to meet the needs of all its customers.

5.3.1 Water Quality

1. The City will strive to provide high quality water while complying with all water quality regulatory requirements.
2. The City will take all reasonable measures to protect its system and customers and will promptly respond to situations that may adversely affect water quality.

5.3.2 Water Quantity

The City has adopted the following policies to ensure that it delivers high quality, safe water which meets or exceeds all local, state, and federal guidelines:

1. The City will pursue steps to meet or exceed all water quality laws and standards.
2. The City will take all reasonable measures to protect its system and customers.

5.3.3 Water Use Efficiency and Regional Participation

In order to promote the efficient use of water, the City has adopted the following policies:

1. The City will participate in regional supply management and planning activities to reduce the cost of service while improving reliability, water quality, and quantity.
2. The City will promote the efficient and responsible use of water and will conserve water during a water shortage.
3. The City has a WUE Program and participates in regional water conservation efforts. Documentation from the City's WUE Program is contained in Appendix F.

5.3.4 Cross-Connection Control

Protecting the water system is of the utmost importance to the City, to help protect the water system from potential pollutants or contaminants which may be introduced from cross-connections, the City has adopted the following policies:

1. The City strives to protect its water system from contamination due to cross-connections and has developed a Cross-Connection Control Program for eliminating cross-connections. Documentation from the City's Cross-Connection Control Program is contained in Appendix H.
2. The City will comply with the backflow prevention assembly installation and testing requirements as indicated in WAC 246-290-490 and as published in the *Cross-Connection Control Manual Accepted Procedure and Practice Manual*, Pacific Northwest Section (PNWS), American Water Works Association (AWWA).
3. The City has staff that is certified as Cross-Connection Control Specialists.

5.4 Facility Policies and Design Criteria

This section describes the planning policies and design criteria used to establish an acceptable hydraulic behavior level and a standard of quality for the water system. Additional criteria are contained in the City's Development Design Standards contained in Appendix G.

5.4.1 Minimum Standards

Minimum design standards ensure the City can provide a uniform and reliable water service.

1. All proposed developments within the City's existing and future service areas shall conform to the City's adopted design criteria, City Municipal Code, construction standards and standard specifications.
2. All projects within unincorporated the County right-of-way must be designed and constructed in accordance with City's Development Design Standards and shall be inspected and approved by City.
3. In accordance with WAC 246-290-200 - Design Standards. (1) Purveyors shall ensure that good engineering criteria and practices are used in the design and construction of all public water systems, such as those set out in:
    a. The most recent published edition of the DOH's Water System Design Manual, International Building Code (IBC), Uniform Plumbing Code (UPC), and other national model codes adopted in the State;
    b. The most recent published edition of *Recommended Standards for Water Works, A Committee Report of the Great Lakes - Upper Mississippi River Board of State Public Health and Environmental Managers*;
    c. Standard specifications of the American Public Works Association, the American Society of Civil Engineers, AWWA, or the American Society for Testing and Materials;
    d. Design criteria, such as contained in current college texts and professional journal articles, acceptable to the City's Public Works Department;
    e. Chapter 173-160 WAC *Minimum Standards for Construction and Maintenance of Wells*;
    f. The latest edition of the PNWS-AWWA Cross-Connection Control Manual, or the University of Southern California (USC) Manual of Cross-Connection Control.
4. In accordance with WAC 246-290-220 - Drinking water materials and additives. (1) all materials shall conform to the American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) Standard 61 if in substantial contact with potable water supplies.
5. In accordance with WAC 246-290-451 - Disinfection of drinking water. (1) No portion of a public water system containing potable water shall be put into service, nor shall service be resumed until the facility has been effectively disinfected.
    a. In cases of new construction, drinking water shall not be furnished to the consumer until satisfactory bacteriological samples have been analyzed by a laboratory certified by the State.

b. In cases of existing water mains, when the integrity of the main is lost resulting in a significant loss of pressure that places the main at risk to contamination, the purveyor shall use standard industry practices to ensure adequate and safe water quality prior to the return of the line to service, including at least one of the following:

   i. Flushing,
   ii. Disinfection, or
   iii. Bacteriological sampling.

The procedure used for disinfection shall conform to standards published by the AWWA, or other industry standards acceptable to the Public Works Department.

5.4.2 Water Pressure

Pressure criteria at service connections are summarized below. These pressure criteria are based on current City standard practices, which are based in part on industry standards, the DOH, and UPC requirements.

1. The City will supply water to all customers at a minimum pressure of 30 psi during all demand conditions, except when providing fire flow or during emergency situations.
2. During fire flow situations, the City will maintain a minimum pressure of at least 20 psi at all customer meters and throughout the system.
3. The City will provide pressure reducing stations to control pressures in the distribution system and avoid high pressures. It is the customer's responsibility to install and maintain a pressure reducing valve on their side of the water meter to reduce pressures to 80 psi or less.
4. The City will endeavor to limit the maximum pressure to 120 psi in the water mains during normal demand conditions, excluding pressure surges.

5.4.3 Pipeline Velocities

Policies regarding velocity of water flow have been created to maintain system reliability for all customers in emergency and non-emergency conditions.

1. Under normal demand conditions, all new distribution system water mains will be designed to deliver the required amount of flow at a velocity of 8 feet per second (fps) or less. Velocities greater than 8 fps are acceptable within short lengths of pipe and within water system facilities.
2. Under normal demand conditions, all new transmission mains will be designed to deliver the required amount of flow at a maximum velocity of 5 fps. Transmission mains designed with velocities greater than 5 fps will be evaluated for hydraulic surges (transient conditions) using a hydraulic model capable of surge analyses.

3. Under emergency conditions, such as a fire, all distribution and transmission system water mains will be designed to deliver the required fire flow and simultaneous MDD at a velocity of 10 fps or less.

5.4.4 Storage Facilities

The City has multiple types of water storage to maintain reliable service for all customers during all seasons and conditions. The following is a list of policies regarding water storage:

1. Storage within the distribution system has sufficient capacity to supplement supply when system demands are greater than the supply capacity (equalizing storage) and still maintain sufficient storage for proper pump operation (operational storage), fire suppression (fire flow storage), and other emergency conditions (standby storage).
2. Standby storage must be stored above the elevation that yields a 20-psi service pressure to all services in the zone that it directly serves under peak hour demand conditions.
3. Fire flow storage must be stored above the elevation that yields a 20-psi service pressure to all services in the zone that it directly serves under MDD conditions.
4. The City will provide sufficient standby storage for an emergency condition in which a major supply source is out of service. The volume of storage will be sufficient to maintain uninterrupted supply to the system for at least two days during the emergency condition.
5. The City will provide sufficient storage for a fire condition equal to the system's maximum fire protection water demand and the required duration.
6. The City will have high-water level and low-water level alarms for all storage facilities at the Operations and Maintenance or Engineering office.
7. Water level data will be transmitted to the Operations and Maintenance or Engineering office.
8. Storage facilities will be located in areas where they will satisfy the following requirements:
    a. Minimize fluctuations in system pressure during normal demands.
    b. Maximize use of the storage facilities during fires and peak demand periods.
    c. Improve the reliability of supply to the water system.

5.4.5 Transmission and Distribution Mains

The policies regulating transmission and distribution of water are essential to the quality of water, reliability of service and fire flow capacity. Consistency in policy allows for more ease in system maintenance and installation. The following is a list of policies regarding water transmission and distribution:

1. All new transmission and distribution mains will be looped to improve water quality, increase reliability, and increase fire flow capacity, unless the City determines that looping is not practical.
2. All new water mains will be designed under the direction of a professional engineer licensed in the State and will comply with the water quality testing and construction completion requirements of the DOH.
3. All new construction will be in accordance with the City's Development Design Standards.
4. All new water mains will be sized by a hydraulic analysis.
5. All new mains providing fire flow will be sized to provide the required fire flow at a minimum residual pressure of 20 psi and maximum pipeline velocity as dictated in Section 5.4.3 of this Plan.
6. The minimum diameter of distribution mains shall be 8 inches and may be reduced to 6 inches or less as long as fire flow requirements can be met.
7. Valve installation on water mains shall be designed based on the following:
    a. Isolation valves shall be installed at locations along the water main to allow sections to be shut down for repair or installing services. The maximum distance between isolation valves shall not exceed 1,000 feet. A minimum of three valves shall be provided per cross, and two valves per tee.
    b. Zone valves shall be located at all pressure zone boundaries when a water main crosses a pressure zone boundary without a pressure reducing station.
    c. Combination air and vacuum release valves shall be placed at all high points of water main installations.
    d. Blow-off assemblies shall be located at water main dead ends where there is not a fire hydrant. If a water main extension is expected in the future, the blow-off assembly shall have a valve the same size as the main with concrete thrust blocking.
    e. Individual service pressure reducing valves must be installed on all new customer service lines in the City. The UPC requires pressure reducing valves on customer service lines if pressures are greater than 80 psi. Pressure reducing valves protect customers from high pressures in case a mainline pressure reducing station fails.
8. Fire hydrant installations will satisfy the following criteria:
    a. Fire hydrants serving detached single-family dwellings or duplex dwellings on individual lots will be located not more than 600 feet on center with a maximum 300-foot frontage length from any lot to a hydrant.
    b. The number of fire hydrants shall be determined on an average spacing of 300 feet computed on an imaginary line parallel to and not less than 50 feet from the structure.

c. All hydrants are to be accessible to fire department pumpers over roads capable of supporting such fire apparatus. The City Engineer shall approve the location of the fire hydrants depending on utility, topography, and building location.

d. Hydrants shall be a minimum of 50 feet out from the building, minor deviations may be granted.

e. Hydrants located in dead-end areas or cul-de-sacs shall service an area of no more than 120,000 square feet.

f. The Public Works Department will consult with the Fire Department to review all proposed fire hydrant installations to ensure the correct number, location, and spacing of fire hydrants for each project.

5.4.6 Supply and Booster Pump Stations

Well and pump station facilities are vital to the efficient and reliable operation of a water system. The City has adopted the following policies regarding well and pump station facilities:

1. Improvements to existing and all new supply and booster pump stations will be designed to comply with the following minimum standards.
    a. All structures will be non-combustible, where practical.
    b. All buildings will have adequate heating, cooling, ventilation, insulation, lighting, and workspaces necessary for on-site operation and repair.
    c. Each station will be equipped with a flow meter and all necessary instrumentation to assist personnel in operating and troubleshooting the facility.
    d. Backup emergency power capability will be provided to at least one booster pump station supplying each pressure zone and sized to meet the firm capacity of that pump station.
2. Pumps will be operated automatically with flexibility in pump start/stop settings.
3. Stations will be operated with the provision for at least two methods of control to minimize system vulnerability.
4. Manual override of stations will be provided for and located at the Operations and Maintenance office using the City's telemetry and supervisory control system.
5. Stations will be monitored with alarms for the following conditions:
    a. Pump started automatically or manually,
    b. Power phase failure,
    c. Communication failure,
    d. Flooding and fire,
    e. Intrusion by unauthorized personnel,

f. Low suction pressure, and

g. High discharge pressure.

6. Stations will have the following indicators:

   a. Local flow indication and totalizing,

   b. Flow indication and totalizing at the Operations and Maintenance or Engineering office, and

   c. Recording of combined supply to the system.

7. Stations will be placed wherever necessary to fulfill the following criteria:

   a. Provide supply redundancy to a pressure zone,

   b. Improve the hydraulic characteristics of a pressure zone,

   c. Maximize storage availability and transmission capacity, and

   d. Improve water quality (i.e., increase circulation) and quantity.

5.4.7 Pressure Reducing Stations

The City has adopted the following policies regarding pressure reducing stations in order to provide facilities which are reliable and easy to maintain:

1. All pressure reducing valves will be placed in vaults that are large enough to provide ample workspace for field inspection and valve repair.
2. Vaults will drain to daylight or be equipped with sump pumps to prevent vault flooding.
3. Pressure relief valves will be provided on the low-pressure side of the pressure reducing valves to prevent system over-pressurizing in case of a pressure reducing valve failure and will be sized by hydraulic analysis.

5.4.8 Water System Control

The City's control system must be capable of efficiently operating the water system's components in accordance with this Plan and in response to reservoir levels, system pressures, abnormal system conditions, electrical power rate structure, and water costs. The system must be reliable and kept up to date to avoid disruption of customer water service and maintain efficient use of water supplies.

5.4.9 Maintenance

The City has adopted the following policies regarding maintenance of equipment and facilities within its water system:

1. Facility and equipment breakdown are given highest maintenance priority. Emergency repairs will be made even if overtime labor is involved.

2. Equipment will be scheduled for replacement when it becomes obsolete (equipment is no longer supported by the manufacturer) and as funding is available.
3. Worn parts will be repaired, replaced, or rebuilt before they represent a high failure probability.
4. Spare parts will be stocked for all equipment items whose failure will impact the ability to meet other policy standards.
5. Equipment that is out of service will be returned to service as soon as possible.
6. A preventive maintenance schedule will be established for all facilities, equipment, and processes.
7. Tools will be obtained and maintained to repair all items whose failure will impact the ability to meet other policy standards.
8. Dry, heated shop space will be available for maintenance personnel to maintain facilities.
9. All maintenance personnel will be trained to efficiently perform their job descriptions.
10. Maintenance will be performed by the water maintenance staff and supervised by the Public Works Director.
11. Written records and reports will be maintained on each facility and item of equipment showing operation and maintenance history.

5.5 Financial Policies

In order to maintain financial viability and a high quality, safe and reliable water system, the City has adopted the following financial policies:

1. The City will set rates that comply with standards established by the AWWA.
2. Rates and additional charges established for the City should be:
    a. Cost-based rates that recover current, historical, and future costs associated with the City's water system services, and support facilities,
    b. Equitable charges to recover costs from customers, commensurate with the benefits they receive, and
    c. Adequate and stable source of funds to cover the current and future cash needs of the City Public Works Department.
3. Existing customers of the City will pay the direct and indirect costs of operating and maintaining the facilities through user rates. In addition, the user rates will include debt service incurred to finance the water capital assets of the City.
4. New customers seeking to connect to the water system will be required to pay a connection charge for an equitable share of the historical cost of the system and for the system's CIP. Connection charge revenues will be used to fund the water CIP project list in conjunction with rate revenue.

5. New and existing customers will be charged for extra services through separate ancillary charges.
6. The City will maintain information systems that provide sufficient financial and statistical information to ensure conformance with rate-setting policies and objectives.
7. User charges must be sufficient to provide cash for the expenses of operating and maintaining the system. To ensure the fiscal and physical integrity of the utility, each year an amount should also be set aside and retained for capital expenditures, which will cover some portion of the depreciation of the physical infrastructure. The amount may be transferred between the Water Fund to the Capital Fund for general or specific purposes.
8. A Working Capital Reserve will be maintained to cover unanticipated emergencies and fluctuations in cash flow. The City will maintain a cash reserve for the Water Fund.
9. Water rates will be based on either the Base-Extra Capacity Method or the Commodity-Demand Method. Both methods strive to equitably charge customers with different service requirements based on the cost of providing the water service. Service requirements relate to the total volume of water used, peak rates of use, and other factors.
10. Fees and charges are calculated for the service area as a whole. Rates will be the same regardless of service location for existing customers.

5.5.1 Connection Charges

In order to have an equitable method of paying for water system improvements, the City has adopted the following connection charge policies:

1. Owners of properties that have not been assessed, charged, or borne an equitable share of the cost of the water system will pay one or more of the following connection charges prior to connection to a water main.
    a. Recovery Contracts (Latecomers Fees): Recovery contracts are negotiated with developers and property owners to provide for the reimbursement of a pro rata portion of the original cost of water system extensions and facilities.
    b. General Facilities Charge: The connection charge will be assessed against any property that has not participated in the development of the water system. Meter charges or other hookup fees are additional to recover the cost of meter and service line installation.
    c. Developer Extension Charges: These charges are for the administration, review, and inspection of developer extension projects.

5.6 Organizational Policies

Appropriate organizational policies are key to the continued successful operation of the City. To promote a healthy organization, the City has adopted the policies in this section regarding the City's structure and staffing.

5.6.1 Staffing

The City recognizes the paramount importance of having highly qualified staff and has adopted the following policies:

1. Personnel certification will comply with State standards.
2. The Public Works Department will promote staff training.

5.6.2 Relationship with Other Departments

The City has adopted the following policies regarding the City's Public Works Department in coordination with other City departments:

1. The Finance Department is responsible for customer billing, payment collection, project cost accounting, fund activity reporting, employee records, union labor negotiations and salary schedules.
2. The Police Department is responsible for enforcing violations of City water ordinances.
3. The Fire Department is responsible for emergency responses to hazardous events at water system facilities. The Fire Department uses water utility facilities for fire protection and establishes fire flow requirements.

5.7 Summary

This chapter summarizes the City's policies on several areas of the City's operations and long-term viability. These policies are in accordance with all federal, state, and county regulations as well as City policies and AWWA design recommendations. These policies are in place to ensure the City continues to meet all applicable requirements and provides high quality water to all customers. Other chapters in this Plan analyze different aspects of the water system infrastructure, demands, financial and organizational elements against these policies.

Chapter 6

Water Supply Quantity and Quality

6.1 Introduction

The two basic objectives of a water system are to provide sufficient water to meet demands and to meet or exceed all applicable water quality standards. This chapter discusses the City's existing water sources, water rights, drinking water regulations, and water quality monitoring. This chapter also uses demand projections from Chapter 4 to determine if the current water rights meet the existing and projected demands for the City's customers. Chapter 8 discusses the City's ability to supply enough water in more detail.

6.2 Water Rights and Supply Overview

All water supplied to the City is provided by five active groundwater wells. The City also has one emergency groundwater well. Additional information on each of the City's exiting sources is presented in Chapter 2.

6.2.1 Water Rights

A water right is a legal authorization to use a specified amount of water for specific beneficial purposes. Throughout this section water right withdrawal amounts are referenced in two ways; as instantaneous rights (Q_i) or as annual rights (Q_a). Instantaneous rights are typically referred to in terms of gpm and represent the maximum flow rate that can be withdrawn at a given time. Annual water rights represent the total amount of water use allowed per year and are typically referred to in terms of acre-feet (AF) per year. These limits are set to prevent drawdown of the aquifers.

The State law requires users of public water to receive approval from the State Department of Ecology (Ecology) prior to actual use of the water. This approval is granted in the form of a water right permit with a development schedule, and after the water is put to beneficial use, a certificate is issued.

6.2.1.1 Existing Water Rights

Table 6-1 summarizes the City's municipal water. The City's water rights certificates can be found in Appendix I.

Table 6-1
Existing Water Rights

DOH Source No.	Source Name	Permit or Certificate Number	Priority Date	Aquifer	Q_i	Q_a			
						Primary		Supplemental	
					(gpm)	(acre-ft)	(gpm)	(acre-ft)	(gpm)
	S01, S05, & S09	876-D	4/9/1940		250	157	97	0	0
	S02	877-D	6/1/1941		500	315	195	0	0
	S03	1322-A	5/8/1950		400	123	76	0	0
	S02	G2-00862C	1/20/1971		100	65	40	0	0
	S04	G2-00863C	1/20/1971		500	200	124	0	0
	S05 & S09	3150-A	4/17/1958		1,000	193	120	595	369
	S06	4449-A	5/22/1962		750	337	209	788	489
	S07	5374	3/8/1965		500	0	0	800	496
	S08	G2-00024C	1/6/1969		720	546	338	0	0
Totals (acre-ft & gpm)					**4,720**	**1,936**	**1,200**	**2,183**	**1,353**
Totals (mgd)					**6.8**	**1.7**		**1.9**	

6.2.1.2 Water Rights Evaluation

An evaluation of the City's existing water rights was performed to determine the sufficiency of the water rights to meet both existing and future water demands. Table 6-2 compares the City's total maximum Q_i with the MDD of the system and the total primary Q_a with the ADD of the system.

Table 6-2
Water Rights Evaluation

Description	Q_i / Maximum Day Demand		Q_a / Average Day Demand		
	(gpm)	(mgd)	(acre-ft)	(mgd)	(gpm)
Total Primary Water Rights	**4,720**	**6.8**	**1,936**	**1.7**	**1,200**
Total Supplemental Water Rights			**2,183**	**1.9**	**1,353**
Existing (2019) City Water Demands	966	1.4	750	0.6	465
Surplus (or Deficient) Rights	3,754	5.4	1,186	1.1	735
Planning Year (2020) City Water Demands	1,342	1.9	814	0.7	505
Surplus (or Deficient) Rights	3,378	4.9	1,122	1.0	695
Projected (2030) City Water Demands	1,374	2.0	833	0.7	516
Surplus (or Deficient) Rights	3,346	4.8	1,103	1.0	684
Projected (2040) City Water Demands	1,374	2.0	833	0.7	516
Surplus (or Deficient) Rights	3,346	4.8	1,103	1.0	684

As shown in Table 6-2, the City has water rights more than its projected requirements through 2040. An analysis of the City's physical supply capacity is presented in detail in Chapter 8.

6.3 Drinking Water Regulations

The quality of drinking water in the United States is regulated by the Environmental Protection Agency (EPA). Under provisions of the Safe Drinking Water Act (SDWA), the EPA can delegate primary enforcement responsibility for water quality control to each state. In the State, DOH is the agency responsible for implementing and enforcing the drinking water regulations. For the State to maintain the authority to implement requirements under the SDWA, the State must adopt drinking water regulations that are at least as stringent as federal regulations. In meeting these requirements, the State has published drinking water regulations that are contained in Chapter 246-290 of the WAC.

6.3.1 Safe Drinking Water Act

The SDWA, enacted in 1974, sets standards for the quality of drinking water and requires water treatment if these standards are not met. The SDWA also sets water testing schedules and methods that water systems must follow. In 1986 the SDWA was amended to include the regulation of a total of 83 contaminants.

In response to the 1986 SDWA Amendments, the EPA established six rules, known as the Phase I Rule, Phase II & IIb Rules, Phase V Rule, Surface Water Treatment Rule, Total Coliform Rule, and Lead & Copper Rule. After these rules were established some were also amended. The EPA regulates most chemical contaminants through the Phase I, II, IIb, and V Rules.

The SDWA was amended again and re-authorized in August of 1996. As part of this amendment and re-authorization, more recognition was given to source water protection, public information, water system improvement funding and operator training in the SDWA. In response to the 1996 SDWA amendments, EPA developed several rules including Stage 1 and Stage 2 Disinfectants and Disinfectant By-Products Rules, and the Interim, Long Term 1 and Long Term 2 Enhanced Surface Water Treatment Rules.

The EPA set two limits for each contaminant that is regulated under these rules. The first limit is a health goal, referred to as the Maximum Contaminant Level Goal (MCLG). The MCLG is zero for many contaminants; especially known cancer-causing agents, or carcinogens. The second limit is a legal limit, referred to as the MCL. The MCLs are equal to or higher than the MCLGs.

6.3.1.1 Phase I Rule

The Phase I Rule, which was EPA's first response to the 1986 Amendments, was published in the Federal Register on July 8, 1987, and became effective on January 9, 1989. This rule provided limits for eight volatile organic chemicals (VOCs) that may be present in drinking water. The VOCs are liquid chemicals that evaporate easily into the air and are used by industries in the manufacture

of rubber, pesticides, deodorants, solvents, plastics, and other chemicals. The VOCs are found in everyday items such as gasoline, paints, thinners, lighter fluid, mothballs, and glue, and are typically encountered at dry cleaners, automotive service stations, and elsewhere in industrial processes.

6.3.1.2 Phase II & IIb Rules

The Phase II & IIb Rules were published in the Federal Register on January 30, 1991 and July 1, 1991, and became effective on July 20, 1992 and January 1, 1993, respectively. These rules established new regulations for 27 contaminants and updated regulation of 11 additional contaminants. Organic, animal or plant produced substances containing carbon and other elements such as hydrogen and oxygen, and inorganic chemicals of mineral origin that are naturally occurring elements were included. Some of the contaminants are frequently applied agricultural chemicals, such as nitrate, while others are more obscure industrial chemicals.

6.3.1.3 Phase V Rule

The Phase V Rule was published in the Federal Register on July 17, 1992 and became effective on January 17, 1994. This rule set standards for 23 additional contaminants, of which 18 are organic chemicals which are mostly pesticides and herbicides and 5 are inorganic chemicals, such as cyanide.

6.3.2 Primary and Secondary Drinking Water Regulations

There are currently 92 contaminants included in the *National Primary Drinking Water Regulations*. Of these 92 contaminants, 83 have established MCLs and MCLGs, while the remaining nine have treatment technique requirements. Monitoring of these contaminants within the State is addressed under WAC 246-290-300, WAC 246-290-310, and WAC 246-290-320.

The EPA has also established secondary standards for 15 contaminants, which generally address aesthetic quality of drinking water. These federal standards are generally used as a guideline since they primarily address taste and odor issues rather than health concerns. Monitoring of these secondary contaminants within the State is addressed under WAC 246-290-300, WAC 246-290-310. Per WAC 246-290-320, secondary contaminant MCL exceedances require treatment for new community water systems, while other public water systems are required to take follow-up action as determined by DOH.

6.3.3 Source Water Quality Regulations

The City's groundwater wells are the only source of water supply in the City. The City does not have any surface water sources or groundwater sources considered under the influence of surface water (GWI). Since the City does not have any surface water or GWI sources, several surface water supply regulations are not discussed in this chapter. These regulations include: Surface Water

Treatment Rule; the Interim, Long Term 1 and Long Term 2 Enhanced Surface Water Treatment Rules; and the Filter Backwash Recycling Rule.

6.3.3.1 Radionuclides Rule

The EPA established the final Radionuclides rule on December 7, 2000 and it became effective on December 8, 2003. The rule established an MCLG of zero for the four regulated contaminants and MCLs of 5 picocuries per liter (pCi/L) for combined radium-226 and radium-228, 15 pCi/L for gross alpha, excluding radon and uranium, 4 millirems per year (mrem/yr) for beta particle and photon radioactivity, and 30 micrograms per liter (μg/L) for uranium. All community water systems were required to complete initial monitoring and integrate all monitoring requirements of the rule between December 8, 2003 and December 30, 2007. The rule requires utilities to undergo four consecutive quarters of monitoring for gross alpha, combined radium-225/228, and uranium. Additionally, systems considered vulnerable were required to monitor for gross beta, tritium, and strontium-90. Initial monitoring is used by the enforcing agency to determine if a water system is vulnerable and whether a system must perform reduced or increased monitoring in the future.

Based on the initial monitoring, the City is required to test for radionuclides every six years. The City last tested for radionuclides in June 2017 with less than 1 pCi/L.

6.3.3.2 Arsenic

Arsenic is highly toxic, affects the skin and nervous system, and may cause cancer. The EPA promulgated the Arsenic rule on January 22, 2001 and it became effective on January 23, 2006. The rule sets the MCLG of arsenic at zero and sets the MCL at 0.01 mg/L which is equivalent to 10 parts per billion (ppb). Community water systems with arsenic levels greater than 10 ppb must include the arsenic sampling results, along with a statement on health risks, in the annual Consumer Confidence Report. Water systems that have arsenic levels of 5 to 10 ppb must include an educational statement about arsenic in their Consumer Confidence Reports.

The City last tested for Arsenic in June 2015 with 0.0010 mg/L or 1 ppb. The testing schedule for arsenic is different for each source and is determined by the State who communicates that information to the City via a yearly Water Quality Monitoring Schedule.

6.3.3.3 Ground Water Rule

In accordance with the 1986 SDWA Amendments, EPA developed a Ground Water Rule (GWR) that specifies the use of disinfectants for groundwater systems, as necessary. The proposed rule was published May 10, 2000 in the Federal Register and the final rule was enacted on January 8, 2007. The rule is aimed at increasing the protection of groundwater sources against microbial pathogens in public water systems that use untreated groundwater. The GWR applies to any system which uses groundwater or a mixture of surface and groundwater if the groundwater is supplied to the customers without treatment.

The basic requirements of the GWR, adopted by DOH on October 1, 2010 include source water monitoring, compliance monitoring, sanitary surveys, corrective actions, and public notification. The rule builds upon the Total Coliform Rule (TCR) by addressing the health risks of fecal contamination in groundwater sources used by public water system. Elements of the GWR include the following

- *Assessment Source Water Monitoring* may be required by DOH on a case-by-case basis to evaluate sources that may be at risk for fecal contamination.

- *Triggered Source Water Monitoring* is required when a system's routine distribution samples collected under the TCR is total coliform positive. Within 24 hours of notification of the total coliform positive result, a water system must collect samples at each source that was in operation at the time the routine sample was collected. These samples must be taken prior to treatment. Systems with more than one groundwater source, like the City, can submit a triggered source water monitoring plan for approval by DOH. This plan may allow a reduction in the number of source samples required. A copy of the City's 2012 Triggered Source Water Monitoring Plan is included in Appendix J.

- *Compliance Monitoring* confirms the effectiveness and reliability of a water system's treatment systems and requires daily monitoring of chemical disinfection residual before the first customer during peak flow for smaller systems and continuous monitoring of disinfection residual for systems serving more than 3,300 people. If a system provides 4-log treatment of viruses and performs compliance monitoring, it does not have to meet the triggered source water monitoring requirements.

The GWR also changes the required frequency of sanitary surveys for community water systems from once every 5 years to once every 3 years. A community water system may be allowed to stay on a 5-year schedule if it meets one of the following criteria:

1. Provides 4-log treatment of viruses for all groundwater sources, or

2. Has no total coliform MCL violations, has no more than one total coliform monitoring violation since the last survey, and has no unresolved significant deficiencies in the current survey.

The GWR requires a water system to take corrective action when it has a significant deficiency or when a source water sample is *E. coli* positive. The DOH defines a significant deficiency as "a defect in the design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the department determines to be causing, or have the potential for causing, the introduction of contamination into the water delivered to consumers."

Corrective actions can involve one or more of the following as directed by DOH:

- Correct all significant deficiencies.
- Provide an alternative source of water.

- Eliminate the source of contamination.
- Provide 4-log treatment.

There are several situations and violations in the GWR that require public notification (PN) either within the system's Consumer Confidence Report (CCR) or otherwise. Table 6-3 shown later in this chapter, summarizes these violations and the type of notification required. The varying tiers of PN required are defined in 40 CFR Section 141, Subpart Q. Each tier has different notification methods and requirements of timing associated. Tier 1 PN must be provided within 24 hours after the violation is discovered, Tier 2 PN must be provided within 30 days after the violation is discovered, and Tier 3 PN must be provided within 1 year after the violation is discovered.

6.3.4 Future PFOA and PFOS Regulations

The EPA issued health advisories for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in the spring of 2016. The PFOA, PFOS, and other per- and polyfluoroalkyl substances (PFASs) are a family of chemicals used since the 1950s to manufacture stain-resistant, water-resistant, and non-stick products. Certain types of firefighting foam contain PFAS. These firefighting foams were historically used by the U.S. military, local fire departments, and airports.

Overtime PFASs leached into groundwater and has contaminated drinking water. Exposure to PFAS over certain levels may result in adverse health effects. The current EPA health advisory level is at 70 parts per trillion.

The State Board of Health began rulemaking for PFAS in drinking water in late 2017. In November 2019, draft State Action Levels (SALs) were published. These draft SALs test for five PFASs as indicators to identify PFASs contamination in public drinking water supplies. Draft SALs are 10 nanogram per liter (ng/L) for PFOA, 15 ng/L for PFOS, 14 ng/L for perfluorononanoic acid (PFNA), 70 ng/L for perfluorohexanesulfonate acid (PFHxS), and 1,300 ng/L for perfluorobutanesulfonic acid (PFBS).

The City does not expect the regulations to affect the City's groundwater source.

6.3.5 Distribution System Water Quality

In addition to source water quality monitoring, the City regularly monitors the water quality throughout the distribution system for several contaminants which are described below.

6.3.5.1 Revised Total Coliform Rule

The TCR was published in the Federal Register on June 29, 1989 and became effective on December 31, 1990. The rule set both MCLGs and MCLs for total coliform levels in drinking water, and the type and frequency of testing that is required for water systems. The rule was revised in April of 2016.

The Revised Total Coliform Rule (RTCR), as with the TCR, requires every public water system is required to develop a coliform monitoring plan, subject to approval by DOH. The RTCR adds a "find and fix" approach to any microbial contamination through the use of assessment reports. The RCTR also adds violations to any water system that fails to complete the required tasks. A copy of the City's Coliform Monitoring Plan is a part of the Water Quality Monitoring Plan, included in Appendix K.

Table 6-3
Ground Water Rule Notification Requirements Summary

Situation	Notification Required
E. coli positive groundwater source sample[1]	Tier 1 PN, CCR, Special Notification
Failure to take corrective action within 120 days of notification	Tier 2 PN, CCR, Special Notification
Failure to maintain at least 4-log treatment of viruses	Tier 2 PN, CCR
Failure to meet monitoring requirements	Tier 3 PN, CCR
Uncorrected significant deficiency[2]	Special Notice in CCR
Unaddressed *E. coli* positive groundwater source sample[3]	Special Notice in CCR

[1]Consecutive systems served by the groundwater source must also notify the public.
[2]Systems must continue to notify the public annually until they correct the significant deficiency.
[3]Community systems must put a notice in the CCR annually until the positive source water sample has been addressed.

Coliforms are a group of bacteria that live in the digestive tract of humans and many animals and are excreted in large numbers with feces. Coliforms can be found in sewage, soils, surface waters, and vegetation. The presence of any coliforms in drinking water indicates a health risk and potential waterborne disease outbreak, which may include gastroenteric infections, dysentery, hepatitis, typhoid fever, cholera, and other infectious diseases.

The rule established the MCLG for total coliforms at zero. To comply with the MCL, systems must not find coliforms in more than five percent of the samples taken each month.

6.3.5.2 Lead and Copper Rule

The Lead and Copper Rule was published in the Federal Register on June 7, 1991 and became effective on December 7, 1992. On January 12, 2000, the EPA published some minor revisions to the rule in the Federal Register, intended to improve the implementation of the rule. In December 2007, additional revisions to the Lead and Copper Rule became effective, intended to enhance implementation of the rule in the areas of monitoring, treatment, customer awareness and lead service line replacement.

The rule identifies "action levels" for both lead and copper. An action level is different from a MCL in that a MCL is a legal limit for a contaminant, and an action level is a trigger for additional prevention or removal steps. The action level for lead is 0.015 mg/L. The action level for copper is 1.3 mg/L. If the 90th percentile concentration of either lead or copper from the group of samples exceeds these action levels, a corrosion control study must be undertaken to evaluate strategies

and make recommendations for reducing the lead or copper concentration below the action levels.

The rule requires systems that exceed the action level for lead to educate the affected public about reducing its lead intake. Systems that continue to exceed the action level for lead after implementing corrosion control and source water treatment may be required to replace piping in the system that contains the source of lead. Corrosion control is typically accomplished by increasing the pH of the water to make it less corrosive, which reduces its ability to corrode water pipes and absorb lead or copper.

The City is required to test for lead and copper every three years. Lead and copper levels were last tested in September 2019 and all results met the 90th percentile compliance rule. The next round of testing is scheduled for August 2022.

6.3.5.2.1 Proposed Revisions to the Lead and Copper Rule

In October 2019, the EPA published proposed changes to the Lead and Copper Rule. These proposed changes include identifying the most impacted areas, strengthening treatment requirements, replacing lead service lines, increasing drinking water sampling reliability and improving risk communication to customers.

> "The City does not have corrosive water, and therefore, the City does not expect this revision to change its water treatment procedures. This revision, however, will most likely require additional sampling and reporting by the City."

6.3.5.3 Stage 1 Disinfectants/Disinfection By-products Rule

Disinfection by-products (DBPs) are formed when free chlorine reacts with organic substances called precursors, most of which occur naturally. Formation of DBPs is dependent on factors such as the amount and type of chlorine used, water temperature, concentration of precursors, pH, and chlorine contact time. The DBPs have been found to cause cancer in laboratory animals and are suspected to be human carcinogens.

The EPA proposed the Stage I Disinfectants/Disinfection By-products Rule (D/DBPR) on July 29, 1994. The final rule was published in the Federal Register on December 16, 1998 and became effective on February 16, 1999. The rule applies to Lakewood Water, City, and most other water systems, including systems serving fewer than 10,000 people, which add a chemical disinfectant to the drinking water during any part of the treatment process.

The rule set the MCL for total trihalomethanes (TTHM), which are a composite measure of four individual trihalomethanes (THMs), at 0.08 mg/L. The rule established MCLs and requires monitoring of three additional categories of disinfectant byproducts as follows:

- Five haloacetic acids (HAA5), 0.06 mg/L
- Bromate, 0.01 mg/L

- Chlorite, 1.0 mg/L

The rule also established maximum residual disinfectant levels (MRDLs) as follows:

- Chlorine, 4.0 mg/L
- Chloramines, 4.0 mg/L
- Chlorine dioxide, 0.8 mg/L

6.3.5.4 Stage 2 Disinfectants/Disinfection By-products Rule

Stage 2 of the D/DBPR was promulgated by EPA on January 4, 2006. This rule is the second part of the D/DBPR, of which the Stage 1 D/DBPR became effective in February 1999. The Stage 2 D/DBPR focuses on monitoring and reducing concentrations of two classes of DPBs: TTHM and HAA5 applies to water systems that add chemical disinfectants. The key requirements of the Stage 2 D/DBPR include:

1. An Initial Distribution System Evaluation (IDSE) to identify distribution system locations with high DBP concentrations.

2. Site specific locational running annual averages instead of system-wide running annual averages to calculate compliance data.

The MCLs for TTHM and HAA5 are 0.080 mg/L and 0.060 mg/L, respectively, which are calculated as locational running annual averages. Per the DOH, the City tests for DBPs once a year at two locations within its distribution system.

6.4 Water Quality Monitoring Results

This section presents the current water quality standards for groundwater sources and the results of the City's recent source water quality monitoring efforts. A discussion of the water quality requirements and monitoring results for the City's distribution system is presented in the section that follows.

6.4.1 Source Monitoring Requirements and Waivers

The City is required to perform water quality monitoring at each of the active sources for inorganic chemical and physical substances, organic chemicals, and radionuclides. The monitoring requirements that the City must comply with are specified in *WAC 246-290-300*. In 1994, the DOH developed the Susceptibility Assessment Survey Form for water purveyors to use in determining a drinking water source's potential for contamination. The results of the susceptibility assessment may provide for monitoring waivers that allow reduced source water quality monitoring.

6.4.2 Source Monitoring Results

The water quality of the City's sources meets or exceeds all drinking water standards. A copy of the City's Water Quality Monitoring schedule is included in Appendix K.

6.4.3 Distribution System Monitoring Requirements and Results

The City is required to perform water quality monitoring within the distribution system for coliform bacteria, disinfectant or chlorine residual concentration, lead and copper, and asbestos in accordance with *WAC 246-290*. The City has been in compliance with all monitoring requirements for the past several years. A summary of the results of distribution system water quality monitoring within the City's system is presented below. Annual water quality reports are included in Appendix K.

6.4.3.1 Coliform Monitoring

The City is required to collect a minimum of seven coliform samples per month from different locations throughout the system, based on a population served of 6,770 in 2019. The City has not collected a positive sample since August 2016.

6.4.3.2 Disinfectant Residual Concentration Monitoring

Disinfection requirements for groundwater sources are contained in *WAC 246-290-451*, which states that a disinfectant residual concentration shall be detectable in all active parts of the distribution system. The City has set a chlorination target to maintain a residual disinfectant concentration of at least 0.2 mg/L. The water samples collected by the City for coliform analysis are also tested for residual disinfectant concentration.

6.4.3.3 Disinfectant By-Products

The City is required to perform water quality monitoring in the distribution system for disinfection by-products in accordance with *WAC 246-290-310.* The MCLs for THMs and HAA5 are 80μg/L and 60 μg/L respectively.

Water samples collected by the City in 2019 were tested for disinfectant by-product concentration. The results of these disinfectant by-product tests in 2018 resulted in non-detection of HAA5 and a range of less than 0.5 to 2.79μg/L of TTHMs.

6.4.3.4 Lead and Copper Monitoring

The Lead and Copper Rule identifies the action level for lead as being greater than 0.015 mg/L and the action level for copper as being greater than 1.3 mg/L.

The results of the tests from the most recent monitoring period during 2019 indicate a range of <0.001 mg/L to 0.0015 mg/L for lead and a range of <0.05 mg/L to 0.513 mg/L for copper. These

results indicate the 90th percentile concentration of lead and copper from each group of samples has never exceeded the action level. Monitoring currently must be completed every three years.

6.4.3.5 Asbestos Monitoring

Asbestos monitoring is required if the sources are vulnerable to asbestos contamination or if the distribution system contains more than ten percent of AC pipe. Although none of the City's sources are susceptible to asbestos contamination, AC pipe composes more than ten percent of the City's distribution system. Therefore, the City must monitor for asbestos in the distribution system.

The current MCL for asbestos is seven million fibers per liter and greater than ten microns in length. The water sample must be taken at a tap that is served by an AC pipe under conditions where asbestos contamination is most likely to occur.

Currently, the City is required to test for asbestos once every nine years. The City's most recent sample in 2020 contained less than 0.116 million asbestos fibers per liter.

6.5 Water Treatment

All of the water produced from the City's wells is chlorinated and fluoridated before it enters the distribution system. A detailed description of each technique and where it is implemented is included in Chapter 2 of this Plan.

6.6 Water Quality Programs

In addition to the above listed water quality requirements, the City follows several water-quality programs that are used to report and protect the City's water quality.

6.6.1 Consumer Confidence Report

The CCR is a report on the quality of water that was delivered to the system during the previous 12 months in accordance with WAC 246-290-72001. The annual report must be updated and re-issued to all customers by July 1st of each year. The report contains information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner. A copy of City's latest CCR at the time of this writing is included in Appendix L.

6.6.2 Wellhead Protection Program

Section 1428 of the 1986 SDWA Amendments mandates that each state develops a wellhead protection program. The State mandate for wellhead protection and the required elements of a wellhead protection program are contained in WAC 246-290-135 Source Water Protection, which became effective in 1994. In the State, DOH is the lead agency for the development and administration of the State's wellhead protection program.

A wellhead protection program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by preventing contamination of the groundwater that it supplies for drinking water. All federally defined Group A public water systems that use groundwater as their source are required to develop and implement a wellhead protection program. A copy of the City's Wellhead Protection Program is contained in Appendix M of this plan.

6.7 Summary

The City is currently in compliance with all applicable water quality regulations and is performing the necessary regulated water quality testing. The City is forecasted to have sufficient water rights to meet water system demands for at least the next 20 years. Chapter 8 will further analyze the physical source capacity of the system.

Chapter 7

Operations and Maintenance

7.1 Introduction

The City's operations and maintenance program has been developed in accordance with WAC 246-290-415. This chapter consists of the following elements: Water System Management and Personnel, Routine System Operations, Recordkeeping and Reporting, and Emergency Operations.

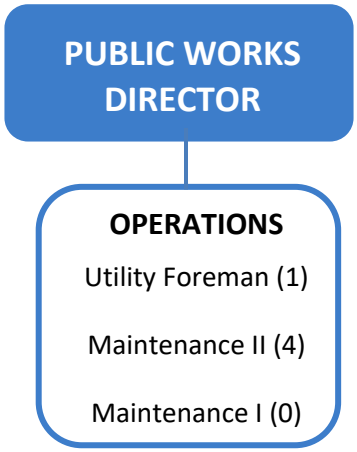
7.2 Water System Management and Personnel

The Public Works Department is responsible for various projects within the City. This section reviews the management structure, personnel responsibilities, and personnel certifications of the Public Works Department as they relate to the water system.

7.2.1 Management Structure

Figure 7-1 shows City's management structure, as it relates to the water system.

Figure 7-1
Organization Chart



7.2.2 Personnel Responsibilities

The key responsibilities of the water operations and maintenance staff are summarized below.

Public Works Director: Ultimate responsibility for the water system. Directs the activities of all divisions of the Public Works Department. Represents the City at regional activities.

Utility Foreman: Responsible for the day-to-day operation of the water system including adjusting the water system supply and storage facilities to meet daily demands. Assists in planning the construction, maintenance, and operations activities of the water system.

Maintenance Staff: Assists the Utility Foreman in in operation and maintenance activities, including on-call and emergency duties. These activities also include water system inspection, repair, hydrant exercising, and valve exercising.

7.2.3 Personnel Certifications

The WAC 246-292 requires the City's system to be operated by one or more certified operators. In addition, a specialty certification is required for backflow device testing. Table 7-1 shows the current certifications of the City's operations and maintenance staff.

Table 7-1
Personnel Certification

Name	Position	Certification
Jeff Davis	Utility Foreman	WDM2, CCS
Russ Parsons	Maintenance Worker II	WDM2, CCS
Jim Marzano	Maintenance Worker II	WDM2
Certificate Definitions: WDM2 – Water Distribution Manager CCS – Cross-Connection Control Specialist		

7.3 Routine System Operations

As described in Chapter 2, the City's system includes five wells, three reservoirs, one pump station, and three pressure reducing stations. Routine operations include visually checking all systems facilities, monitoring flows and reservoir levels, responding to customer inquiries and complaints, and performing customer meter readings.

7.3.1 Supplies and Equipment

Spare parts and repair equipment are stored at the City's Public Works Facility for water system operation and maintenance. The following list summarizes the City's status and protocol regarding supplies and equipment:

- Spare parts, such as valves, pipe, fittings, electrical, and electronic parts, are kept in good supply. Most critical systems can be repaired from in-house stores.
- Common tools and equipment, such as hand tools, power tools, pumps, and shoring, are kept in the inventory. Accounts are maintained with vendors so that tools and equipment not on hand can be quickly purchased.
- Heavy equipment, such as backhoes, dump trucks, graders, and bulldozers, are either owned by the City or leased from local suppliers.

7.3.2 Preventative Maintenance

Routine preventive maintenance is conducted throughout the water system including the wells, storage facilities, water mains, PRVs, and hydrants. Maintenance schedules that meet or exceed manufacturer's recommendations have been established for all critical components in the water system. Table 7-2 shows the schedule used for preventive maintenance:

Table 7-2
Preventative Maintenance

Storage Facilities	
As Needed	Detailed inspection of interior and exterior of reservoirs. Clean, repaint, and repair interior and exterior as needed on tanks.
Water Mains	
Annually or Bi-Annually	Leak survey.
Annually	Directional Flush.
Well House or Pump Stations	
Bi-Annually	Operate and exercise all valves. Inspection should include completely opening, closing, reopening, and re-closing the valve until it seats properly.
As Needed	Calibrate flow meter; maintain electrical and mechanical equipment; paint structures and piping.
Pressure Reducing & Relief Stations	
Bi-annually	Flush and check all valves and screens; check pressure settings; rebuild and paint every three years, or as necessary.
Isolation & Hydrant Valves	
Annually	Operate full open/closed; uncover where buried; clean out valve boxes and repair, as necessary. Half exercised in the fall and the other half in the spring.
Air & Vacuum Release Valve Assemblies and Blow-Off Assemblies	
Annually	Operate full open/closed and flushed; continuously operating valves should be opened/flushed more frequently.

7.3.3 Routine Water Quality Sampling

The DOH has adopted federal regulations that specify minimum monitoring requirements for water systems. The sampling requirements depend on the population served, source type, and treatment provided. The specific requirements are contained in WAC 246-290-300 and the City's practices are described in Chapter 6.

7.3.4 Staffing Analysis

The City successfully operates its water system with four maintenance employees whose time is divided up with other City departments. The operating budget has two full-time employees for the maintenance and operations of the water system. The City's system has not grown significantly since the 2014 Water System Plan and is not expected to experience significant growth in the foreseeable future. Therefore, the City should be able to continue to successfully operate its system with its current maintenance employees throughout the planning period.

7.4 Recordkeeping and Reporting

The City must comply with all recordkeeping and report requirements stated in WAC 246-290-480. Per these requirements, the City submits the following reports to DOH.

- Any reports or communications related to monitoring waivers.
- Daily source meter readings and total annual source meter readings, as requested.
- Any significant changes to the WFI form WFI.
- Bacteriological test results.
- Disinfection byproducts information.
- Certification that the system complied with public notification regulations when a public notification is required.

In addition to these reports, the City reports to DOH on the status on its various programs, as described below.

- Cross-connection control program summary is reported annually. The City must notify DOH as soon as possible, but no later than the end of the next business day, when a backflow incident is known by the City to have contaminated the public water system or occurred within the premises of a consumer served by the City.

- The WUE report is submitted by July 1st of each year. This report calculates the annual and three-year rolling average distribution system loss for the water system and describes progress made on WUE goals.

- The CCR is delivered to customers and DOH by July 1st of each year. This report provides information on the system's water source and water quality. The City's 2018 CCR is provided in Appendix L.

Several other reports are required for state agencies, including the Department of Revenue, Department of Labor and Industries, Department of Social and Health Services, Ecology, and the Employment Security Department. All these reports are completed according to their instructions. If the City is unable to satisfactorily address departmental concerns or consumer complaints regarding the level of reliability associated with normal or abnormal operating conditions, the purveyor may be required to prepare a project report pursuant to WAC 246-290-110.

The WAC 246-290-480 also requires the City to retain critical records dealing with facilities and water quality issues. Table 7-3 provides a summary of these records and their required retention periods.

Table 7-3
Recordkeeping Summary

Record Type	Required Retention
Bacteriological analysis results	5 years
Chemical analysis results	As long as the system is in operation
Daily source meter readings	10 years
Other records of operation and analyses as may be required by DOH	3 years
Chlorine residual analysis results	3 years
Documentation of actions to correct violations or primary drinking water standards	3 years after last corrective action
Records of sanitary surveys	10 years
Project reports, construction documents and drawings, inspection reports, and approvals	Life of the facility
Public Notices and Certifications associated with the water system	3 years
Cross-Connection Control program	
Records pertaining to the master list of service connections and/or consumer's premises	As long as the premises pose a cross-connection hazard
Records regarding inventory information	5 years or life of backflow preventer, whichever is shorter
Records regarding backflow incidents and annual summary reports	5 years
Other records, including fluoride levels, treatment plant performance, and other source characteristics are maintained in accordance with DOH.	Varies

7.4.1 Recordkeeping Procedures

The City's recordkeeping procedures are as follows:

- All records include the date, place, time of sample, and name of person collecting the sample. Electronic data with these attributes are retained as opposed to signature as required in WAC 246-290-480.1.a.
- All sample analysis records include the identification of sample type, date of analysis, laboratory, and person responsible for performing the analysis, analytical method used, and results of the analysis.
- All water quality and quantity data are kept in spreadsheet format saved on the City computer server and back-up data tapes.
- Maintenance workers, inspectors, or other staff provides information to the Public Works Utility Foreman, who must review the information prior to it being filed.
- Project reports, construction documents and drawings, inspection reports, and approvals are saved both in electronic format and Mylar or paper format.

7.4.2 Operations and Maintenance Records

Operations and maintenance manuals are available for staff members' reference. The City requires complete operation and maintenance manuals for all new equipment.

7.4.3 Customer Service Request Records

Customer service requests are made by either contacting City Hall to initiate a maintenance request or going online to the City's website to report a concern. All service requests are dealt with in a timely manner. Records of these requests are maintained by the City Clerk.

7.5 Emergency Operations

The City has a reliable system with adequate emergency response and operations capabilities in accordance with WAC 246-290-420. The City system is designed to provide reliable service under normal operating conditions and is also well equipped to accommodate short-term system failures and abnormalities. Its capabilities are summarized in the following sections.

7.5.1 Water Service Reliability

As a municipality, the City has the structure, stability, authority, and responsibility to assure that water service will be continuous. It has developed a resilient system in order to provide a reliable water service. These resiliencies are described below.

Multiple Supply Wells: Should the City lose the operation of one supply well water could be routed throughout the City from the other wells. If needed, the City could active its emergency well. Such a failure would not adversely affect the City's ability to meet the water demands of its customers.

Multiple Reservoirs: Water storage is provided by three active reservoirs that are located at different sites. The duplication of reservoirs in separate pressure zones, coupled with the water system's ability to transfer water between zones through a series of pressure reducing stations and a booster pump station, provides sufficient redundancy to prevent service disruption when one of the reservoirs is out of service for cleaning, painting, or repairs.

Distribution System: The City has attempted to loop water mains, wherever possible, to improve water circulation (i.e., water quality) and minimize impacts to the system in the event that a portion of the distribution system must be taken out of service for maintenance or repairs.

Security Measures: The City maintains security measures at all City water system facilities. These measures include fencing and located gates surrounding all water storage reservoir tanks and pumping facilities, screening of all reservoir tank vents and openings, locking of all reservoir tank hatches, and locking of all water system vaults.

7.5.2 Water Shortage Plan

During a water shortage, the City has an agreement with Tacoma Public Utilities to utilize an intertie at Lowes for water supply.

7.5.3 Emergency Response Plan

The City's Emergency Response Plan identifies procedures that would be conducted in the event of a serious emergency or disaster situation. The Emergency Response Plan also contains a list of water personnel responsible for making decisions in emergency situations. A copy of this plan is stored securely at the Public Works Facility but is not available for public review.

7.6 Cross-Connection Control Program

The City has adopted a cross-connection control program to comply with WAC 246-290-490 pertaining to contamination of potable water due to cross-connections. Backflow prevention devices are required at service connections where a potential for contamination exists. Appendix H includes a copy of the City's Cross-Connection Control Plan. As shown in Table 7-2, the City employs several certified Cross-Connection Control Specialists.

7.7 Sanitary Survey Findings

The City's most recent sanitary survey was performed by DOH on May 8, 2019. The City promptly responded to DOH's findings, making changes to its system were recommended.

7.8 Summary

The City has procedures and policies in place to operate and maintain its water system. It has an organizational structure that ensures each component of the system is managed and overseen by those with the appropriate certification. Routine operation items include things like making daily rounds to visually check system facilities, monitoring flow and reservoir level recordings, and respond to customer inquiries and complaints. Preventive maintenance consists of regularly servicing pumps and motors, exercising valves, cleaning, and painting reservoirs, and flushing dead-end pipelines. The City has performed a staffing analysis to assure that it has enough staff to properly operate and maintain its existing system.

The City has system reliability and emergency management plans in place to address circumstances that could require increased levels of management under emergency conditions. It maintains a cross-connection control program through municipal code and reports on its status annually. Finally, the City has projects identified to maintain the system and address areas requiring improvements as identified through system operations and as discussed in further detail in Chapter 9.

Chapter 8

Water System Analyses

8.1 Introduction

This chapter presents an analysis of the City's existing water system and evaluates its ability to meet the design criteria and policies per the City Standards and the State Requirements. The City's policies and design criteria are presented in Chapter 5 and State Requirements are summarized in Section 8.2. The City's existing and future water demands are presented in Chapter 4. A description of the water system facilities and their current operation is presented in Chapter 2. Any deficiencies identified in this analysis will be addressed in the proposed improvements presented in Chapter 9.

8.2 Evaluation Criteria

Table 8-1 summarizes the DOH requirements used to evaluate the water system in this chapter.

Table 8-1
Evaluation Criteria

System Element	Evaluation Criteria	DOH Requirements
Water Supply	Firm Supply Capacity	Replenish depleted FSS within 72-hr while supplying maximum day demand (MDD) *(DOH Manual Section 5.4 & WAC 246-290-222(4))*
	Well Sources - Firm Yield	Recommend providing MDD in a period of 20hrs or less of pumping. *(DOH Manual Section 5.4)*
Storage Facilities	Total Storage Capacity	Sum of operational, equalization, emergency (fire & standby), and dead. *(DOH Manual Section 7.1.1 & WAC 246-290-235(3))*
	Operational (OS)	The volume of water before sources turn on. *(DOH Manual Section 7.1.1.1)*
	Equalizing (ES)	= (peak hour demand [PHD]-maximum supply capacity) *150 min *Min pressure 30 psi.* *(DOH Manual Section 7.1.1.2)*
	Standby (SB)	= (no. of ERU_{MDD}) x (Locally adopted SB flow in gpd/ERU) x (Adopted no. of days) If multiple sources, SB may be reduced so that Volume can supply PHD with largest source out of service. Min recommended = 200 gallons per ERU *Min pressure 20 psi* *(DOH Manual Section 7.1.1.3)*
	Fire Suppression (FSS)	= (Maximum fire flow) x (duration) *Min pressure 20 psi* *(DOH Manual Section 7.1.1.4)*
	Dead (DS)	Volume that cannot provide minimum design pressure to all customers. *(DOH Manual Section 7.1.1.5)*
Pump Stations	Firm Capacity when pumping to storage	Average day demand (ADD) with largest pump out of service *(DOH Manual Section 8.1.1)*
	Total Capacity when pumping to storage	MDD *(DOH Manual Section 8.1.1 & WAC 246-290-230)*
	Firm Capacity when pump to system (no storage)	PHD with largest pump out of service *(DOH Manual Section 8.1.2 & WAC 246-290-230(5))*
	Reliable Capacity when pump to system (no storage)	MDD + Fire Flow with largest pump out of service *(DOH Manual Section 8.1.2 & WAC 246-290-230(6))*
Service Pressure	Minimum during MDD plus fire flow	20 psi *(DOH Manual Section 6.2.5 & WAC 246-290-230(6))*
	Minimum during PHD	30 psi *(DOH Manual Section 6.2.5 & WAC 246-290-230(5))*
	Maximum	Recommend 80 psi. If over 80 psi, recommend customers get an individual PRV. *(DOH Manual Section 6.2.7)*

8.3 Pressure Zones

Ideally, distribution static pressures should fall between 40 and 80 psi to avoid over-pressurized lines. A water service area consists of different pressure zones that maintain a design hydraulic grade line (HGL) that can reasonably keep distribution pressures within this range; therefore, pressure zone boundaries are determined according to topography, tank overflow elevations, and pressure reducing settings.

Table 8-2 summarizes the highest and lowest water meter elevations served by each of the pressure zones, and the resulting pressures under static conditions (i.e., no demands). The City is currently providing water at sufficient pressures throughout the water system, as shown in the table. The highest pressures in the system occur at the lowest elevations of each pressure zone. All new water services with pressures greater than 80 psi must have individual pressure reducing valves to reduce the pressure to 80 psi or less, in accordance with the plumbing code.

Table 8-2
Minimum and Maximum Distribution System Pressures

Pressure Zone	Highest Elevation Served		Lowest Elevation Served	
	Elevation (ft)	Static Pressure (psi)	Elevation (ft)	Static Pressure (psi)
High	470	47	248	96
Low	425	50	191	101
Weathervane	520	48	330	82

8.4 Supply Capacity Evaluation

This section evaluates the City's groundwater wells to determine if they have sufficient capacity to provide water supply to the system at a rate that meets the existing and future demands of the system.

8.4.1 Analysis Criteria

Supply facilities must be reliable and must provide a sufficient quantity of water at pressures that meet the requirements of WAC 246-290-230. The City's groundwater wells all serve portions of the water system that have storage facilities. The capacity of supply facilities in a pressure zone that has adequate storage must be sufficient to provide water at a rate that is equal to or greater than the MDD of the zone being served. This approach assumes that demands in excess of the MDD will be supplied using equalizing storage. According to Section 5.4 of the 2019 DOH Water System Design Manual, water system sources must be capable of supplying MDD and replenishing depleted fire suppression storage within 72 hours. The fire storage flow rate is based on the system fire storage calculation in Section 8.6.

8.4.2 Analysis Results

Murraysmith evaluated the combined supply facilities against the demand of the system as a whole in Table 8-3. The current supply capacities of the facilities are compared to system demands for 2019, and projected system demands for 2030 and 2040. Table 8-3 indicates that the City's wells have sufficient capacity to meet the existing and future supply requirements of the system through the year 2040 and beyond.

Table 8-3
Supply Capacity Evaluation

Description	Existing (gpm)	Projected (gpm)[1]	
	2019	2030	2040
Max Day Demand	1,036	1,141	1,141
Fire Storage Replenish Rate	69	69	69
Total Supply (Required)	***1,106***	***1,210***	***1,210***
Well no. 4 Capacity	400	400	400
Well no. 6 Capacity	100	100	100
Well no. 7 Capacity	600	600	600
Well no. 8 Capacity	600	600	600
Well no. 9 Capacity	1,250	1,250	1,250
Total Supply (Available)	***3,000***	***3,000***	***3,000***
Surplus/Deficiency	1,894	1,790	1,790

[1]Maximum projections are based on City growth projections extrapolated from developer plans within the City's UGA.

8.5 Supply Capacity Evaluation: Weathervane Booster Pump Station

This section evaluates the Weathervane Booster Pump Station to determine if it has sufficient capacity to meet the existing and future demands of the Weathervane Zone, which it serves.

8.5.1 Analysis Criteria

The primary purpose of the booster pump station is to supply the customers located in Weathervane Zone that cannot be served with adequate pressures by the High Zone.

The Weathervane Zone has no storage and is a closed system. Storage capacity is provided to this area within the Golf Course storage. The existing booster pump station was designed and constructed to meet the DOH criteria at the time of installation in 2001. In 2019, DOH made changes to Water System Design Manual, which requires that pump stations pumping to closed zones provide MDD plus fire flow or PHD, whichever is greater. This requirement is different than the original design criteria of the booster station.

8.5.2 Analysis Results

Table 8-4 evaluates the total supply capacity of the booster pump station against existing and projected 2040 demands. Because PHD is smaller than MDD plus fire flow (FF), the Weathervane Zone is evaluated using MDD + FF (conservative) criteria.

Table 8-4
Weathervane Zone Booster Pump Station Capacity Evaluation

Description	Existing (gpm)	Projected (gpm)	
	2019	2020	2040
Weathervane Zone MDD	62	67	69
Max FF Demand	1,000	1,000	1,000
Total Required Supply	132	136	138
Booster Pump Station (Firm Capacity)[1]	690	690	690
Surplus/Deficiency	**(372)**	**(377)**	**(378)**

[1]The firm capacity of the pump station is the total capacity with the largest pump out of service.

The results of the analysis indicate that the booster pump station does not have sufficient capacity to meet new design manual criteria. This is due to a change in the DOH requirements for capacity evaluations of pump stations. Capacity evaluations of pump stations now must assume the largest pump is out of service, even if it is not regularly used. Chapter 9 includes recommendations on how to meet the new criteria.

8.5.3 Supply Reliability

The booster pump station houses four pumps and serves as a supply facility for the Weathervane Zone. The pump station has an emergency engine generator set equipped with an automatic transfer switch to enable operation of the station in the event of a power outage.

8.6 Storage Facilities

This section evaluates the City's existing water storage facilities to determine if they have sufficient capacity to meet the existing and future storage requirements of the system.

8.6.1 Analysis Criteria

Water storage requirements are typically defined by the following components: operational storage, equalizing storage, standby storage, fire flow storage, and dead storage (see Table 8-1). A description of each storage component and the criteria used to evaluate the capacity of the City's tanks is provided below.

Operational Storage: Operational storage is used to supply the water system under normal demand conditions. The operational storage in all the City's reservoirs is the volume of storage between the average water level of the reservoirs which signal a supply source to operate and the maximum water level (i.e., overflow elevation) of the reservoirs. The operational storage volume shown in **Table 8-4** is based on an operating range of 3 feet for the 0.2 MG High tank and the 0.6 MG Golf Course tank.

Equalizing Storage: When the source pumping capacity cannot meet the periodic daily (or longer) peak demands placed on the water system, equalizing storage must be provided as a part of the total storage for the system, and must be available at 30 psi to all service connections. The criteria for determining the equalizing storage requirements for the City's system is based on the equalizing calculation in the DOH equalizing storage equation shown in **Table 8-1.** The City's PHD is less than the supply firm capacity, so there is no equalization storage requirement.

Standby Storage: Standby storage is the portion of the reservoir used to supply the water system under emergency conditions when supply facilities are out of service. As shown in **Table 8-1**, the DOH allows water systems with multiple sources to require that standby volume supply PHD with the largest supply source out of service but recommends a minimum standby storage of 200 gallons per ERU in the system. **Table 8-4** calculates standby as the maximum of either the volume required to supply PHD for one day with the Well 9 out of service or the volume required to supply all ERUs at least 200 gallons.

Fire Flow Storage: The FF storage is the portion of the reservoir with sufficient volume to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest FF requirement. The volume of the FF storage is the product of the FF rate and duration of the system's maximum FF requirement. The required volume of FF storage shown in **Table 8-4** is the product of the maximum FF requirement of 2,500 gpm and its 2-hour duration.

Both standby storage and FF storage are considered emergency storage components. The City has elected to nest these two storage components, which results in only the larger of the two individual components being used in the required storage computation.

Dead Storage: Dead storage is the bottom portion of the reservoir that cannot be used because water is stored at an elevation that is too low to provide sufficient pressure. This unusable storage occupies the lower portion of many ground-level standpipe-type reservoirs. The High tank and Golf Course tank combined have approximately 0.2 MG of dead storage.

8.6.2 Analysis Approach

Similar to the supply facility analysis, the storage analyses are based on an evaluation of the existing tanks providing water to the system as a whole, since water from either tank may be utilized by all zones in the system through pressure reducing stations or the booster pump station.

8.6.3 Existing and Future Storage Analysis Results

The results of the storage analysis for the existing system indicate that the existing storage facilities have sufficient capacity to meet existing demands and approximately 0.76 MG of excess storage for the system. The future storage analysis was performed to determine the ability of the City's existing tanks to meet the future storage requirements, based on projected demands for years 2030 and 2040. The analysis results indicate that the existing storage facilities have sufficient capacity to meet the future demands of the system beyond the year 2040 based on the demand projections presented in Chapter 4. Table 8-5 summarizes the storage analysis.

Table 8-5
Storage Capacity Evaluation

Description	Existing System (2020)	Future System (2030)	Future System (2040)
Usable Storage (MG)			
Maximum Storage Capacity	1.85	1.85	1.85
Dead (Non-usable) Storage	0.21	0.21	0.21
Total Usable Storage	**1.64**	**1.64**	**1.64**
Required Storage (MG)			
Operational Storage	0.11	0.11	0.11
Equalizing Storage	0	0	0
Standby Storage	0.63	0.64	0.64
Fire Suppression Storage	0.6	0.6	0.6
Total Required Storage	**0.87**	**0.88**	**0.88**
Surplus Storage (MG)	0.77	0.76	0.76

8.7 Distribution and Transmission System Capacity Analysis

This section evaluates the City's existing distribution and transmission mains to determine if the water pipelines are sized and looped adequately to provide the necessary flow rates and pressures to meet the existing and future requirements of the system.

8.7.1 Hydraulic Model

Since the 2014 Plan the City has experienced minimal growth with no new developments and limited changes to demand. The FF requirements have also remained the same; the Tacoma Fire Department serves the City and has set the FF requirements of 1,000 gpm for residential areas and 2,500 gpm for commercial areas. Therefore, the previous hydraulic analysis and results are carried forward to this Plan. A summary of this analysis can be found in Appendix N.

The analysis was developed using Bently's WaterCAD Version 8, and the model was calibrated using FF tests. Their analysis includes scenarios for full build-out for each zone under PHD, MDD with FF, and CIP improvements necessary to meet fire flow requirements.

8.7.2 Hydraulic Analyses Results

The results of their hydraulic analysis showed no low-pressure deficiencies under PHD conditions but a few FF deficiencies low and weathervane pressure zones. The results of their FF analyses were used to propose improvements for water mains that are undersized or not looped adequately to provide sufficient FF. These improvements are discussed in more detail in Chapter 9.

8.8 System Capacity

System capacity analyses were performed to determine the maximum number of ERUs that the system can serve, based on an independent evaluation of each component of the City's water system (supply, storage, transmission). A separate analysis was performed for the existing system with 2019 demand levels and the future system with the year 2040 maximum projection demand levels. The results of these analyses provide the City with information to ensure sufficient capacity is available when reviewing applications for new connections to the water system and to assist in the scheduling of planned improvements that will increase supply, storage, or transmission capacity.

8.8.1 Analysis Criteria

The physical capacity of the City's water system and ability to serve additional customers is based on the limiting capacity of supply, storage, or distribution, whichever facility has the least capacity. The capacity analysis for supply was computed from the well capacities and the system's MDD per ERU. The capacity analysis for storage was computed from the total usable capacity of the storage facilities and the storage requirement per ERU. The storage requirement per ERU was determined from the existing storage requirement presented in this chapter and existing ERUs presented in Chapter 4. The capacity analysis for distribution was computed from the total capacity of the transmission mains sizes for the wells and the system's MDD per ERU. The ERU-based demand data was derived from the average day demand of the system and demand peaking factors from Chapter 4.

8.8.2 System Capacity Analysis Results

The results of the system capacity analysis, as shown in Table 8-6, indicate that the existing system has sufficient capacity to serve an additional 1,521 ERUs and the future system in the year 2040 with maximum demand projections will have sufficient capacity to serve an additional 1,448 ERUs. Storage capacity is the limiting factor of the system for both years, as shown in the table.

Table 8-6
System Capacity Analysis

Description of Capacity Parameter	Year	
Demands per ERU Basis	**2020**	**2040**
ADD per ERU (gpd/ERU)	230	230
MDD per ERU (gpd/ERU)	513	513
PHD per ERU (gpd/ERU)	867	867
Water Rights Capacity	**2020**	**2040**
Water Rights (Total, MGD)	4.38	4.38
MDD per ERU (gpd/ERU)	513	513
Maximum Supply Capacity (ERUs)	8,536	8,536
Source Capacity	**2020**	**2040**
Supply Capacity (Total, MGD)	4.32	4.32
MDD per ERU (gpd/ERU)	513	513
Maximum Supply Capacity (ERUs)	**8,418**	**8,418**
Storage Capacity	**2020**	**2040**
Maximum Usable Storage Capacity (MG)	1.6	1.6
Available Standby and Equalization Storage Capacity (MG)	0.9	0.9
Standby Storage Requirement per ERU (gal/ERU)	200	200
Equalizing Storage Requirement per ERU (gal/ERU)	0	0
Maximum Storage Capacity (ERUs)	**4,649**	**4,649**
Distribution System Capacity	**2020**	**2040**
MDD (gpm)	1,077	1,141
Maximum Fire Flow Requirement (gpm)	2,500	2,500
Capacity of 12" Main @ Velocity of 10 fps (gpm)	3,500	3,500
Capacity of 8" Main @ Velocity of 10 fps (gpm)	1,400	1,400
Remaining System Capacity (gpm)	1,323	1,259
Maximum Distribution Capacity (ERUs)	**10,448**	**10,268**
Maximum System Capacity	**2020**	**2040**
Based on Limiting Facility (ERUs)	4,649	4,649
Available System Capacity	**2020**	**2040**
Maximum System Capacity (ERUs)	4,649	4,649
Projected Average Day Demand (MGD)	0.72	0.74
Projected ERUs (ERUs)	3,128	3,201
Remaining System Capacity (ERUs)	**1,521**	**1,448**

[1]Note that distribution system leakage is included in the demand estimates.

As shown in the fire flow analysis (**Section 8.7**), required FF is not available at all points in the system due to undersized pipes within the distribution system; however, storage is the limiting system capacity factor for the system as a whole. Improvements to address system deficiencies are outlined in **Chapter 9.**

8.9 Asset Management

The City actively assesses and plans for the maintenance, repair, and replacement of its major assets. The City's preventive maintenance practices, as described in Chapter 7, allow the City to keep their assets in good condition, expending the useful life of its assets.

An inventory of the City's existing major water system assets was compiled for an asset condition assessment which will further inform the development of the City's 20-year CIP plan. A summary of the asset condition assessment is shown in Table 8-7. It reviews each asset's estimated age, general condition, and estimated remaining life expectancy.

Table 8-7
Asset Condition Assessment Summary

Asset	Construction Year	Age	Condition	Expected Lifespan	Estimated Replacement Year
Well 4	1971	49	Good	100	2071
Well 6	1962	58	Good	100	2062
Well 7	1965	55	Good	100	2065
Well 8	1969	51	Good	100	2069
Well 9	1958	62	Good	100	2058
Disinfection Facilities	2016	4	Excellent	50	2066
Weathervane BPS	2003	17	Good	50	2053
High Tank	1951	69	Acceptable	100	2051
Golf Course Tank	1966	54	Acceptable	100	2066
Low Tank	1980	40	Acceptable	100	2080

As the table shows, no major facility is expected to need replacement during this planning period. The City will continue to review their facilities to ensure adequate time for planning for the replacement of any major assets.

8.10 Summary

The City's water system is supplied by a reliable source and includes redundancy and storage which further improves reliability. The results of the water system analyses presented in this chapter indicate that the overall water system is in good operating condition and will require some improvements to ensure that a high level of service is maintained. Recommended improvements are presented in Chapter 9.

Chapter 9

Water System Improvements

9.1 Introduction

This chapter presents water system improvements that the City plans to implement within the 20-year planning period to resolve existing system deficiencies and meet the future demands of the water system. The water system improvements recommended in this chapter consider system deficiencies described in Chapter 8 as well as the City's knowledge of what facilities need to be maintained, renovated, or replaced. Recommended improvements have been sized to accommodate the projected demands shown in Chapter 4 and to meet the design standards and policies described in Chapter 5.

This chapter compiles this list of improvements into a CIP with planning-level project cost estimates and an implementation schedule. The CIP will help guide the City project planning efforts and its annual budgeting process.

9.2 Water System Improvements Completed Since 2014

Since the last Plan was prepared in 2014, the City has spent considerable time and expense improving their water system. The City installed approximately 3,400 linear feet of water main as well as facility improvements. The City hired consultants to conduct a rate study and design disinfection facilities in 2016. The City also continued several programs including its conservation and leak detection program, cross-connection control program, and updating its comprehensive water system plan.

A more detailed summary of the water system improvements completed since 2014 is presented in Table 9-1.

Table 9-1
Water System Improvements Completed Since 2014

2014 CWSP CIP No.	Project Description
1	Installed air gaps or soft starts at each well site
2	Installed fluoride monitors at each well site
3	Installed 1,000 linear feet of 8-inch piping on Golden Gate Avenue, from Princeton Street to Columbia Street
4	Installed 1,150 linear feet of 12-inch piping on Farallone Avenue, from Columbia Street to Princeton Street
6	Recoated the exterior of the High Tank reservoir
7	Installed 1,712 linear feet of 8-inch piping on Ramsdell Avenue, from Tot Lot to San Juan
8	Installed 700 linear feet of piping on Farallone Avenue, from Vassar Street to Golden Gate Avenue

9.2.1 New Water System Improvements

The water system improvements identified from the results of the distribution and transmission system analyses in Chapter 8 are listed in Table 9-2. The table also includes a brief description of each improvement and the deficiency it resolves. Most of the improvements are necessary to resolve existing system deficiencies.

The water system improvements are grouped into the following project type categories: Water Main Replacements (CIP R1), Water Main Looping (CIP L1 – L2), Facility Improvements (CIP F1- F3), and City-wide Programs (CIP CW1).

Table 9-2
Capital Improvement Program Projects

ID Num	Project Location or Name	Project Limits	Existing Deficiency	Proposed Improvement	Est Length (ft)	Estimated Cost
WATERMAIN REPLACEMENT					5,165	$1,950,000
R1	8" Watermain Replacement of Old & Undersized Mains	Citywide	On-going required watermain replacements	This project involves replacing old, leaking, or undersized mains to improve water quality, pressure, or fire flow capacity for deficient watermains.	5,165	$1,950,000
LOOPING					2,100	$843,000
L1	12" Watermain on Summit Avenue	Princeton St to Columbia St	Dead ends with insufficient looping, flow, and water quality	This project will install 12-inch DI looping to improve flow and water quality to the area.	950	$408,000
L2	8" Watermain on Eldorado Avenue	Princeton St to Columbia St	Dead ends with insufficient looping, flow, and water quality	This project will install 8-inch DI looping to improve flow and water quality to the area.	1,150	$435,000
FACILITIES						$1,250,000
F1	Golf Course 0.6 MG Tank Recoating	0.6 MG Reservoir	On-going water tank maintenance	This project involves repainting the existing Golf Course Tank to protect against corrosion, repair any lost paint due to aging, and beautify the tank.		$150,000
F2	Water Meter Upgrades and Software for Meter Reading Changes	Citywide		This project involves replacing existing water meters and the new software for reading meter changes.		$450,000
F3	Weathervane Zone Pump Station Firm Capacity Improvements	Weathervane Zone Pump Station	No longer meets DOH requirement for firm capacity	This project involves providing two additional 500 gpm pumps to the weathervane zone.		$650,000
CITYWIDE PROGRAM						$140,000
CW1	Comprehensive Plan	System Wide, every 10 years	On-going required comprehensive plan updates	This task involves the update of the Comprehensive Water System Plan every ten years to meet the requirements that are in effect at the time of the update. WAC 246-290-100 requires the City to update its Comprehensive Water System Plan every ten years and submit to the Department of Health for review and approval. Drinking water regulations are continuously changing and must be addressed in the City's Comprehensive Water System Plan.		$140,000

9.3 Project Cost Estimates

Project costs were estimated for each of the planned improvements and are presented in 2020 dollars. The planning-level project cost estimates include the estimated construction cost and indirect costs. The construction cost estimate portion includes all construction related costs, sales tax, and a 20 percent construction cost contingency. The indirect cost portion is estimated at 35 percent of the construction cost and is included to provide a budget amount for engineering (preliminary design, final design, and construction management services), surveying, permitting, legal, and administrative services.

9.3.1 Weathervane Pump Station Firm Capacity Improvement Options

Based on the capacity analysis in Chapter 8, the Weathervane Pump Station no longer meets the DOH revised firm capacity requirements. There are several alternatives to meet the firm capacity requirement including installing an additional high demand pump, upsizing the existing high demand pumps, or upsizing one of the low flow pumps. Since the pump station currently serves the Weathervane Pressure Zone with no issues, the firm capacity improvement is to be expected to occur within the 10- to 20-year planning period. However, should population growth occur within Weathervane Pressure Zone or other major infrastructure improvements be required, this project would move sooner in the planning timeline as discussed in Section 9.5.

9.3.1.1 Option 1 – Additional High Demand Pump

One option to address the firm capacity deficiency is to add a third 500 gpm pump. However, the existing pump station space is limited, so the additional pump and appurtenances would reduce the limited space and make maintenance more difficult to perform. In order to accommodate the additional pump, the pump station would have to increase in size, which increases the overall project cost. Overall, this option is estimated to be $1,100,000, but does not include possible generator upsizing or power service required improvements. In order to avoid structural and architectural improvements, other options include upsizing existing pumps.

9.3.1.2 Option 2 – Upsizing Existing High Demand Pumps

Currently the pump station has two 500 gpm pumps to meet high demand conditions. If these two pumps were upsized to 880 gpm each, then the station would meet the firm capacity requirement. This option would require more expensive pumps and appurtenances. The price of these pumps as well as the electrical improvements needed is estimated to be $650,000.

9.3.1.3 Option 3 – Upsizing an Existing Low Flow Pump

The pump station has two 95 gpm pumps for low flow operations. One of these pumps could be upsized to 500 gpm to meet the firm capacity requirements. However, that would reduce the existing redundancy of having two low flow pumps. This option's estimated costs are about $250,000 for a new pump, pump appurtenances, and electrical improvements.

For future planning, Table 9-4 shows the estimated cost for Option 2.

9.4 Water Main Cost Estimates

The water main costs were estimated based on pricing on RSMeans. Construction costs were added to the cost per linear foot to account for traffic and erosion control, valves and fittings, service line costs, restoration, and contractor profit. Indirect costs were added for engineering, sales tax, contingency, legal, and administrative services. Table 9-3 shows the estimated project cost per linear foot used for the water main project construction cost estimates.

9.5 Prioritizing Improvements

The planned improvements were prioritized based on project need, maintenance requirements, existing deficiencies, capacity requirements, and reliability considerations. The results of the priority ranking of the water main and all other improvements were used to schedule the improvements, as presented in the section that follows.

9.6 Schedule of Improvements

The implementation schedule shown in Table 9-4 includes the previously described water main improvements and all other improvements described earlier in this chapter that are planned in the next 20 years. This schedule is a useful planning tool for the City, but it cannot account for real-time or real-world changes which may create opportunities for projects to necessarily be constructed out of order. Some examples of this include funding opportunities like grants or loans, developer potential, property ownership changes or acquisitions, and other capital needs of the City and its related utilities or departments. Staff and managers of the water system should carefully review opportunities and make adjustments as deemed appropriate.

The project cost estimates shown in the table are based on 2020 dollars for all years shown. These cost estimates will be adjusted by the City at the time of project implementation to include an escalation factor that represents inflation and the construction market conditions anticipated at the actual time of construction. The financial program in Chapter 10 describes in more detail the escalation factor to be used for future project cost adjustments.

Table 9-3
Water Main Unit Costs for Construction

Pipe Dia (in)	Basic Cost ($/LF)	Mobilization 8% of Total	Traffic Control 2%	Erosion Control 2%	Valve & Fittings 25%	Service Lines ($/LF)	Restoration Cost ($/LF)	Contractor Overhead & Profit 10% of Total	Construction Value	Eng Design 20% of Total	Legal/ Admin 10% of Total	Sales Tax 9.9% of Total	Contingency 20% of Total	Planning Value
4	$47	$8	$1	$1	$12	$40	$80	$19	**$208**	$42	$21	$27	$59	**$356**
6	$44	$8	$1	$1	$11	$40	$81	$19	**$204**	$41	$20	$26	$58	**$350**
8	$54	$9	$1	$1	$14	$40	$82	$20	**$220**	$44	$22	$28	$63	**$378**
10	$62	$10	$1	$1	$16	$40	$83	$21	**$234**	$47	$23	$30	$67	**$401**
12	$72	$11	$1	$1	$18	$40	$84	$23	**$250**	$50	$25	$32	$72	**$429**
14	$85	$12	$2	$2	$21	$40	$85	$25	**$271**	$54	$27	$35	$78	**$465**
16	$96	$13	$2	$2	$24	$40	$86	$26	**$289**	$58	$29	$37	$83	**$496**

Table 9-4
Planned Improvements Implementation Schedule

ID Num	Description	Estimated Project Cost (2020 x$1,000)	20-Year Schedule of Improvements Planned Year of Project and Estimated Cost in 2020 (x$1,000)										
WATERMAIN REPLACEMENT			2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031-2040
R1	8" Watermain Replacement of Old & Undersized Mains	$1,950			$200	$200	$160	$160	$160		$160	$160	$750
LOOPING													
L1	12" Watermain on Summit Avenue	$408							$122	$286			
L2	8" Watermain on Eldorado Avenue	$435											$435
FACILITIES													
F1	Golf Course 0.6 MG Tank Recoating	$150			$60	$90							
F2	Water Meter Upgrades and Software for Meter Reading Changes	$450	$250	$200									
F3	Weathervane Zone Pump Station Firm Capacity Improvements	$650											$650
CITYWIDE PROGRAM													
CW1	Comprehensive Plan	$140										$70	$70
Total Annual Cost (note - average cost per year is shown for years beyond 2030)		$4,183	$250	$200	$260	$290	$160	$160	$282	$286	$160	$230	$1,905

Chapter 10

Financial Analysis

TO BE PROVIDED AS SOON AS POSSIBLE.

WATER INTERTIE AGREEMENT

BETWEEN

CITY OF TACOMA AND CITY OF FIRCREST

This agreement made and entered into this 3rd day of June, 1992, by and between the City of Tacoma (hereinafter referred to as "Tacoma"), and the City of Fircrest (hereinafter referred to as "Fircrest"), WITNESSETH THAT:

A. RECITALS:

WHEREAS, Fircrest and Tacoma are responsible for operating and maintaining a public water system in accordance with federal, state, and local laws and regulations, and

WHEREAS, the parties recognize the responsibility of public water utilities to provide for the highest quality of water and reliability of service to their customers at reasonable cost, and

WHEREAS, the parties further recognize that water resources are finite and vulnerable, and the prudent use and management of these resources requires cooperation among water utilities, and

WHEREAS, both Fircrest and Tacoma have water system facilities which can be interconnected so as to be mutually beneficial to both utilities during periods of a system emergency,

NOW THEREFORE, it is agreed that Fircrest and Tacoma may provide for interties of water mains and as to all such future interties, as well as existing interties as documented in the Appendices, the terms and conditions contained herein shall apply.

B. DEFINITIONS:

The definition of certain terms, as used later in this agreement, are as follows:

INTERTIE: A physical connection between water mains of the two parties to this agreement, at specifically identified points, where water may be transferred from the supplies of one system to the transmission or distribution facilities of the other.

FAX TRANSMITTAL	# of pages 4
To: Eric Winckler	From: Don Morrison
Co. EPA	Co. The City of Fircrest
Dept.	Phone # (206) 564-8900
Fax # 206-553-0124	Fax # (206) 566-0762

WATER INTERTIE AGREEMENT

BETWEEN

CITY OF TACOMA AND CITY OF FIRCREST

This agreement made and entered into this 3rd day of June, 1992, by and between the City of Tacoma (hereinafter referred to as "Tacoma"), and the City of Fircrest (hereinafter referred to as "Fircrest"), WITNESSETH THAT:

A. RECITALS:

WHEREAS, Fircrest and Tacoma are responsible for operating and maintaining a public water system in accordance with federal, state, and local laws and regulations, and

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WHEREAS, the parties further recognize that water resources are finite and vulnerable, and the prudent use and management of these resources requires cooperation among water utilities, and

WHEREAS, both Fircrest and Tacoma have water system facilities which can be interconnected so as to be mutually beneficial to both utilities during periods of a system emergency,

NOW THEREFORE, it is agreed that Fircrest and Tacoma may provide for interties of water mains and as to all such future interties, as well as existing interties as documented in the Appendices, the terms and conditions contained herein shall apply.

B. DEFINITIONS:

The definition of certain terms, as used later in this agreement, are as follows:

INTERTIE: A physical connection between water mains of the two parties to this agreement, at specifically identified points, where water may be transferred from the supplies of one system to the transmission or distribution facilities of the other.

SURPLUS PRODUCTION CAPACITY: Volumetric rate of available water supply, from the sources of the supplying water system, which can be transferred through an intertie after all service requirements to the customers of the supplying system are met.

ISOLATION VALVE: A positive shut off valve which shall be installed at the point in each water system which is used to accept or deliver water through the intertie. The isolation valve is defined as part of the system connected to the intertie and not part of the intertie. Each connected system has sole responsibility for providing and operating their isolation valve.

MINIMUM REQUESTED CAPACITY: A minimum flow capacity for water to be delivered through an intertie. Intertie facilities shall be designed so as to afford the agreed upon minimum requested by either party to this agreement, and the availability of sufficient flow from the system shall be certified by the supplying utility. The minimum requested capacities shall be the principal basis of negotiating cost sharing of construction of intertie facilities.

C. CONDITIONS:

1. Existing interties shall be governed by the terms of this agreement. No future interties shall be permissible without a subsequent and separate agreement between the parties. Any such agreement shall be negotiated by and between the parties in accordance with the terms contained herein; however, neither party shall be obligated to agree to or execute any such agreement or permit the other party to construct a water intertie.

2. All water interties, presently existing or to be constructed in the future, shall be utilized only in emergency situations.

3. Cost of providing joint use facilities and equipment such as pumps, buildings, and other appurtenances shall be agreed upon prior to the construction thereof. Such costs shall be shared on the basis of mutual benefit which may be determined in each case by establishing a minimum requested capacity for each utility. Maintenance costs shall also be agreed upon and shall be borne of the basis of benefit/use of the intertie.

4. Each utility shall be responsible for installing, operating, and maintaining an isolation valve, which is identified as the point of delivery and does not include the building or vault and appurtenances.

5. Neither party shall be liable for failure to deliver water to the other party at any time. If water is provided, it shall be provided only from surplus production and/or storage capacity of the supplying utility as determined at the time of intertie operation.

6. Except as otherwise provided herein, the supplying utility shall charge the receiving utility for water supplied on the basis of unit cost. Unit cost of supplied water shall be based on a rate determined by evaluation of production, transmission, and distribution cost components applied to water delivered. A water rate shall be established by each party at the time of this agreement and shall remain in effect until March 1 of the succeeding year. The rates may be adjusted annually thereafter, as set forth in an adopted rate schedule.

7. The party requesting water shall submit a written request to the supplying utility, and the supplying utility must give written permission prior to the transference of any water to the requesting utility. Should, however, a situation arise necessitating the supply of water immediately, a verbal request shall initially be sufficient, followed by a written request. Verbal authorization, however, must be obtained from the supplying party before obtaining any water. Each party shall designate, in writing, an authorized person(s) who has authority to evaluate such a verbal request and determine whether such a request should be granted. Tacoma will install the meter regardless of which party is requesting emergency water.

8. The City of Tacoma and City of Fircrest agree that their respective city owned utilities shall have the right to construct, install, own, and maintain utility transmission facilities in the streets or other rights-of-way of the other respective municipality without being subject to franchise fees or other costs, and subject only to the usual and accustomed permits, any actual administrative costs, franchise agreement requirements, ordinances, and charter provisions. The City of Tacoma and the City of Fircrest agree that this provision shall not enable either entity to encroach upon the established utility service areas of either entity.

9. Termination of any intertie by either party shall be preceded by not less than 12 months written notice.

CITY OF TACOMA

By _____
Director of Utilities

By _____
~~for~~ Director of Public Works

Approved as to form & legality:

_____
~~Chief~~ Asst. City Attorney

CITY OF FIRCREST

By _____
City Manager

Attest:

By _____
City Clerk

Approved as to form & legality:

_____
City Attorney

1839

3.12.00

Tacoma, City of

City of Fircrest
Contract Information Cover Sheer

Company/ Municipality	Tacoma, City of		
Start Date	1/13/05		
End Date	1/13/25		20yrs
Service	Water Franchise - non-exclusive		
Department	PW		
Resolution No.	CRD 1354	Date	10/12/04
Notification to Cancel	Tacoma accepted 1/13/2005		

Comments	
payments due 30 days past end of quarter. 6%	

CITY OF FIRCREST
ORDINANCE NO. 1354

AN ORDINANCE OF THE CITY OF FIRCREST, WASHINGTON, GRANTING UNTO THE CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES, WATER DIVISION, A MUNICIPAL CORPORATION, ITS SUCCESSORS AND ASSIGNS, THE RIGHT, PRIVILEGE, AUTHORITY AND NONEXCLUSIVE FRANCHISE FOR TWENTY YEARS, TO CONSTRUCT, MAINTAIN, OPERATE, REPLACE AND REPAIR ANY WATER SYSTEM, IN, ACROSS, OVER, ALONG, UNDER, THROUGH AND BELOW CERTAIN DESIGNATED PUBLIC RIGHTS-OF-WAY OF THE CITY OF FIRCREST, WASHINGTON.

WHEREAS, the City of Fircrest requires that the Tacoma Department of Public Utilities, Water Division obtain a non-exclusive franchise for the purpose of operating potable water systems within portions of the City of Fircrest; and

WHEREAS, the five year extension period, pursuant to RCW 35A.14.900 and approved by City of Fircrest Ordinance No. 1242 has expired, and

WHEREAS, the City Council has the authority to grant franchises for the use of its streets and other public properties (RCW 35A.47.040);

NOW THEREFORE, THE CITY COUNCIL OF THE CITY OF FIRCREST, WASHINGTON, DO ORDAIN AS FOLLOWS:

Section 1. Franchise Granted. Pursuant to RCW 35A.47.040, the City of Fircrest, a Washington municipal corporation (hereinafter the "City"), hereby grants to City of Tacoma, Department of Public Utilities, Water Division, a municipal corporation organized under the laws of the State of Washington (hereinafter "Grantee"), its heirs, successors, legal representatives and assigns, subject to the terms and conditions hereinafter set forth, a franchise for a period of twenty (20) years, beginning on the effective date of this ordinance.

This franchise grants the Grantee the right, privilege and authority to construct, operate, maintain, replace, and use all necessary equipment and facilities for a water system, in, under, on, across, over, through, along or below the public rights-of-way and public places located in the City of Fircrest, as approved under City permits issued pursuant to this franchise.

Section 2. Non-Exclusive Franchise Grant. This franchise is granted upon the express condition that it shall not in any manner prevent the City from granting other or further franchises in, along, over, through, under, below or across any of said rights-of-way, streets, avenues or all other public lands and properties of every type and description. Such franchise shall in no way prevent or prohibit the City from using any said roads, streets or other public properties or affect its jurisdiction over them or any part of them, and the City shall retain power to make all necessary changes, relocations, repairs, maintenance, establishment, improvement, dedication of same as the City may deem fit, including the dedication, establishment, maintenance, and improvement of all new rights-of-way, thoroughfares and other public properties of every type and description. It is provided, however, the City agrees not to compete with Grantee as a water system or provider of water in the current service area of the Grantee during the period of this Franchise.

Section 3. Relocation of Water Facilities. The Grantee agrees and covenants at its sole cost and expense, to protect, support, temporarily disconnect, relocate or remove from any street, any component of its installations when so required by the City by reason of traffic conditions or public safety, dedications of new rights-of-way and the establishment and improvement thereof, widening and improvement of existing rights-of-way, street vacations, freeway construction, change or establishment of street grade, or the construction of any public improvement or structure by the City,

provided that the Grantee shall in all such cases have the privilege to temporarily bypass, in the authorized portion of the same street upon approval by the City, any section of water line or facility required to be temporarily disconnected or removed. The provisions of this section shall not be applicable if the relocation need results from a private development, use or activity.

If the City determines that the project necessitates the relocation of the Grantee's then existing facilities, the City shall:

(A) At least ninety (90) days prior to commencement of construction of such improvement project, provide the grantee with written notice and plans requiring such relocation, unless another time period for the notice is agreed to by the parties for a particular project; and

(B) Provide the Grantee with copies of pertinent portions of the plans and specifications for such improvement project and a proposed location for the Grantee's facilities so that the Grantee may relocate its facilities in other City rights-of-way in order to accommodate such improvement project.

After receipt of such notice and such plans and specifications, the Grantee shall complete relocation of its facilities at no charge or expense to the City (except as hereinafter provided) so as to accommodate the improvement project construction schedule.

The Grantee may, after receipt of written notice requesting a relocation of its facilities, submit to the City written alternatives to such relocation. The City shall evaluate such alternatives and advise the Grantee in writing if one or more of the alternatives is suitable to accommodate the work, which would otherwise necessitate relocation of the facilities. If so requested by the City, the Grantee shall submit additional information to assist the City in making such evaluation. The City shall give each alternative proposed by the Grantee full and fair consideration. In the event the City ultimately determines that there is no other reasonable alternative, the Grantee shall relocate its facilities as otherwise provided in this Section. Provided, however, the parties agree to exercise good faith, reasonable and timely decision making especially when issues arise in the field pertaining to relocations. The provisions of this Section shall survive the expiration or termination of this franchise agreement.

The provisions of this Section shall in no manner preclude or restrict the Grantee from making any arrangement it may deem appropriate when responding to a request for relocation of its facilities by any person or entity other than the City, where the facilities to be constructed by said person or entity are not or will not become City-owned, operated or maintained facilities, provided that such arrangements do not unduly delay a City construction project. The City on occasion will be constructing, reconstructing and/or relocating roads, streets, public ways, areas or facilities within the right-of-way or property, which will require Grantee to install and/or relocate part of its water system. Grantee will be relying on the alignment, lines and grades as set forth in City's approved plans wherein Grantee thereafter constructs or reconstructs its water system in accordance with City's requirements and City standards. Therefore, if City thereafter again adjusts and/or revises the alignment, line or grade for a road, street, public way or area, before this part of the Grantee's water system has been in place for fifteen (15) years (commencing with the initial City revision), then City agrees to reimburse Grantee a pro rata share of the total relocation costs based on fifteen (15) year life expectancy for the portion of Grantee's water system that is affected by the City revision unless differently agreed to in writing by City and Grantee at the time of the installation or relocation.

Section 4. Consideration For Agreement.

(A) The consideration for this agreement includes, but is not limited to, the mutual and individual benefits of this agreement that allow each of the parties the ability to make long term planning decisions in light of the provisions set forth herein, and the non-competition provisions as provided in Section 16 of this agreement.

(B) If the City grants to any other water provider a franchise with terms that are overall more favorable than those set forth herein, Grantee shall have the right to renegotiate the provisions of this franchise that Grantee believes are overall more favorable than those set forth herein. Grantee shall also have the right to renegotiate the provisions of this franchise that are affected by a substantial change in state or federal law that would allow the City the opportunity to tax and assess additional revenue from the Grantee's operations within the corporate boundaries of the City.

In the case where the parties do not agree on the renegotiation or identification of affected provisions of this franchise, the parties agree to a binding arbitration process as follows: Each of the parties shall select an arbitrator, and the two arbitrators shall select a third arbitrator. In accordance with the procedures of Chapter 7.04 of the Revised Code of Washington, the panel of three arbitrators shall review the evidence and authorities presented by the parties and hear the argument of the parties, and thereafter decide the issue(s) presented for arbitration. The arbitrators shall be authorized to require each party to provide to the other reasonable discovery. The arbitrators shall render their decision based upon their interpretation of the provisions of this franchise agreement. The arbitrators are not empowered to modify or amend the text of this franchise agreement. The parties agree to be bound by the decisions of the panel of arbitrators as to the identification of affected provisions of this franchise and/or the re-negotiation thereof.

If there is a substantial change in the law that undermines the ability of one or both or the parties to receive the benefits of this agreement, one or both of the parties may re-open this agreement to address the terms affected by the substantial change in the law.

Section 5. The Grantee's Maps, Records and Plans. After any construction is complete, and at a reasonable time thereafter, the Grantee shall provide to the City upon request and at no cost, a copy of all as-built plans, maps and records.

Section 6. Excavations. During any period of relocation, construction or maintenance, all surface structures, if any, shall be erected and used in such places and positions within said public rights-of-way and other public properties so as to interfere as little as practicable with the free passage of traffic and the free use of adjoining property, and the Grantee shall at all times post and maintain proper barricades and comply with all applicable safety regulations during such period of construction as required by the ordinances of the City or the laws of the State of Washington.

Whenever the Grantee shall excavate in any public right-of-way or other public property for the purpose of installation, construction, repair, maintenance or relocation of its facilities, it shall apply to the City for a permit to do so and upon obtaining a permit shall give the City at least forty-eight (48) hours notice during normal work week of the Grantee's intent to commence work in the public right-of-way. In no case shall any work commence within any public right-of-way or other public property without a permit, except as otherwise provided in this franchise ordinance. During the progress of the work the Grantee shall not unnecessarily obstruct the passage or proper use of the right-of-way, and shall file as-built plans or maps with the City showing the proposed and final location of its facilities.

If either the City or the Grantee shall at any time plan to make excavations in any area covered by this franchise and as described in this Section, the party planning such excavation shall afford the other, upon receipt of a written request to do so, an opportunity to share such excavation, PROVIDED THAT:

(A) Such joint use shall not unreasonably delay the work of the party causing the excavation to be made;

(B) Such joint use shall be arranged and accomplished on terms and conditions satisfactory to both parties; and

(C) Either party may deny such request for safety reasons. The provisions of this Section shall survive the expiration or termination of this franchise agreement.

(D) Such joint use shall be in compliance with Tacoma Water's utility separation requirements, as detailed in Attachment "A" of this agreement.

Section 7. Restoration after Construction. The Grantee shall, after abandonment approved under Section 13 herein, or installation, construction, relocation, maintenance, or repair of water facilities within the franchise area, restore the surface of the right-of-way or pubic property to at least the same condition the property was in immediately prior to any such installation, construction, relocation, maintenance or repair. The Public Works Director shall have final approval of the condition of such streets and public places after restoration. All concrete encased monuments which have been disturbed or displaced by such work shall be restored pursuant to all federal, state and local standards and specifications. The Grantee agrees to promptly complete all restoration work and to promptly repair any damage caused by such work to the franchise area or other affected area at its sole cost and expense. The provisions of this Section shall survive the expiration, revocation or termination by other means of this franchise.

Section 8. Emergency Work – Permit Waiver. In the event of any emergency in which any of the Grantee's facilities located in or under any street, breaks, are damaged, or if the Grantee's construction area is otherwise in such a condition as to immediately endanger the property, life, health, or safety of any individual, the Grantee shall immediately take the proper emergency measures to repair its facilities, to cure or remedy the dangerous condition for the protection of property, life, health or safety of individuals without first applying for and obtaining a permit as required by this franchise. However, this shall not relieve the Grantee from the requirement of obtaining any permits necessary for this purpose, and the Grantee shall apply for all such permits not later than the next succeeding day during which City Hall is open for business. Grantee shall make every reasonable effort to notify Grantor of the necessity to perform emergency work prior to conducting such work.

Section 9. Dangerous Conditions, Authority for City to Abate. Whenever construction, installation or excavation of facilities authorized by this franchise has caused or contributed to a condition that appears to substantially impair the lateral support of the adjoining street or public place, or endangers the public, an adjoining public place, street utilities or City property, the Public Works Director may direct the Grantee, at the Grantee's own expense, to take actions to protect the public, adjacent public places, City property or street utilities, and such action may include compliance within a prescribed time.

In the event that the Grantee fails or refuses to promptly take the actions directed by the City, or fails to fully comply with such directions, or if emergency conditions exist which require immediate action, the City may enter upon the property and take such actions as are necessary to protect the public, the adjacent streets, or street utilities, or to maintain the lateral support thereof, or actions regarded as necessary safety precautions; and the Grantee shall be liable to the City for the costs thereof. The provisions of this Section shall survive the expiration, revocation or termination of this franchise. Grantee shall relocate, at its cost, any structures that the City Public Works Director objectively determines are located in a place or in a way so as to constitute a danger to the public.

Section 10. Permits and Fees. Grantee shall be required to obtain all permits from the City necessary for work in the City and/or in the City's rights-of-way. During the term of this franchise, Grantee and contractors of Grantee shall pay for all permit fees associated with projects of Grantee located within the corporate limits of the City, pursuant to the applicable City fee schedules.

In addition to the above, the Grantee shall promptly reimburse the City for any and all costs the City reasonably incurs in response to any emergency caused by the negligence of the Grantee. City agrees to process Grantee's and Grantee's contractors permits in the same expeditious manner as other permit applicants' permits are processed. Permits may be processed by facsimile or other electronic means.

Section 11. Indemnification. The Grantee hereby releases, covenants not to bring suit and agrees to indemnify, defend and hold harmless the City, its officers, employees, agents and representatives from any and all claims, costs, judgments, awards or liability to any person, including claims by the Grantee's own employees to which the Grantee might otherwise be immune under Title 51 RCW, arising from injury or death of any person or damage to property, monetary losses, including refunds of charges or fees paid by customers, of which it is alleged or proven that the acts or omissions of the Grantee, its agents, servants, officers or employees in performing this franchise caused or contributed thereto, including claims arising against the City by virtue of the City's ownership or control of the rights-of-way or other public properties, by virtue of the Grantee's exercise of the rights granted herein, including payment of any monies to the City, or by virtue of the City's permitting the Grantee's use of the City's rights-of-way or other public property, based upon the City's inspection or lack of inspection of work performed by the Grantee, its agents and servants, officers or employees in connection with work authorized on the City's property or property over which the City has control, pursuant to this franchise or pursuant to any other permit or approval issued in connection with this franchise.

Inspection or acceptance by the City of any work performed by the Grantee at the time of completion of construction shall not be grounds for avoidance of any of these covenants of indemnification. Said indemnification obligations shall extend to claims which are not reduced to a suit and any claims which may be compromised prior to the culmination of any litigation or the institution of any litigation.

In the event that the Grantee refuses the tender of defense in any suit or any claim, said tender having been made pursuant to the indemnification clauses contained herein, and said refusal is subsequently determined by a court having jurisdiction (or such other tribunal that the parties shall agree to decide the matter), to have been a wrongful refusal on the part of the Grantee, then the Grantee shall pay all of the City's costs for defense of the action, including all reasonable expert witness fees and reasonable attorney's fees and the reasonable costs of the City, including reasonable attorney's fees of recovering under this indemnification clause.

In the event of liability for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of the Grantee and the City, its officers, employees and agents, the Grantee's liability hereunder shall be only to the extent of the Grantee's negligence unless otherwise provided by law. It is further specifically and expressly understood that the indemnification provided herein constitutes the Grantee's waiver of immunity under Title 51 RCW, solely for the purposes of this indemnification. This waiver has been mutually negotiated by the parties.

The provisions of this Section shall survive the expiration or termination of this franchise agreement.

Section 12. Insurance. Grantee is currently self-insured and has excess insurance coverage for potential liability in excess of its self-insured retention amounts. To the extent that Grantee is legally obligated by this franchise, Grantee's self insurance fund and/or insurance policies shall provide adequate protection to the City in amounts equivalent to the levels set forth herein below. Grantee's general comprehensive liability policy, which includes automobile liability coverage (if such a policy continues to be obtained), shall have an endorsement naming the City and its officers and employees as additional insured for their actions pursuant to this franchise.

The amounts of insurance coverage that the Grantee shall maintain, whether by self insurance or insurance policies shall not be the equivalent of less than the following:

(A) Automobile Liability insurance with limits no less than $1,000,000 combined single limit per accident for bodily injury and property damage; and

(B) Commercial General Liability insurance, written on an occurrence basis with limits no less than $1,000,000 combined single limit per occurrence and $2,000,000

aggregate for personal injury, bodily injury and property damage. Coverage shall include but not be limited to: blanket contractual; products/completed operations; broad form property damage; explosion, collapse and underground (XCU); and employer's liability.

Any deductibles or self-insured retentions must be declared to and approved by the City. Payment of deductible or self-insured retention shall be the sole responsibility of the Grantee.

Any insurance policy(ies) obtained by the Grantee to comply herewith shall name the City (its officers, employees and volunteers), as an additional insured with regard to activities performed by or on behalf of the Grantee. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers. In addition, the insurance policy shall contain a clause stating that coverage shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability. The Grantee's insurance shall be primary insurance with respect to the City, its officers, officials, employees and volunteers. Any insurance policy or policies obtained by the Grantee to comply with this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

Any failure to comply with the insurance reporting provisions of the policies required herein shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

Section 13. Abandonment of the Grantee's Facilities. No water line larger than 12 inches or significant facility installed by the Grantee under street pavement may be abandoned by the Grantee without the express written consent of the City. Any proposal for abandonment that requires City consent or removal of the Grantee's facilities subject to this section must be first approved by the Public Works Director, and all necessary permits must be obtained prior to such work. If any abandoned facility conflicts with City projects (i.e., storm sewer improvement or lowering the profile of a road), the Grantee will remove the abandoned facility at its own expense. The provisions of this Section shall survive the expiration, revocation or termination of this franchise agreement.

Section 14. Street Vacations. City may have occasion to vacate certain streets, public ways or areas that have Grantee's lines and facilities located thereon. City agrees to exert reasonable good faith efforts to reserve an easement for Grantee's lines and facilities when a street, public way or area is vacated. If it is not feasible for City to reserve an easement for Grantee's line(s) and facilities, the proponents of the vacation shall be required (by the City) as part of land use or other permitting approvals, to reimburse Grantee all costs to relocate said line(s) and facilities.

Section 15. Modification. The City and the Grantee hereby reserve the right to alter, amend or modify the terms and conditions of this franchise upon written agreement of both parties to such alteration, amendment or modification.

Section 16. Exercise of City Authority. The parties acknowledge that the City has authority to operate its own water system and also has authority to contract with other public or private entities for the purchase of water. Grantee's long range planning would be improved, and its rate structure stabilized if the City did not elect to exercise its authority in the service area of the Grantee. Therefore, Grantee agrees that for and in consideration of the City not exercising its authority to operate its own water system in the service area served by Grantee, or not contracting with other public or private entities for the purchase of water in said service area, and the other factors of consideration set forth in Section 4 of this agreement, Grantee shall pay to the City an annual fee in the amount of 6% of gross revenues Grantee receives from Grantee's water system customers served from Grantee's water system located within City's street rights-of-way, as defined further in this section. Gross revenues means

money or funds received by reason of transaction of water utility service business including sales of water to customers. Gross revenue does not include: (a) uncollected amounts; (b) amounts received from condemnation award or condemnation settlements; (c) amounts received as compensation or reimbursement of damages to or protection of any property of Grantee; (d) amounts received as compensation for or in aid to construction; (e) amounts collected as sales tax; (f) discounts, returns, allowances and repossessions; and (g) amounts received from surcharge to water rates for system improvements necessary to meet Grantee's standards.

The payments to the City shall be made quarterly, in four equal payments each year, on or before March 31, June 30, September 30, and December 31 each year during the term hereof. It is provided, however, that absent any Federal, State or other governmental laws or regulations to the contrary, such payments made by the Grantee to the City shall not result in a surcharge to the customers in the City of Fircrest. It is further provided that nothing herein shall be deemed to impair the authority of the City to exercise its governmental powers.

Section 17. Forfeiture and Revocation. If the Grantee willfully violates or fails to comply with any of the provisions of this franchise, or through willful misconduct or gross negligence fails to heed or comply with any notice given the Grantee by the City under the provisions of this franchise, then the Grantee shall, at the election of the Fircrest City Council, forfeit all rights conferred hereunder and this franchise may be revoked or annulled by the Council after a hearing held upon reasonable notice to the Grantee. The City may elect, in lieu of the above and without any prejudice to any of its other legal rights and remedies, to obtain an order from the superior court having jurisdiction compelling the Grantee to comply with the provisions of this Ordinance and to recover damages and costs incurred by the City by reason of the Grantee's failure to comply.

Section 18. Remedies to Enforce Compliance. In addition to any other remedy provided herein, the City reserves the right to pursue any remedy to compel or force the Grantee and/or its successors and assigns to comply with the terms hereof, and the pursuit of any right or remedy by the City shall not prevent the City from thereafter declaring a forfeiture or revocation for breach of the conditions herein.

Section 19. City Ordinances and Regulations. Nothing herein shall be deemed to direct or restrict the City's ability to adopt and enforce all necessary and appropriate ordinances regulating the performance of the conditions of this franchise, including any valid ordinance made in the exercise of its police powers in the interest of public safety and for the welfare of the public. The City shall have the authority at all times to control by appropriate regulations the location, elevation, manner of construction and maintenance of any facilities by the Grantee, and the Grantee shall promptly conform with all such regulations, unless compliance would cause the Grantee to violate other requirements of law.

Section 20. Cost of Publication. The cost of the publication of this Ordinance shall be borne by the Grantee.

Section 21. Acceptance. Within sixty days after the passage and approval of this Ordinance, this franchise may be accepted by the Grantee by its filing with the City Clerk an unconditional written acceptance thereof. Failure of the Grantee to so accept this franchise within said period of time shall be deemed a rejection thereof by the Grantee, and the rights and privileges herein granted shall, after the expiration of the sixty (60) day period, absolutely cease and determine, unless the time period is extended by ordinance duly passed for that purpose.

Section 22. Survival. All of the provisions, conditions and requirements of Section 3, Relocation of Water Facilities; 9, Dangerous Conditions; 11, Indemnification; and 13, Abandonment of the Grantee's Facilities, of this franchise shall be in addition to any and all other obligations and liabilities the Grantee may have to the City at common law, by statute, or by contract, and shall survive the City's franchise to the Grantee for the use of the areas mentioned in Section 1 herein, and any

renewals or extensions thereof (however, such survival period extends only through the applicable statute of limitations period). All of the provisions, conditions, regulations and requirements contained in the franchise ordinance shall further be binding upon the heirs, successors, executors, administrators, legal representatives and assigns of the Grantee and all privileges, as well as all obligations and liabilities of the Grantee shall inure to its heirs, successors, executors, administrators, legal representatives and assigns of the Grantee and all privileges, as well as all obligations and liabilities of the Grantee shall inure to its heirs, successors and assigns equally as if they were specifically mentioned wherever the Grantee is named herein.

Section 23. Severability. If any section, sentence, clause or phrase of this Ordinance should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause or phrase of this franchise Ordinance. In the event that any of the provisions of this franchise are held to be invalid by a court of competent jurisdiction, the City reserves the right to reconsider the grant of this franchise and may amend, repeal, add, replace or modify any other provisions of this franchise, or may terminate this franchise.

Section 24. Assignment. This agreement may not be assigned or transferred without the written approval of the City, except the Grantee may freely assign this Agreement in whole or in part to a parent, subsidiary, or affiliated corporation or as part of any corporate financing, reorganization or refinancing and provided that the City's approval shall not be unreasonably withheld. In the case of transfer or assignment as security by mortgage or other security instrument in whole or in part to secure indebtedness, such consent shall not be required unless and until the secured party elects to realize upon the collateral. The Grantee shall provide prompt, written notice to the City of any such assignment.

Section 25. Notice. Any notice or information required or permitted to be given to the parties under this franchise agreement may be sent to the following addresses unless otherwise specified:

City of Fircrest
Attn: City Manager or designee
115 Ramsdell Street
Fircrest, WA 98466

City of Tacoma
Department of Public Utilities
Water Division
3628 South 35th Street
Tacoma WA 98409
Attention: Water Superintendent

Section 26. Effective Date.

(A) This Franchise and the rights, privileges, and authority granted hereunder and the contractual relationship established hereby shall take effect and be in force from and after the effective date of this Franchise as specified in this Section.

(B) Within sixty (60) days after passage of this ordinance by the Fircrest City Council, Grantee shall signify its acceptance of this Franchise by executing a written acceptance of this Franchise

(C) The effective date of this Franchise shall be the date on which it is accepted in writing by Grantee.

APPROVED AND ADOPTED this 12th day of October 2004 at the regular meeting of the City Council of the City of Fircrest.

CITY OF FIRCREST

MAYOR

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

Date of Publication: FEB. 16, 2005

Effective Date: JAN. 13, 2005

Franchise Ordinance No. 1354

ACCEPTED this 13th day of January, 2005, subject to applicable federal, state and local law.

City of Tacoma Department of Public Utilities, Water Division, (dba) Tacoma Water, providing water services as Tacoma Water

By: Water Superintendent

By: Director of Utilities

Approved As To Form & Legality:

~~Chief~~ Assistant City Attorney

CITY OF FIRCREST
ORDINANCE NO. 1354

AN ORDINANCE OF THE CITY OF FIRCREST, WASHINGTON, GRANTING UNTO THE CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES, WATER DIVISION, A MUNICIPAL CORPORATION, ITS SUCCESSORS AND ASSIGNS, THE RIGHT, PRIVILEGE, AUTHORITY AND NONEXCLUSIVE FRANCHISE FOR TWENTY YEARS, TO CONSTRUCT, MAINTAIN, OPERATE, REPLACE AND REPAIR ANY WATER SYSTEM, IN, ACROSS, OVER, ALONG, UNDER, THROUGH AND BELOW CERTAIN DESIGNATED PUBLIC RIGHTS-OF-WAY OF THE CITY OF FIRCREST, WASHINGTON.

WHEREAS, the City of Fircrest requires that the Tacoma Department of Public Utilities, Water Division obtain a non-exclusive franchise for the purpose of operating potable water systems within portions of the City of Fircrest; and

WHEREAS, the five year extension period, pursuant to RCW 35A.14.900 and approved by City of Fircrest Ordinance No. 1242 has expired, and

WHEREAS, the City Council has the authority to grant franchises for the use of its streets and other public properties (RCW 35A.47.040);

NOW THEREFORE, THE CITY COUNCIL OF THE CITY OF FIRCREST, WASHINGTON, DO ORDAIN AS FOLLOWS:

Section 1. Franchise Granted. Pursuant to RCW 35A.47.040, the City of Fircrest, a Washington municipal corporation (hereinafter the "City"), hereby grants to City of Tacoma, Department of Public Utilities, Water Division, a municipal corporation organized under the laws of the State of Washington (hereinafter "Grantee"), its heirs, successors, legal representatives and assigns, subject to the terms and conditions hereinafter set forth, a franchise for a period of twenty (20) years, beginning on the effective date of this ordinance.

This franchise grants the Grantee the right, privilege and authority to construct, operate, maintain, replace, and use all necessary equipment and facilities for a water system, in, under, on, across, over, through, along or below the public rights-of-way and public places located in the City of Fircrest, as approved under City permits issued pursuant to this franchise.

Section 2. Non-Exclusive Franchise Grant. This franchise is granted upon the express condition that it shall not in any manner prevent the City from granting other or further franchises in, along, over, through, under, below or across any of said rights-of-way, streets, avenues or all other public lands and properties of every type and description. Such franchise shall in no way prevent or prohibit the City from using any said roads, streets or other public properties or affect its jurisdiction over them or any part of them, and the City shall retain power to make all necessary changes, relocations, repairs, maintenance, establishment, improvement, dedication of same as the City may deem fit, including the dedication, establishment, maintenance, and improvement of all new rights-of-way, thoroughfares and other public properties of every type and description. It is provided, however, the City agrees not to compete with Grantee as a water system or provider of water in the current service area of the Grantee during the period of this Franchise.

Section 3. Relocation of Water Facilities. The Grantee agrees and covenants at its sole cost and expense, to protect, support, temporarily disconnect, relocate or remove from any street, any component of its installations when so required by the City by reason of traffic conditions or public safety, dedications of new rights-of-way and the establishment and improvement thereof, widening and improvement of existing rights-of-way, street vacations, freeway construction, change or establishment of street grade, or the construction of any public improvement or structure by the City, provided that the Grantee shall in all such cases have the privilege to temporarily bypass, in the authorized portion of the same street upon approval by the City, any section of water line or facility required to be temporarily disconnected or removed. The provisions of this section shall not be applicable if the relocation need results from a private development, use or activity.

If the City determines that the project necessitates the relocation of the Grantee's ...

writing if one or more of the alternatives is suitable to accommodate the work, which would otherwise necessitate relocation of the facilities. If so requested by the City, the Grantee shall submit additional information to assist the City in making such evaluation. The City shall give each alternative proposed by the Grantee full and fair consideration. In the event the City ultimately determines that there is no other reasonable alternative, the Grantee shall relocate its facilities as otherwise provided in this Section. Provided, however, the parties agree to exercise good faith, reasonable and timely decision making especially when issues arise in the field pertaining to relocations. The provisions of this Section shall survive the expiration or termination of this franchise agreement.

The provisions of this Section shall in no manner preclude or restrict the Grantee from making any arrangement it may deem appropriate when responding to a request for relocation of its facilities by any person or entity other than the City, where the facilities to be constructed by said person or entity are not or will not become City-owned, operated or maintained facilities, provided that such arrangements do not unduly delay a City construction project. The City on occasion will be constructing, reconstructing and/or relocating roads, streets, public ways, areas or facilities within the right-of-way or property, which will require Grantee to install and/or relocate part of its water system. Grantee will be relying on the alignment, lines and grades as set forth in City's approved plans wherein Grantee thereafter constructs or reconstructs its water system in accordance with City's requirements and City standards. Therefore, if City thereafter again adjusts and/or revises the alignment, line or grade for a road, street, public way or area, before this part of the Grantee's water system has been in place for fifteen (15) years (commencing with the initial City revision), then City agrees to reimburse Grantee a pro rata share of the total relocation costs based on fifteen (15) year life expectancy for the portion of Grantee's water system that is affected by the City revision unless differently agreed to in writing by City and Grantee at the time of the installation or relocation.

Section 4. Consideration For Agreement.

(A) The consideration for this agreement includes, but is not limited to, the mutual and individual benefits of this agreement that allow each of the parties the ability to make long term planning decisions in light of the provisions set forth herein, and the non-competition provisions as provided in Section 16 of this agreement.

(B) If the City grants to any other water provider a franchise with terms that are overall more favorable than those set forth herein, Grantee shall have the right to renegotiate the provisions of this franchise that Grantee believes are overall more favorable than those set forth herein. Grantee shall also have the right to renegotiate the provisions of this franchise that are affected by a substantial change in state or federal law that would allow the City the opportunity to tax and assess additional revenue from the Grantee's operations within the corporate boundaries of the City.

In the case where the parties do not agree on the renegotiation or identification of affected provisions of this franchise, the parties agree to a binding arbitration process as follows: Each of the parties shall select an arbitrator, and the two arbitrators shall select a third arbitrator. In accordance with the procedures of Chapter 7.04 of the Revised Code of Washington, the panel of three arbitrators shall review the evidence and authorities presented by the parties and hear the argument of the parties, and thereafter decide the issue(s) presented for arbitration. The arbitrators shall be authorized to require each party to provide to the other reasonable discovery. The arbitrators shall render their decision based upon their interpretation of the provisions of this franchise agreement. The arbitrators are not empowered to modify or amend the text of this franchise agreement. The parties agree to be bound by the decisions of the panel of arbitrators as to the identification of affected provisions of this franchise and/or the re-negotiation thereof.

If there is a substantial change in the law that undermines the ability of one or both or the parties to receive the benefits of this agreement, one or both of the parties may re-open this agreement to address the terms affected by the substantial change in the law.

Section 5. The Grantee's Maps, Records and Plans. After ...

public right-of-way. In no case shall any work commence within any public right-of-way or other public property without a permit, except as otherwise provided in this franchise ordinance. During the progress of the work the Grantee shall not unnecessarily obstruct the passage or proper use of the right-of-way, and shall file as-built plans or maps with the City showing the proposed and final location of its facilities.

If either the City or the Grantee shall at any time plan to make excavations in any area covered by this franchise and as described in this Section, the party planning such excavation shall afford the other, upon receipt of a written request to do so, an opportunity to share such excavation, PROVIDED THAT:

(A) Such joint use shall not unreasonably delay the work of the party causing the excavation to be made;

(B) Such joint use shall be arranged and accomplished on terms and conditions satisfactory to both parties; and

(C) Either party may deny such request for safety reasons. The provisions of this Section shall survive the expiration or termination of this franchise agreement.

(D) Such joint use shall be in compliance with Tacoma Water's utility separation requirements, as detailed in Attachment "A" of this agreement.

Section 7. Restoration after Construction. The Grantee shall, after abandonment approved under Section 13 herein, or installation, construction, relocation, maintenance, or repair of water facilities within the franchise area, restore the surface of the right-of-way or public property to at least the same condition the property was in immediately prior to any such installation, construction, relocation, maintenance or repair. The Public Works Director shall have final approval of the condition of such streets and public places after restoration. All concrete encased monuments which have been disturbed or displaced by such work shall be restored pursuant to all federal, state and local standards and specifications. The Grantee agrees to promptly complete all restoration work and to promptly repair any damage caused by such work to the franchise area or other affected area at its sole cost and expense. The provisions of this Section shall survive the expiration, revocation or termination by other means of this franchise.

Section 8. Emergency Work – Permit Waiver. In the event of any emergency in which any of the Grantee's facilities located in or under any street, breaks, are damaged, or if the Grantee's construction area is otherwise in such a condition as to immediately endanger the property, life, health, or safety of any individual, the Grantee shall immediately take the proper emergency measures to repair its facilities, to cure or remedy the dangerous condition for the protection of property, life, health or safety of individuals without first applying for and obtaining a permit as required by this franchise. However, this shall not relieve the Grantee from the requirement of obtaining any permits necessary for this purpose, and the Grantee shall apply for all such permits not later than the next succeeding day during which City Hall is open for business. Grantee shall make every reasonable effort to notify Grantor of the necessity to perform emergency work prior to conducting such work.

Section 9. Dangerous Conditions, Authority for City to Abate. Whenever construction, installation or excavation of facilities authorized by this franchise has caused or contributed to a condition that appears to substantially impair the lateral support of the adjoining street or public place, or endangers the public, an adjoining public place, street utilities or City property, the Public Works Director may direct the Grantee, at the Grantee's own expense, to take actions to protect the public, adjacent public places, City property or street utilities, and such action may include compliance within a prescribed time.

In the event that the Grantee fails or refuses to promptly take the actions directed by the City, or fails to fully comply with such directions, or if emergency conditions exist which require immediate action, the City may enter upon the property and take such actions as are necessary to protect the public, the adjacent streets, or street utilities, or to maintain the lateral support thereof, or actions regarded as necessary safety precautions; and the Grantee shall be liable to the City for the costs thereof.

Attachment A

It shall be understood that when the City of Fircrest is installing new infrastructure within public rights of way or within private property within the city limits of the City of Fircrest, such infrastructure shall be constructed so as to provide clearances from Tacoma Water facilities as follows:

Sanitary Sewer facilities shall maintain 10-feet horizontal (minimum) clearance in all cases, except as allowed in the Department of Ecology manual "Criteria for Sewage Works Design", latest edition.

Storm mains or any other City of Fircrest owned facilities shall maintain 5-feet horizontal clearance from any Tacoma Water facilities, including services, meters, hydrants and hydrant laterals.

Where proposed construction and/or maintenance of Fircrest facilities will occur in proximity to Tacoma Water, Tacoma Water, (502-8246) shall be notified in the design phase, where practical, or with as much lead time as possible.

It is further understood that any Tacoma Water owned facilities, whether planned or maintained, shall be designed and maintained as to comply with these same clearance criteria. Likewise notification shall be made to the City of Fircrest, (564-8900) when construction of Tacoma Water facilities will occur in proximity of City of Fircrest facilities.

HONORABLE MAYOR AND CITY COUNCIL
CITY OF FIRCREST, WASHINGTON

In the matter of the application of the City of Tacoma Department of Public Utilities, Water Division, a Municipal Corporation, for a franchise to construct, operate and maintain water facilities in, upon, under, along, across and through certain franchise areas of the City of Fircrest Washington	)	ACCEPTANCE OF FRANCHISE

WHEREAS the City Council of the City of Fircrest, Washington has granted a franchise to the City of Tacoma Department of Public Utilities, Water Division, a Municipal Corporation, its successors and assigns, by enacting City of Fircrest Ordinance No. 1354, adopted on the 12th day of October, 2004, and amended by Ordinance No. 1363, adopted on the 23rd day of November, 2004;

WHEREAS copies of said Ordinances received from the City of Fircrest granting said franchise were approved by the Public Utility Board for the City of Tacoma Department of Public Utilities on January 12, 2005;

NOW, THEREFORE, the City of Tacoma Department of Public Utilities, Water Division, a Municipal Corporation, for itself, its successors and assigns, hereby accepts said Ordinance granting a franchise, and all the terms and conditions thereof, and files this, its written acceptance, with the City of Fircrest, Pierce County, Washington.

IN TESTIMONY WHEREOF said Franchise Grantee, City of Tacoma Department of Public Utilities, Water Division has caused this written Acceptance to be executed in its name by its undersigned Water Superintendent thereunto duly authorized on this 19th day of January, 2005.

CITY OF TACOMA, DEPARTMENT OF PUBLIC UTILITIES, WATER DIVISION

Attest:

Elizabeth Larson
Clerk, Public Utility Board

By: John C. Kirner
John C. Kirner
Water Superintendent

Copy received for City of
Fircrest: Jan. 19, 2005
By: Ruth Rosenblatt
City Clerk

TACOMA WATER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

January 19, 2005

Rick Rosenbladt, City Clerk
The City of Fircrest
115 Ramsdell Street
Fircrest, WA. 98466-6999

Subject: Water Service Franchise

Dear Mr. Rosenbladt:

This letter will confirm that the Tacoma Public Utility Board approved the subject Franchise, described in your Ordinance NO.1363, on January 12, 2005, by Resolution U-9941. I have enclosed a copy of this Resolution for your records.

Also, as part of our normal Franchise documentation, I have enclosed an original of our "Acceptance of Franchise" form. Please date and sign this document and return it to us. We will date our receipt back from you and send you a copy for your records.

Finally, I have also enclosed a fully executed original of Ordinance NO. 1354, for your records. If you have any further questions regarding this matter, please contact me at 502-8744 or e-mail at jeltrich@cityoftacoma.org.

Sincerely,

Joseph D. Eltrich

Joseph D. Eltrich
Special Projects Engineer

RESOLUTION NO. U-9941

WHEREAS the City of Tacoma, Department of Public Utilities, Water Division (d.b.a. Tacoma Water), requests approval of a twenty-year franchise with the City of Fircrest, and

WHEREAS since the late 1970's, Tacoma Water has provided water service to customers located in two areas that were formerly part of unincorporated Pierce County, that were annexed by Fircrest in 1997. Consistent with RCW 35A.14.900, Fircrest waited seven years to implement a separate franchise agreement with Tacoma Water, and

WHEREAS on October 12, 2004, the Fircrest City Council approved Ordinance No. 1354, granting a twenty-year franchise to Tacoma Water for the continued operation of the water system in designated areas within in Fircrest, and

WHEREAS in addition to the twenty-year term, the proposed franchise provides for a slight reduction in Tacoma Water's service area, but with no change in the number of existing customers served, and an annual franchise fee, paid quarterly, of 6 percent of gross revenues from customers located within the City of Fircrest, and

WHEREAS this proposed franchise was negotiated betweenTacoma Water and Fircrest representatives and includes provisions substantially similar to those approved for Puyallup and University Place, and

WHEREAS it is in the best interest to accept said franchise as recommended; Now, therefore,

TACOMA WATER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

December 8, 2004

Mark Burlingame
Public Works Director
City of Fircrest
115 Ramsdell Street
Fircrest, WA 98466

Subject: Water Service Franchise Agreement

Dear Mr. Burlingame:

As you know, I had originally scheduled review and approval of the subject Franchise before our Public Utility Board at their December 15 meeting. Unfortunately, I was unable to meet that schedule due to a couple of items of concern raised by our legal division.

The first concern related to the requirement for Comprehensive General Liability Coverage in the aggregate amount of $2 million. This item has been addressed in a letter from Ken Turner, TPU Management Services Manager, which I have enclosed for your review.

The second concern raised by our legal staff relates to the wording contained in Section 16 of the Franchise Agreement where it states that Tacoma Water "shall pay the City an annual fee in the amount of 6% of gross revenues from Grantee's water system **customers served from Grantee's water system located within City's street rights-of-way**, as defined in this section." The concern is that, in a strict interpretation of this wording, someone could conclude that revenues generated by any customer served by these mains, whether inside or outside Fircrest could be subject to the Franchise Fee. We firmly believe that the intent of both the City of Fircrest and the City of Tacoma is that the revenues and customers referenced in the Franchise Agreement relate only to customers within the corporate limits of the City of Fircrest. If this is the City of Fircrest's opinion also, then we feel a letter back from Fircrest confirming this belief is sufficient for us to take the Franchise Agreement forward for approval by our Utility Board and City Council. Our proposed re-wording for the Franchise Agreement would insert the words "within the City limits that are" between the words "**customers served**" in the sentence highlighted in bold type above.

If you have any questions regarding this matter or need to discuss it further, please contact me at 502-8744 or e-mail at jeltrich@cityoftacoma.org.

Sincerely,

Joseph D. Eltrich
Special Projects Engineer

TACOMA PUBLIC UTILITIES
3628 South 35th Street
Tacoma, Washington 98409-3192

December 8, 2004

Mark Burlingame
Public Works Director
City of Fircrest
115 Ramsdell Street
Fircrest, WA 98466

Re: Water Service Franchise Agreement Insurance Requirements

Dear Mr. Burlingame:

This letter serves to inform you of the City of Tacoma, Department of Public Utilities position in regard to insurance coverage for vehicle, general liability, and fidelity bonds.

The City of Tacoma is partially self-insured (i.e., up to $1 million) for all liability coverage. Additionally the City has Comprehensive General Liability Insurance for claims above the $1 million self-insured retention amount. The City is also certified as self-insured for Workers' Compensation by the State of Washington. Furthermore, the City has in place a Fidelity bond with limits of $1 million.

The City stands ready to respond to all claims for which it is legally and financially responsible.

Please contact me at (253) 502-8102 if I can provide further information.

Sincerely,

Kenneth A. Turner
Management Services Manager

TACOMA WATER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

August 3, 2005

Ms. Susan Clough, City Manager
City of Fircrest
120 Ramsdell Street
Fircrest, WA 98466-6999

Subject: Franchise Fee Payment Methodology

Dear Ms. Clough:

This letter is intended to define terms for payment of the Franchise fee referenced in the Franchise Agreement between Tacoma Water and the City of Fircrest of January 13, 2005.

Tacoma Water will provide franchise fee payments to the City of Fircrest beginning in 2005. Accordingly, we propose the following payment format, which reflects a similar situation to that agreed to between Tacoma Power and Fircrest in 2002.

- Tacoma Water agrees to make quarterly Franchise payments to the City of Fircrest based on the conditions stated in Section 16 of the Franchise adopted under Fircrest Ordinance 1354.
- Quarterly payments will be made based on the actual gross revenues for that quarter.
- The quarterly payment will be due no later than 30 days past the end of the quarter (i.e. 30 days past March, June 30, September 30 and December 31).
- The first payment due Fircrest will reflect the gross revenues for the first two quarters of 2005 and be paid in accordance with the schedule described herein.

If these terms are agreeable to you, please sign in the block provided below.

We do apologize for any confusion or any other problems this matter may have caused and look forward to our continued excellent working relationship with the City of Fircrest. If you have any questions at all regarding this matter, please feel free to contact Joe Eltrich at 502-8744.

Sincerely,

John C. Kimer
Tacoma Water Superintendent

Approved:

Susan Clough, City Manager
City of Fircrest

TACOMA WATER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

November 20, 2006

Dear Tacoma Water Customer:

Tacoma Water is proposing a rate increase of approximately 7.5 percent (system average) that, if approved, would take effect in January 2007. This would be followed by another 7.5 percent rate increase that would take effect in January 2008. Based on your past interest and participation in our rate processes, we would like to invite you to our customer roundtable meeting where the rate proposal will be discussed in more detail. This meeting will be held on Monday, November 27, 2006, at 6:00 p.m. in the Public Utilities Administration Building auditorium conference room at South 35th Street and Union Avenue.

At that meeting, we will discuss our revenue requirements for 2007-2008 and explain proposed expenditures. Your comments regarding our proposal are welcome. Also, public comment will be taken at a hearing to be held by the Public Utility Board on December 6, 2006, at 6:30 p.m.

Thank you for your interest in water rates and your consideration of this important community issue.

Sincerely,

John C. Kirner
Water Superintendent

JCK:JCE:nr

WATER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

November 30, 2006

Bill Brandon
City Manager
City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98466

Re: Proposed Tacoma Water Rate Adjustment 2007/2008

Dear Mr. Brandon:

The Public Utility Board and City Council of the City of Tacoma are being asked by Tacoma Water to approve rate increases for the 2007 and 2008 Biennium which will include residential increases of 7.2% and commercial rate increases of 7.4% on January 1, 2007 and January 1, 2008.

At the start of the 2005-2006 biennium, Tacoma Water was requested by the Tacoma City Council and the Tacoma Public Utility Board to review the 20% inside/outside rate differential which has been in effect for Tacoma Water customers for many years. There was a desire on the part of the Board and Council to determine if the current 20% inside/outside differential was recovering sufficient revenue to cover the costs of serving customers outside the City or if a higher inside/outside differential should be established. The result of this deliberation was that both the Public Utility Board and the City Council supported maintaining the inside/outside differential at the present 20% level.

The evaluation of the inside/outside differential did bring into view the fact that your City, among others, charges a franchise fee to the City of Tacoma of 6% of water revenues. This franchise charge essentially decreases the benefit of the 20% inside/outside differential which is charged by Tacoma. Therefore, the Board and Council believe it is appropriate to adjust the rates within your City to offset the franchise fee and allow recovery of the full amount of the 20% inside/outside differential by Tacoma Water. This adjustment in rates will be ramped in over a 4 year period and will be in addition to any other rate increase approved by the Public Utility Board and City Council. I hope that you will recognize this as a fair adjustment to the water rate and an important step to maintaining the current inside/outside differential at 20%.

If you have any questions regarding this rate adjustment by Tacoma Water, please contact me at (253) 502-8208.

Sincerely,

John C. Kirner
Water Superintendent

JCK:dj

THE CITY OF FIRCREST

115 RAMSDELL STREET • FIRCREST, WASHINGTON 98466-6999 • (253) 564-8901 • FAX (253) 566-0762

December 13, 2006

Mr. John Kirner, Water Superintendent
Tacoma Water
3628 S. 35th Street
Tacoma, WA 98409-3192

RE: Letter of November 30, 2006; Proposed Tacoma Water Rate Adjustment 2007/2008

Dear Mr. Kirner:

Thank you for your letter referenced above, describing the anticipated upcoming actions of the Public Utility Board and City Council with respect to proposed rate increases for the next biennium. I have reviewed your proposal and have compared it with the franchise agreement by and between the City of Fircrest and Tacoma Water currently in effect (as of January 2005). In response I have the following comments.

It appears that this proposal would eventually increase rates within the franchise areas by an additional 6% surcharge above the current/future outside of Tacoma rates in recognition of the additional franchise cost of serving customers within the City of Fircrest. It appears this proposed action may not be consistent with Section 16, paragraph 2 of the subject franchise. I respectfully request your review and consideration of this franchise section in contrast to the additional fee discussed in your letter prior to the imposition of this additional fee upon Fircrest citizens.

Thank you for your consideration of this matter. Please contact me upon your review and consideration to discuss this further.

Sincerely,

Bill Brandon, City Manager
City of Fircrest

C: Michael Smith, City Attorney
Mark Burlingame, Public Works Director
Mayor and City Councilmembers
Project file

TACOMA WATER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

December 15, 2006

Bill Brandon, City Manager
City of Fircrest
115 Ramsdell Street
Fircrest, WA 98466

RE: Proposed Tacoma Water Rate Adjustment for 2007-2008

Dear Mr. Brandon:

We have reviewed your letter of December 13, 2006, regarding Tacoma Water's proposed rate adjustment for the 2007-2008 biennium. As you requested, we paid particular attention to the franchise agreement between Tacoma Water and the City of Fircrest, particularly Section 16 Paragraph 2 of that agreement. It is our opinion that the adjustment of the proposed rate to be charged to City of Fircrest customers does not constitute a surcharge as referenced in Section 16 Paragraph 2 of the franchise agreement. Other utilities do charge a surcharge which appears as a line item on the bill specifically identifying the additional cost as a charge based on recovery of taxes paid to the local jurisdiction

Tacoma Water's 2007-2008 rate adjustment includes a cost of service based adjustment due to the fact that the franchise paid by Tacoma Water to the City of Fircrest makes it a higher cost to serve residents in the City of Fircrest rather than customers in unincorporated Pierce County. The rate adjustment is a reasonable and prudent allocation of costs that avoids having other classes of customers subsidize City of Fircrest customers.

After a policy review in 2006, the City of Tacoma decided to maintain its inside-outside water rate differential at a very low 20 percent, but the result of the franchise fee is that Tacoma only recovers 14 percent from customers within the City of Fircrest. This was not an acceptable situation to the Public Utility Board and the City Council of the City of Tacoma.

Sincerely,

John C. Kirner

John C. Kirner
Water Superintendent

JCK:nd

THE CITY OF FIRCREST

115 RAMSDELL STREET • FIRCREST, WASHINGTON 98466-6999 • (253) 564-8901 • FAX (253) 566-0762

December 27, 2006

John Kirner, Water Superintendent
Tacoma Water
3628 South 35th Street
Tacoma, WA 98409-3192

RE: Proposed Water Rate Adjustment 2007/2008

Dear Mr. Kirner:

We received your letter of December 15, 2006. We disagree with your analysis and request reconsideration of your conclusions. Whether the fee is imbedded into the rate or outside, it represents an extra fee (surcharge) that customers of similar classes in other locations do not pay.

I would request that you contact City Manager Bill Brandon when he returns from vacation on January 2, 2007, to schedule a meeting as soon as possible to discuss our differences of opinion.

We also request that Tacoma Water not impose the surcharge while we are attempting to resolve this matter without legal action.

I can be reached at (253) 238-4121 and Bill Brandon can be reached at (253) 238-4128.

Sincerely,

Rick Rosenbladt

Rick Rosenbladt
Acting City Manager

C: Fircrest Mayor and Council
Bill Brandon, City Manager
Michael Smith, City Attorney
Mark Burlingame, Public Works Director

WATER FACILITIES INVENTORY (WFI) FORM

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

ONE FORM PER SYSTEM

Quarter: 1
Updated: 12/11/2019

Printed: 2/2/2021
WFI Printed For: On-Demand
Submission Reason: Other

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
25150 T	FIRCREST CITY OF	PIERCE	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

JEFFREY P. DAVIS [UTILITY FOREMAN]
115 RAMSDELL
FIRCREST, WA 98466

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

7. OWNER NAME & MAILING ADDRESS

FIRCREST, CITY OF
JEFFREY P. DAVIS
115 RAMSDELL
FIRCREST, WA 98466

UTILITY FOREMAN

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone: (253) 564-8900		Owner Daytime Phone: (253) 564-8900	
Primary Contact Mobile/Cell Phone:		Owner Mobile/Cell Phone:	
Primary Contact Evening Phone:		Owner Evening Phone:	
Fax: (253) 564-3640	E-mail: xxxxxxxxxxxxxxxxxxx	Fax:	E-mail: xxxxxxxxxxxxxxxxxxx

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

- [ ] Agricultural
- [x] Commercial / Business
- [ ] Day Care
- [x] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [ ] Industrial
- [ ] Licensed Residential Facility
- [ ] Lodging
- [x] Recreational / RV Park
- [x] Residential
- [x] School
- [ ] Temporary Farm Worker
- [x] Other (church, fire station, etc.): _____

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [x] City / Town
- [ ] County
- [ ] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons)

1,800,000

- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES -

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
25150 T	FIRCREST CITY OF	PIERCE	A	Comm

15	16	17	18									19			20	21						22	23	24			
	SOURCE NAME	INTERTIE	SOURCE CATEGORY									USE				TREATMENT						DEPTH		SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	InAct 06/16/2005 WELLS #4,5&9 WF			X								X			Y	X						88	2350	SE SE	11	20N	02E
S02	WELLS #6 & 7 WF			X								X			Y		X		X			151	800	SE NW	14	20N	02E
S03	WELL #8 ACN701		X									X			Y		X		X			112	720	NE SW	14	20N	02E
S04	InAct 12/03/1999 WELL #2				X							X			Y	X						162	725	NE SE	11	20N	02E
S05	WELL #4 AEF223		X									X			Y		X		X			88	525	SE SE	11	20N	02E
S06	WELL #5		X											X	Y	X						102	1100	SE SE	11	20N	02E
S07	WELL #6 AAD990				X							X			Y		X		X			151	750	SW NW	14	20N	02E
S08	WELL #7 AEF249				X							X			Y		X		X				800	SW NW	14	20N	02E
S09	WELL #9 AAY306		X									X			Y		X		X			130	1250	NE SE	11	20N	02E
S10	86800/TACOMA	86800 N												X	Y	X							0			00N	00E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
25150 T	FIRCREST CITY OF	PIERCE	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)		2739	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	2257		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	45		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	482		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	56	56	
28. TOTAL SERVICE CONNECTIONS		2795	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 6080

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?					36	36	36	36	36			
B. How many days per month are they present?					31	30	31	31	30			

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?	540	540	540	540	540	478	478	478	540	540	540	540
B. How many days per month is water accessible to the public?	31	28	31	30	31	30	31	30	30	31	30	31

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	481	481	481	481	481	226	226	481	481	481	481	481
B. How many days per month are they present?	31	28	31	30	31	30	31	31	30	31	30	31

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	7	7	7	7	7	7	7	7	7	7	7	7

34. NITRATE SCHEDULE	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)			

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

Intentionally left blank

WS ID	WS Name
25150	FIRCREST CITY OF

Total WFI Printed: 1

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Water Facilities Inventory (WFI)

Report Create Date:	2/2/2021		
Water System Id(s):	25150T		
Print Data on Distribution Page:	ALL		
Print Copies For:	DOH Copy		
Water System Name:	ALL		
County:	-- Any --		
Region:	ALL		
Group:	ALL		
Type:	ALL		
Permit Renewal Quarter:	ALL		
Water System Is New:	ALL		
Water System Status:	ALL		
Water Status Date From:	ALL	**To**	ALL
Water System Update Date	ALL	**To**	ALL
Owner Number:	ALL		
SMA Number:	ALL		
SMA Name:	ALL		
Active Connection Count From:	ALL	**To:**	ALL
Approved Connection Count	ALL	**To:**	ALL
Full-Time Population From:	ALL	**To:**	ALL
Water System Expanding	ALL		
Source Type:	ALL		
Source Use:	ALL		
WFI Printed For:	On-Demand		

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

To be completed after local government review

Local Government Consistency Determination Form

Water System Name: City of Fircrest PWS ID: 25150T

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: March 2021

Local Government with Jurisdiction Conducting Review: _____

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

	For use by water system	For use by local government
Local Government Consistency Statement	**Identify the page(s) in submittal**	**Yes or Not Applicable**
a) The water system service area is consistent with the adopted land use and zoning within the service area.	Pg 3-4 to 3-6	
b) The growth projection used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	Pg 3-6 to 3-8	
c) For cities and towns that provide water service: All water service area policies of the city or town described in the plan conform to all relevant utility service extension ordinances.	Pg 5-2 to 5-3	
d) Service area policies for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	Pg 5-3 to 5-11	
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.	Pg 3-1 to 3-4	

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

_____ _____

Signature Date

_____

Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

This checklist may be used to meet the requirements of WAC 246-290-108. When using an alternative format, it must describe all of the elements; 1a), b), c), d), and e), when they apply.

For **water system plans (WSP)**, a consistency review is required for the service area and any additional areas where a municipal water supplier wants to expand its water right's place of use.

For **small water system management programs**, a consistency review is only required for areas where a municipal water supplier wants to expand its water right's place-of-use. If no water right place-of-use expansion is requested, a consistency review is not required.

For **engineering documents,** a consistency review is required for areas where a municipal water supplier wants to expand its water right's place-of-use (water system plan amendment is required). For noncommunity water systems, a consistency review is required when requesting a place-of-use expansion. All engineering documents must be submitted with a service area map (WAC 246-290-110(4)(b)(ii)).

A) Documenting Consistency: The planning or engineering document must include the following when applicable.

a) A copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that relate to water supply planning.

b) A copy of the **growth projections** that correspond to the service area. If the local population growth projections are not used, explain in detail why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.

c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. *This applies to cities and towns only.*

d) All **service area policies** for how new water service will be provided to new customers.

e) **Other relevant elements** the Department of Health determines are related to water supply planning. See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

B) Documenting an Inconsistency: Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and explain how to resolve the inconsistency.

C) Documenting a Lack of Local Review for Consistency: Where the local government with jurisdiction did not provide a consistency review, document efforts made and the amount of time provided to the local government for review. Please include: name of contact, date, and efforts made (letters, phone calls, and emails). To self-certify, please contact the DOH Planner.

To be completed after City review of entire DRAFT Comprehensive Water System Plan

Determination Environmental of Non-significance

City of Fircrest – Proposed 2020 Comprehensive Water System Plan (CWSP)
Case Number – #LU21-02

TO: Interested Parties
SUBJECT: Preliminary Determination of Non-Significance

In accordance with WAC 197-11-340, a copy of the preliminary determination of Environmental Non-significance for the project described below is transmitted for your review and comment:

Applicant: City of Fircrest, Department of Public Works

Proposal: 2020 Comprehensive Water System Plan (CWSP)

Location: Applies to the Incorporated Area of the City of Fircrest

Lead Agency: City of Fircrest

City Contact: Tyler Bemis, Public Works Director
City of Fircrest
115 Ramsdell Street
Fircrest, WA 98466
Phone: 253-238-4113

The lead agency for this proposal has made a preliminary determination that this project does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(9c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

Comments on this Determination of Environmental Non-significance (DNS) must be submitted by 5:00 p.m. by the closing date of the comment deadline, which is stated below. The Responsible Official may reconsider the determination based upon timely comments and may retain, modify, or, if significant adverse impacts are likely, withdraw the DNS determination.

Unless modified by the City, the preliminary DNS will become a final determination on April 17, 2014. An appeal of this determination must be filed within 21 days of the issue date of this notice. An appeal must be accompanied by the required filing fee of $100.00. Appellants shall be billed for the actual cost of the application, unless they substantially prevail on appeal or reconsideration. The appeal must be filed with the Planning/Building Department, 115 Ramsdell Street, Fircrest, Washington 98466.

Responsible Official: Angelie Stahlnecker
Position/Title: Planning & Building Administrator

Signature: _____
Issue Date: March 28, 2014
Comment Deadline: April 10, 2014

A. BACKGROUND

1. Name of proposed project, if applicable:
City of Fircrest 2020 Comprehensive Water System Plan (CWSP), 2020-2025

2. Name of applicant:
City of Fircrest
Public Works Department
115 Ramsdell Street
Fircrest WA 98466

3. Address and phone number of applicant and contact person:
Tyler Bemis, Public Works Director
City of Fircrest
Public Works Department
115 Ramsdell Street
Fircrest, WA 98466
253-564-8900

4. Date checklist prepared:
February 18, 2021

5. Agency requesting checklist:
City of Fircrest, Washington

6. Proposed timing or schedule (including phasing, if applicable):
Council hearing and adoption estimated for April 2021.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
This is a non-project proposal. 6-Year updates are required under state law. Revisions and updates are likely on a 6-Year basis dependent upon project needs and funding priorities.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.
None.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? if yes, explain.
None

10. List any government approvals or permits that will be needed for your proposal, if known.
None – this is a non-project proposal.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (lead agencies may modify this form to include additional specific information on project description.)
This is the 6-Year update of the City's CWSP. The water system projects identified include re-coating of reservoirs and watermain replacement located throughout the city. All work would be located within existing rights-of-way.

12. Location of proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Applies to the City of Fircrest right-of-way within the corporate city limits.

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

a. General description of the site (circle one): **Flat, rolling**, hilly, steep slopes, mountainous, other _____.

b. What is the steepest slope on the site (approximate percent slope)?

Within the City rights-of-way, slopes are generally, 0% to 12% slopes. Only one street (Drake Street) exceeds a slope of 15%.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

The majority of soils in Fircrest are Alderwood gravelly sandy loam. The remainder is classified primarily as muck and loam. Varies by project site.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

None have been identified.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposal. Indicate source of fill.

None of the listed projects are expected to require significant filling or grading.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

All construction activity will take place within existing paved areas (streets) or associated public right-of-way. Minimal erosion may occur, and will be addressed through installation of appropriate erosion control measures.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The amount of impervious surfaces after project construction will be equivalent to present coverage.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

None proposed under this non-project proposal. All construction activity in Fircrest is required to comply with the Department of Ecology Stormwater Management Manual for Western Washington. Erosion control techniques employing best management practices will be designed and implemented to keep erosion to a minimum.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile. odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Particulate emissions (dust) will result from construction activity. Precise quantities are unknown, although the level of particulates will be limited by controls imposed by the City.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No, none have been identified.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Per FMC 22.58.008(j), construction dust and other particulates will be controlled through frequent watering and/or other dust control measures.

3. **Water**

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Tacoma Holding Basin that abuts the Fircrest corporate limits. Leach Creek flows into Chambers Creek, which in turn flows into the Puget Sound. Emerson Pond is the other surface body water located within Fircrest. Wetlands are associated with both bodies of water.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals_____; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable). or the number of animals or humans the system(s) are expected to serve.

Not applicable.

c. Water Runoff (including storm water):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Stormwater runoff from roads and other impervious surfaces infiltrates in retention and detention ponds and infiltration galleries throughout the city. The storm water system also has numerous outfalls to discharge water into the Tacoma Holding Basin and Leach Creek, which empties into Chambers Creek and the Puget Sound.

2) Could waste materials enter ground or surface waters? If so, generally describe.

None is anticipated.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

All construction activity in Fircrest is required to comply with the Department of Ecology Stormwater Management Manual for Western Washington. Best management practices will be implemented during project construction.

4. **Plants**

a. Check or circle types of vegetation found on **or adjacent to** the site:

☑ deciduous tree: alder, maple, aspen, other
☑ evergreen tree: fir, cedar, pine, other
☑ shrubs
☑ grass
____ pasture
____ crop or grain
____ wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
____ water plants: water lily, eelgrass, milfoil, other
____ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

All of the watermain will occur within existing paved street sections. There are no plans to remove any existing vegetation. Within existing right-of-way, sidewalk planters and medians could be impacted.

c. List threatened or endangered species known to be on or near the site.
A Cooper's Hawk nest was reported at one time near the Tacoma Holding Basin, however, there are none observed at this time. The area of this previous nest is not located near any of the proposed projects, and it is not located adjacent to a City Right-of-Way.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
None.

5. Animals

a. Circle any birds and animals that have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other (list):
mammals: deer, bear, elk, beaver, other (list):
fish: bass, salmon, trout, herring, shellfish, other (list):
Not applicable -this is a non-project proposal.

b. List any threatened or endangered species known to be on or near the site.
None known at this time.

c. Is the site part of a migration route? If so, explain.
The City of Fircrest is within the Pacific Flyway.

d. Proposed measures to preserve or enhance wildlife, if any:
None proposed.

6. **Energy and Natural Resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating. manufacturing, etc.
None.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
Not applicable - this is a non-project proposal.

c. What kinds of energy conservation features are included in the plans of this proposal?
Not applicable - this is a non-project proposal.

List other proposed measures to reduce or control energy impacts, if any:
None proposed under this non-project proposal. As implementation of a specific project occurs, the city will take appropriate measures to reduce or control energy impacts from project construction.

7. **Environmental Health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste that could occur as a result of this proposal? If so, describe.

Not applicable -this is a non-project proposal.

1) Describe special emergency services that might be required.
Not applicable - this is a non-project proposal.

2) Proposed measures to reduce or control environmental health hazards, if any:

None proposed under this non-project proposal. As implementation of a specific project occurs, the city will utilize required safety procedures to minimize a risk of health hazards from exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Not applicable - this is a non-project proposal. In general, project activities will be located in a variety of urban environments that experience noise from traffic and other activities.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Noise will be generated during watermain replacement of each project on a short-term basis, typically during daytime hours, only.

3) Proposed measures to reduce or control noise impacts, if any:

None proposed under this non-project proposal. As implementation of a specific project occurs, the city will minimize noise impacts through the use of properly muffled equipment and machinery and limiting hours of construction to reasonable a reasonable time of the day, as appropriate.

8. **Land and Shoreline Use**

a. What is the current use of the site and adjacent properties?

The current sites consist of developed public right-of-way.

b. Has the site been used for agriculture? If so, describe.

No.

c. Describe any structures on the site.

See "a" above.

d. Will any structures be demolished? If so, what?

No.

e. What is the current zoning classification of the site?

The City contains zoning classifications including R-4, R-4-C, R-6, R-8, R-10-TCD, R-20, NO, NC, CO, CC, PROS (Parks, Recreation and Open Space), and GC (Golf Club). The street sections are located within and adjacent to most of these classifications.

f. What is the current comprehensive plan designation of the site?

Right-of-way zoning is comparable to the Comprehensive Plan designations.

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable – there are no shorelines of the state in the City of Fircrest.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

Fircrest is an aquifer recharge area and contains Leach Creek, Ross Creek, Emerson Pond, and numerous wetlands.

i. Approximately how many people would reside or work in the completed project?

Not applicable -this is a non-project proposal. Projected population for the City is 6935 by year 2035.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measure's to avoid or reduce displacement impacts, if any:

None proposed under this non-project proposal.

1. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

None proposed under this non-project proposal, as it is not required.

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None.

c. Proposed measures to reduce or control housing impacts, if any:

None proposed under this non-project proposal.

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

Not applicable.

b. What views in the immediate vicinity would be altered or obstructed?

None.

c. Proposed measures to reduce or control aesthetic impacts, if any:

None proposed or required.

11. **Light and Glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None, other than temporary lighting during construction activities, if required.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

None proposed under this non-project proposal.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?

Varies by project location.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None proposed under this non-project proposal.

13. **Historic and Cultural Preservation**

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

None known.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

None known.

c. Proposed measures to reduce or control impacts, if any:

No impacts are anticipated.

14. **Transportation**

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Variable, by project location.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

Pierce Transit currently serves Fircrest on Regents Boulevard, South 19th Street, Orchard Street, and Emerson Street.

c. How many parking spaces would the completed project have? How many would the project eliminate?

None.

d. Will the proposal require any new roads or streets, or improvement to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No new streets will be constructed. The project intent is to replace watermain within numerous existing street sections.

e. Will the project use (or occur in the immediate vicinity of water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

No change from the present.

g. Proposed measures to reduce or control transportation impacts, if any:

None proposed under this non-project proposal.

15. **Public Services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

b. Proposed measures to reduce or control direct impacts on public services, if any.

Not applicable.

16. **Utilities**

a. Circle the utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

Not applicable -this is a non-project proposal.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity that might be needed.

No changes are proposed.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Angelie Stahlnecker

Title: Planning & Building Administrator

Date Submitted: February 18, 2021

D. **SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS** (do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

The Six-Year Update to the CWSP consists of identifying replacement and maintenance of existing watermain and water system facilities within existing street sections or rights-of-ways. There may be short-term increases in emissions (particulates) and noise during construction activities. There will not be any long-term impacts in terms of those items listed above.

Proposed measures to avoid or reduce such increases are:

Specific project components must comply with the City's Land Development Code, including performance standards that require compliance with the DOE Stormwater Management Manual for Western Washington and implementation of dust control measures.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

All proposed construction is to occur within existing street pavement sections. No impacts are anticipated.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

The City will review the impacts of each specific development in the city on a project-by-project basis. Project mitigation measures will ensure that waterways and wetlands are protected through compliance with the DOE Stormwater Management Manual for Western Washington, and critical area regulations, if applicable.

3. How would the proposal be likely to deplete energy or natural resources?

None are anticipated.

Proposed measures to protect or conserve energy and natural resources are:

None proposed.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Projects included in the CWSP are not anticipated to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, since they consist of maintenance to, or replacement of, watermain and water system facilities.

Proposed measures to protect such resources or to avoid or reduce impacts are:

Individual project components will be required to comply with the City's critical area regulations and other environmental regulations and policies,

where applicable.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Projects included in the CWSP are not anticipated to affect land and shoreline use, since they consist of maintenance of the existing water system. Fircrest does not have any shorelines as defined by the State.

Proposed measures to avoid or reduce shoreline and land use impacts are:

The City will ensure that future development occurs in a manner consistent with the Fircrest Comprehensive Plan land use policies and development regulations.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Implementation of the CWSP will not result in increased demands, since the project components are maintenance-oriented and not capacity-related.

Proposed measures to reduce or respond to such demand(s) are:

None proposed under this non-project proposal.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The non-project proposal would not conflict with local, state, or federal laws or requirements for the protection of the environment.

Interested Parties:

City of University Place Department of Development Services
City of Tacoma Public Works
Wash Dept of Ecology, SEPA Register (via PDF)

Monthly Well Supply (in gallons)

WELL 4

Month	2015	2016	2017	2018	2,019
JANUARY	1,287,000	1,689,000	1,584,000	2,587,000	2,639,000
FEBRUARY	2,004,000	1,721,000	1,383,000	2,252,000	2,256,000
MARCH	1,637,000	1,868,000	1,628,000	3,087,000	2,475,000
APRIL	1,800,000	66,000	1,202,000	2,834,000	2,908,000
MAY	2,679,000	2,563,000	2,483,000	5,089,000	3,484,000
JUNE	5,646,000	4,894,000	3,476,000	5,235,000	1,599,000
JULY	6,551,000	4,762,000	5,486,941	6,743,000	10,906,000
AUGUST	5,454,000	4,773,000	6,247,000	6,143,000	15,700,000
SEPTEMBER	2,487,000	2,255,000	3,807,000	4,208,000	2,230,000
OCTOBER	1,526,000	1,669,000	2,521,000	3,893,000	1,193,000
NOVEMBER	1,715,000	1,409,000	1,794,372	3,335,000	780,000
DECEMBER	1,687,000	3,059,588	2,034,000	3,775,000	0
	34,473,000	30,728,588	33,646,313	49,181,000	46,170,000

WELL 7

Month	2015	2016	2017	2018	2,019
JANUARY	2,504,576	2,217,039	3,160,746	1,877,313	1,998,388
FEBRUARY	2,260,754	2,239,849	2,674,916	1,545,776	2,170,017
MARCH	2,711,110	2,212,698	2,680,733	1,649,836	2,028,914
APRIL	2,707,354	3,219,953	2,421,448	1,629,575	1,999,320
MAY	3,829,919	4,459,530	3,496,060	3,437,672	3,604,150
JUNE	5,562,279	4,701,528	6,999,890	3,818,886	4,244,088
JULY	5,423,347	5,482,774	5,763,000	5,388,286	5,890,029
AUGUST	4,653,701	5,773,651	4,612,351	4,462,420	4,998,567
SEPTEMBER	3,449,803	4,459,459	4,036,874	2,009,536	3,819,773
OCTOBER	3,047,233	3,289,217	2,422,130	1,090,934	3,035,456
NOVEMBER	2,430,558	3,055,537	2,223,000	863,488	2,219,607
DECEMBER	2,256,447	1,372,000	1,853,509	1,003,678	2,213,465
	40,837,081	42,483,235	42,344,657	28,777,400	38,221,774

WELL 8

Month	2015	2016	2017	2018	2,019
JANUARY	3,381,000	2,966,000	4,383,000	2,622,000	2,609,000
FEBRUARY	3,059,000	3,026,000	3,381,000	2,231,000	3,019,000
MARCH	3,649,000	2,961,000	3,599,000	2,290,000	2,798,000
APRIL	3,644,000	4,347,000	3,280,000	2,241,000	2,701,000
MAY	5,128,000	5,994,000	4,693,000	3,714,000	4,909,000
JUNE	7,520,000	6,347,000	4,364,000	5,269,000	5,719,000
JULY	7,269,000	7,372,000	21,601,000	7,364,000	7,998,000
AUGUST	6,240,000	7,733,000	6,365,000	6,097,000	6,687,000
SEPTEMBER	4,631,000	5,991,000	5,575,000	2,681,000	4,997,000
OCTOBER	4,112,000	4,460,000	9,305,000	1,449,000	4,088,000
NOVEMBER	3,252,000	4,143,000	8,167,000	1,202,000	2,731,000
DECEMBER	3,024,000	5,192,000	2,551,000	1,313,000	2,906,000
	54,909,000	60,532,000	77,264,000	38,473,000	51,162,000

WELL 9

Month	2015	2016	2017	2018	2,019
JANUARY	4,979,000	5,882,000	5,822,000	9,704,000	10,026,000
FEBRUARY	4,192,000	5,968,000	5,292,000	8,458,000	8,242,000
MARCH	5,584,000	6,418,000	6,194,000	8,820,000	9,009,000
APRIL	6,117,000	8,665,000	5,751,000	10,559,000	10,648,000
MAY	9,017,000	13,243,000	9,417,000	15,708,000	12,728,000
JUNE	19,226,000	13,387,000	14,802,000	19,723,000	16,149,000
JULY	22,444,000	16,993,000	7,604,000	25,099,000	10,563,000
AUGUST	17,884,000	17,128,000	23,833,000	22,711,000	3,661,000
SEPTEMBER	8,619,000	9,813,000	14,215,000	15,473,000	8,701,000
OCTOBER	5,295,000	6,167,000	3,342,000	13,984,000	4,651,000
NOVEMBER	5,989,000	5,271,000	2,464,000	12,302,000	5,808,000
DECEMBER	5,797,000	4,100,000	7,898,000	11,460,000	8,487,000
	115,143,000	113,035,000	106,634,000	174,001,000	108,673,000

CITY OF FIRCREST

CONSERVATION PLAN

Prepared on: February 2014

Prepared by:

Jerome W. Morrissette and Associates Inc., P.S.
1700 B2 Cooper Point Road SW
Olympia, WA 098502
(360) 352-9456

City of Fircrest

Conservation Plan Table of Contents

***CITY OF FIRCREST* - WATER CONSERVATION PROGRAM**

Section One: Introduction

The City of Fircrest is required to develop and manage a conservation program per WAC 246-290-100 and WAC 246-290-810 (Water Efficiency Program - Municipal Water Law). It is anticipated that water conservation will become more and more important in years to come given the limited nature of the groundwater resource for the western side of Washington State. This plan is being prepared as part of the City of Fircrest comprehensive plan effort.

Water conservation should be an everyday practice and concern for all members of each community. The prevention of unnecessary leakage as well as the minimization of wasteful, inefficient water usage or practices are goals that all water users should be aware of and should improve upon whenever possible. While it is true that reductions in the cost of water service provided is a benefit of efficient and conservative water use, other benefits include and are not limited to the following:

- The efficient and conservative use of water reduces the demand on groundwater resources, which helps to ensure that sufficient groundwater supplies of acceptable quality will be maintained during prolonged periods of drought. This is a benefit not only to those users which already have water allocations, but is a benefit to other users which may have a need for additional water allocation due to growth, deterioration of the quality of water available from their present water source, or other reasons.

- The efficient and conservative use of water stored in the distribution system will help to prolong the availability of water to customers during periods of electrical power outages. This could occur not only as a result of reduced leakage of the stored water but also as result of more efficient water usage behavior on the part of the customers.

- The efficient and conservative use of water during periods of drought, electrical power outages, or other water emergencies can help to prevent contamination of the water distribution system by conserving the water storage necessary to maintain positive system pressures. For those distribution systems that have leaky pipes, maintenance of positive water system pressure continually forces clean / treated water out of the leaks preventing untreated or contaminated water from entering the distribution system. Since most water distribution systems have leaks, continued maintenance of positive water system pressures is one of the best ways to insure against contamination. Maintaining positive system pressure also helps to prevent the backflow of contaminants into the water system that could occur through any cross-connections that may exist in the system. This prevention of untreated or contaminated water from entering the distribution system becomes even more important when dealing with water supplies that are not continuously chlorinated.

- The efficient and conservative usage of water will help to minimize the operating costs of the water system, which should enable funds to be spent on modernization and improvements in water system reliability and water quality.

- The efficient and conservative usage of water can delay the need for the development of new water production capacity and may reduce both the scope and cost of the additional capacity required.

Section Two: Education/Water Conservation Promotion

The City of Fircrest is required by the State of Washington to do water conservation program promotion on an annual basis. This promotion will include distributing hand delivered notices or by distributing water conservation pamphlets available from DOH/DOE. Currently, each Fircrest newsletter requests lot owners to report all leaks and to conserve water.

There are a number of publications available through the American Water Works Association as well as other sources that are designed to teach water conservation principles and practices. Some of these publications are in the form of cartoon-like pamphlets and coloring books designed for children. Other publications designed for adults illustrate the relative costs in dollars that are associated with water leaks of various sizes. The City of Fircrest provides these types of pamphlets at the Public Works building. These pamphlets not only promote water conservation but also enhance the public relations image of the City of Fircrest and are well worth the costs borne by the city to provide them at no charge to its customers. An example of some of the suggested everyday conservation practices for residential customers are as follows:

1. Immediately report to the City of Fircrest any suspected or known leaks in the water mains, service lines, valve boxes, or other parts of the water system.
2. Each water customer should immediately repair any faucet or other internal leaks visible within the plumbing system of their residence.
3. Use a broom rather than a hose to clean off driveways, patios, and sidewalks. You'll save 5 gallons of water for each minute the hose is turned off.
4. Never run the dishwasher with a partial load of dishes. Wait until there are enough dishes to fill the dishwasher before running it.
5. Never run the clothes washing machine with a partial load of clothes. Wait until there are enough clothes to fully load the washer before running it. This saves about 30 gallons of water each time you didn't run a small load through the wash.
6. When brushing your teeth, don't leave the water running. Wet the brush, turn the water off, and then turn it on briefly while you rinse. This will save about 3 gallons of water every time you brush.
7. When shaving, don't leave the water running. Fill the sink with just enough water to rinse the blade. This will save about 3 gallons of water per shave.
8. Install low-flow aerators on kitchen and bathroom faucets. This will save about 2.5 gallons of water for each minute of use.
9. Install low-flow shower heads and save about 3 gallons of water for each minute of showering.

10. Place a 1 gallon toilet tank displacement bag in each toilet tank and save 1 gallon of water per flush per toilet.
11. When replacing old toilets, purchase ultra-low flow models and save 4 gallons of water per flush per toilet.
12. When watering the yard or garden, it is more effective to deep soak the ground once a week than to lightly sprinkle the ground several times a week. Watering the yard or garden in the early morning or late evening will reduce the amount of water lost to evaporation during the heat of the day.
13. Adjust sprinkling times according to the demands of different seasons. Less water is required during the spring and fall than in the summer.
14. Measure how many inches of water your sprinkler applies per cycle, then compare this amount with the actual water requirements of your lawn and plants. Adjust the amount of watering time appropriately so that only the amount of water needed is applied.
15. Reduce artificial irrigation when rainfall meets some or all of your turf areas' water requirements.
16. Reduce turf areas and replace part of the lawn with drought-tolerant, native species of groundcover, plants and shrubs (xeriscape). By doing this, you can reduce your outdoor water use by 30 percent or more.
17. Dethatch or aerate your lawn annually. This allows water to penetrate down to the root areas.
18. Test the pH of your soil each year. Soil with a pH of 6.5 allows for an easier flow of nutrients from the soil to the grass, making for healthier grass that is better able to tolerate periods of drought.
19. Mow your lawn frequently, cutting less than 1 inch of grass each time. Maintain the height of your grass at 2 to 2.5 inches. At this height, the grass is better able to tolerate periods of drought.
20. Listen to weather forecasts; manually turn off sprinklers when rain is predicted.
21. Mulch around the base of trees, shrubs, and plants. This will reduce water loss due to evaporation while retarding the growth of weeds, which drink needed water from the soil.
22. Cover swimming pools when not in use. This action will reduce the water loss due to evaporation. Over the course of the summer, it is possible to save the total volume of water in the pool.
23. When washing cars, use a bucket and sponge along with a hose that has a shut-off valve to reduce water use.
24. Immediately report to the City of Fircrest any non-permitted/unauthorized users of water taken from fire hydrants or flush hydrants. For example the un-permitted filling of swimming pools, tanker trucks, jet trucks, hydromulch trucks, or the washing of streets by unauthorized personnel should be reported. Municipal City / County / Fire users are the only users that should be obtaining water from the system in this manner.

Section Three: Historical and Projected Water Use

The majority of future growth of water system customers will come from the development of infill lots, redevelopment of commercial property, and a few large parcels that can be subdivided within the water system service area. It is anticipated that the existing land use in the City of Fircrest will remain residential with isolated areas of commercial.

The Fircrest water system has historically supplied single-family residential users and commercial users with potable water. In addition to these users, the water system has also supplied the Tacoma Fire Department with water for fighting fires. Actual water use is for drinking, bathing, washing, cooking, and irrigation.

The larger water users within the Fircrest water system are those commercial users which water use history is located in Attachment B. The City of Fircrest has not historically collected source meter data daily, therefore, the Maximum Day Demand (MDD) cannot be calculated (at this time) based on source meter data. The calculation in the source and storage analysis assumes that the MDD is two times the Average Day Demand (ADD). The City has now replaced the telemetry system with a SCADA system that allows the system to automatically take source meter readings at any time interval desired. Therefore, the City of Fircrest will collect daily source meter data over the next six year planning period, and will provide an actual MDD in the next comprehensive system plan update.

Based on development potential within the City of Fircrest, as well as projected figures from the Planning Department, the City of Fircrest is projecting an average annual population growth rate of 0.20% over the life of this Comprehensive Water System Plan update.

Section Four: Unaccounted for Water Loss

Until 2002, the water system that the City of Fircrest owns and operates was not capable of calculating unaccounted for water loss, because individual water meters did not exist at the service connections.

Table C.1 indicates the percentage of unaccounted water loss within the water system (difference between source meters and service meters). This table indicates water losses from 7.5% to 26.4% over the past five years. It is understood that the previous years' percentages exceed the maximum desired amount, however, in 2013 the system is back below the 10% threshold. In 2011 the City had a leak detection survey throughout the entire water system, and all major leaks were repaired within the last two years. The remaining known leaks are planned to be repaired this year, which consist of hydrant and valve repair/replacement.

Historical source and service meter data is provided in Attachment B. Source meter information is collected monthly, and service meters are read every other month.

Table C.1 – Water Loss

Year	Water Loss (%)
2009	10.2
2010	22.7
2011	26.4
2012	18.3
2013	7.5

Section Five: Allowable Water Use

The allowable annual water use is calculated by subtracting the allowable unaccounted for water loss from the allowable annual water withdrawal and dividing by the number of approved connections (since the City of Fircrest does not have an official number of approved connections, an estimate of 0.5 acre-ft/yr per connection will be assumed in the tables below). The allowable annual water use per connection is tabulated in Table C.2 (using an allowable unaccounted water loss of 10%). The value for unaccounted for water loss of 10% is used primarily as a guideline for the maximum allowable in the analysis for allowable water use per connection. Water systems that can keep the unaccounted for water at less than 10% are generally considered to be doing an adequate job in controlling leakage. The ultimate goal for the water systems would be to have no significant unaccounted for water loss.

Table C.2: Allowable Annual Water Use

Water System Name	Annual Allowable Water Use (cf)	Annual Allowable Unaccounted for Water (cf)	Number of Approved System Connections	Allowable Annual Water Use Per Connection (cf)
Fircrest Water System	84,332,160	8,433,216	3,872	19,602

Based on the results of Table C.1, the following maximum monthly water usage amounts are obtained:

Table C.3: Monthly Allowable Average Water Usage per Connection

Water System Name	Monthly Average Annual Water Usage (cf)
Fircrest Water System	1,633 (400 gal/day)

It is understood that the water use calculations for conservation as illustrated above is not an acceptable approach. With an average day demand of 172 gpm per residential connection based on 2012 service meter data, the majority of Fircrest water customers appear to be using water wisely.

Section Six: Conservation Plan Goals

The City of Fircrest is considering the purchase of a portable leak detection system (geophone), which allows the operator to physically listen for leaks within the water system through a very sensitive transmitter/receiver and headphone system. If purchased, the city staff will periodically test the water system per the equipment manufacturer's specifications during periods of low water demand (in order to eliminate a majority of the "noise" interference within the distribution network). City of Fircrest employees also travel throughout the water systems daily. Any suspicious "wet" areas are investigated for possible water line leaks. Also, all Fircrest lot owners are requested to notify the City of Fircrest of any possible leaks.

Currently, the Fircrest Water System has adequate water rights that will serve the projected number of connections at the end of the 20 Year planning period. Source and service meter readings are taken per the operation and maintenance schedule identified in the comprehensive water system plan, and these readings are analyzed periodically to ensure that the system is only using water for which the city has water rights for and to see if there are any anomalies that would indicate the probability of a major system leak.

Beginning January 1, 2002, the City of Fircrest started billing water customers based on an increasing block rate structure, promoting water conservation. Because people now pay for each cubic foot of water they use, it is assumed people are conserving water significantly more than they did in the past. Therefore, it is estimated that the water reduction will be 0.2% per year through 2027 since the customers have now been accustomed to the new water rates. Table C.4 details the water system demand and conservation estimates for the six year planning period and the 20 year forecast. Every year after the conception of the new rate structure, written notice of how the system is performing and water conservation status will be defined for all system users.

Table C.4: Conservation Goals

Year	Conservation Goal (%)	Average Day Demand (gpd per ERU)	Max Day Demand (gpd per ERU)	*Cumulative Annual Water Reduction (gal)
2014	0.2	172.0	344.0	-
2015	0.2	171.7	343.3	416,142
2016	0.2	171.3	342.6	970,998
2017	0.2	171.0	341.9	1,387,140
2018	0.2	170.6	341.3	1,941,996
2019	0.2	170.3	340.6	2,358,138
2020	0.2	169.9	339.9	2,912,994

*Note: Cumulative Annual Water Reduction Volume calculated based on projected ERUs in Table 2.2. and is a comparison to 2012 water use.

Currently, all public education measures for water conservation at the Fircrest Water System are being implemented.

Section Seven: Punitive Rate Structure

The current January 2014 fee structure for the City of Fircrest is as follows:

Residential Fee:	$22.00/month includes 700 cf $0.010/cf for usage from 701 cf to 2,000 cf $0.016/cf for usage over 2,000 cf $12.50 surcharge for outside City Limits
Commercial Fee:	$22.00/month includes 1,400 cf $0.012/cf for usage from 1,401 cf to 2,600 cf $0.018/cf for usage over 2,600 cf

Section Eight: Projected Water Savings

The projected water savings for the system are identified in Table C.4 in Section 5 above. At the end of the six year planning period, the system would anticipate a reduction in water use of 3,044,100 gallons (406,965 cf = 9.34 acre-ft) in six years.

Section Nine: Emergency Use and Conservation

Due to the water source conditions/capacities prevailing within the Fircrest Water System, the general welfare requires that the water resources available to the City of Fircrest be put to the maximum beneficial use to the extent to which they are capable. The waste, unreasonable use, or unreasonable methods of use of water must be prevented. The conservation of water within the Fircrest water systems is to be extended with a view to the reasonable and beneficial use with the interests of the people served by the City of Fircrest.

The City of Fircrest water system manager, or his/her designate, are hereby authorized and directed to implement the applicable provisions of this program under their determination that such implementation is necessary to protect the public health and welfare and safety.

The provisions of this program shall apply to all persons, customers, and property utilizing water service provided by the City of Fircrest.

No customer of, or person who uses water from, the City of Fircrest shall knowingly make, cause, use, or permit the use of water received from the City of Fircrest for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this program, or in an amount in excess of that use permitted by the

conservation stage in effect pursuant to action taken by the water system manager, or his/her designate, in accordance with the provisions of this Ordinance.

The City of Fircrest water system manager, or his/her designate, shall promulgate guidelines which set forth the criteria for determining when a particular conservation stage is to be implemented and terminated. Such guidelines shall be updated when, in the opinion of the water system manager, or his/her designate, the conditions of the water system have changed so as to necessitate such update.

The City of Fircrest will provide permanent notification signs on all main entrances to the City that indicate the current water conservation stage in effect. Notices will be sent to each lot owner describing the conditions of each stage. The following are the conservation stages identified for the City of Fircrest conservation program:

STAGE I Voluntary Conservation

Customers of or persons who use the water service provided by the City of Fircrest are requested to voluntarily limit the amount of water used to the amount that is absolutely necessary for health, business, and outdoor use.

STAGE II Mandatory Compliance - Water Alert

Upon implementation by the City of Fircrest water system manager, or his/her designate, the following restrictions shall apply to all customers of or persons who use the water service provided by the City of Fircrest:

> Irrigation utilizing individual sprinklers from hoses, or buried sprinkler systems for the purpose of watering lawns, gardens, landscaped areas, trees shrubs and other plants is prohibited, except on designated water use days which shall be as follows:
>
> > Odd numbered street addresses will water on odd numbered days of the month, and even numbered street addresses will water on even numbered days of the month.

STAGE III Mandatory Compliance - Water Warning

Upon implementation by the City of Fircrest water system manager, or his/her designate and publication of notice, the following restrictions shall apply to all customers of or persons who use the water service provided by the City of Fircrest:

1. Irrigation utilizing individual sprinklers from hoses, or buried sprinkler systems for the purpose of watering lawns, gardens, landscaped areas, trees shrubs and other plants is prohibited except on designated water use days which shall be as follows:

Users of water at odd numbered street addresses will water on either Saturday or Sunday and Wednesday or Thursday when such date is on an odd numbered day of the month. Users of water at even numbered street addresses will water on either Saturday or Sunday and Wednesday or Thursday when such a date is on an even numbered day of the month. It being the intent to have four designated outdoor watering days per week and to allow each user of water to irrigate two times each week.

2. On the Saturday/Sunday and Wednesday/Thursday watering days, no watering may be done between the hours of 6:00 P.M. to 9:00 P.M. Hand held garden hoses or small hand held watering containers may be used on any day except during the hours of 6:00 P.M. and 9:00 P.M.

3. Washing of private vehicles is prohibited except on the Saturday/Sunday and Wednesday/Thursday odd/even basis. No private vehicles may be washed between the hours of 6:00 P.M. and 9:00 P.M.

4. Washing of sidewalks, streets, driveways, parking areas, tennis courts, patios, or other paved areas is absolutely prohibited except by the Department of Public Works, and the Fire Department to alleviate health or fire hazards.

5. Swimming pools will be filled only on the Saturday/Sunday and Wednesday/Thursday even/odd basis. No filling between the hours of 6:00 P.M. and 9:00 P.M.

6. The placing of sprinklers that spray a significant amount of water in the street is strictly prohibited (no matter how much you water it, pavement won't grow).

7. Taking water from a fire hydrant is prohibited. Utility crews, the Public Works Department, and the fire departments are exempt from this condition in order to properly maintain the water system for public health and safety.

STAGE IV Mandatory Compliance - Water Emergency

Upon implementation by the water system manager, or his/her designate, and publication of notice, the following restriction shall apply to all customers of or persons who use the water service provided by the City of Fircrest:

1. Water usage for outside irrigation utilizing individual sprinklers from hoses or buried sprinkler systems for the purpose of watering lawns, gardens, landscaped areas, trees, shrubs and other plants shall be prohibited.

2. The washing of private vehicles is prohibited.

3. The use of water from fire hydrants for any reason other than the use by the utility crews, Department of Public Works, and the Fire Department to maintain the water system and water quality is prohibited.

4. The washing of sidewalks, streets, driveways, parking areas, tennis courts, patios or other paved areas is strictly prohibited except by the Public Works Department and the fire department to alleviate a health or fire hazard.

5. The filling of swimming pools is prohibited during the Water Emergency.

Water conservation is an everyday practice and all customers should use water wisely. The following are guidelines to be used in case of a sudden power outage that causes a stoppage of pumps and does not allow time for delivery of compliance notices. These guidelines will be sent out to all lot owners with the annual water billings. The City of Fircrest requests all customers to comply with the following procedures during such an event:

POWER OUTAGE

1. There will be no outdoor use of water including washing of cars, watering and gardens.

2. Reduce indoor use including bath, laundry and dish washing to the greatest extent possible.

3. Any questions on water use should go to the water system manager.

The following are guidelines to be used in everyday conservation practices, and no official notices beyond those sent with the annual billing will be posted or sent out to property owners advising of these everyday procedures:

SUGGESTED EVERYDAY CONSERVATION PRACTICES

1. Report any suspected or known leak.

2. Repair all faucet leaks.

3. Dishwasher - Wait until you have a full load before washing.

4. Washing machine - Have a full load before you wash. You use about 30 gallons of water for each small load you wash, and about 42 gallons for each large load.

5. Yard watering - It is better to deep soak a yard and garden once a week than sprinkling light several times a week.

6. Water morning or evening to prevent rapid evaporation during heat of the day.

7. Car - wash with bucket and sponge using a hose with a shut-off valve.

The water system manager will try to inform all residents when there will be a water turnoff for a line repair. In case of an accidental break there is no time for notification of turnoff. If a customer has a complaint, it should be directed to the water system manager. Just because we turn our faucet on and water is running out does not mean we have an unlimited source.

Section Ten: Water Use Efficiency Program

Per the Water Use Efficiency (WUE) Guidebook, the following information is intended to provide the measures the City of Fircrest is implementing in order to meet current DOH WUE requirements.

The measures that must be implemented and evaluated are described in the text about in Section One through Section Nine. Based on the number of connections of this system, Fircrest is required to meet six measures that can count toward the WUE program. The following are the six additional measures to be implemented by the City of Fircrest and the timing for implementation and evaluation of effectiveness.

Measure 1: Conservation Rate Structure

The conservation rate structure for the water system customers is identified in Section Seven of the plan. This new rate structure was implemented (and since modified) beginning in January of 2002. Since this time, we have seen a substantial decrease in Average Day Demand within the system as detailed in the sections above and in Attachment B.

Measure 2: Customer Leaks

The City of Fircrest currently provides education regarding customer leaks identified in Measures 4 through 6 listed below. Historically, since the inception of the conservation rate structure, people that complain about very high water bills are advised that they may have a leak. Fircrest staff will assist homeowners in determining if they do indeed have a leak, and if they do, identifying the leak. The customer is then notified that they can receive a credit to their utility bill for the first billing (implying if they don't get the leak(s) fixed, they will be paying a much higher utility bill).

Measure 3: Water bill showing consumption history

The software utilized by the City of Fircrest includes a consumption history chart and table on the bill so the customer can see their trends for water consumption and cost.

Measure 4: Education – Consumer Confidence Report

The consumer confidence report sent out by the City every year emphasizes water conservation with information on how to obtain low-flow water fixtures.

Measure 5: Education – Annual Strawberry Feed

Every year the City of Fircrest and local supporters sponsor an outdoor festival call the Strawberry Feed. There are many informative booths set up along with activities and food booths. The Fircrest Public Works sets up a water conservation booth with someone dressed up in a water drop costume and supplies water conservation handouts and kits with water conserving items in it such as a rain gage, bladders for toilet tanks to reduce the volume of water per flush, low-flow shower heads, and other useful charts and information.

Measure 6: Education – National Night Out

Every year the City of Fircrest and local supporters sponsor an outdoor event that is put on across the nation on the same night called National Night Out. The main purpose of this event is to address public safety. However, there are many informative booths set up along with activities and food booths. The Fircrest Public Works sets up a water conservation booth with someone dressed up in a water drop costume and supplies water conservation handouts and kits with water conserving items in it such as a rain gage, bladders for toilet tanks to reduce the volume of water per flush, low-flow shower heads, and other useful charts and information.

As can be seen by the measures listed above, the Fircrest Water System is substantially in compliance with the WUE program.

Attachment A

Water Rights Self Assessment Form

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Project Report Form
Water Rights Self Assessment for Existing Conditions

Permit Certificate or	Name of rightholder or claimant	Priority Date	Source Name/Number	Primary or supplemental	Existing System Capacity - based on water right limits		Projects Production/withdrawal with New Project On-line		Projected System Capacity Status (excess or deficiency of water rights)	
					Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qi)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
*876-D	City of Fircrest	4/9/1940	SO1, SO5, & SO9	Primary	250	157/0	-	-	-	-
877-D	City of Fircrest	6/1/1941	SO2	Primary	500	315/0	-	-	-	-
1322-A	City of Fircrest	5/8/1950	SO3	Primary	400	123/0	-	-	-	-
G2-00862C	City of Fircrest	1/20/1971	SO2	Primary	100	65/0	-	-	-	-
G2-00863C	City of Fircrest	1/20/1971	SO4	Primary	500	200/0	-	-	-	-
*3150-A	City of Fircrest	4/17/1958	SO5 & SO9	Primary & Supplemental	1,000	193/595	-	-	-	-
4449-A	City of Fircrest	5/22/1962	SO6	Primary & Supplemental	750	337/788	-	-	-	-
5374	City of Fircrest	3/8/1965	SO7	Supplemental	500	0/800	-	-	-	-
G2-0024C	City of Fircrest	1/6/1969	SO8	Primary	720	546/0	-	-	-	-
Total	N/A	N/A	N/A	N/A	**4,720**	**1,936/2,183**	**1,520**	**731/2183**	**3,200 (excess)**	**1,205/2183 (excess)**

Intertie Name/Identifier	Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Projected Production/Withdrawal with New Project On-line		Current Intertie Supply Status (Excess/Deficiency)	
		Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (qi)	Maximum Annual Volume (Qa)
1.							
2.							
3.							
4.							
TOTAL **********	****** ********** **********						

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DOH Form 331-370 (Updated 08/10)

* Water right certificates will be transferred over to Well #9 (SO9)

To return form, please see reverse side.

Please return completed form to the Office of Drinking Water regional office checked below.

☒ Northwest Drinking Water
Department of Health
20425 72nd Ave S, Suite 310
Kent, WA 98032-2358
Phone: (253) 395-6750
Fax: (253) 395-6760

☐ Southwest Drinking Water
Department of Health
PO Box 47823
Olympia, WA 98504-7823
Phone: (360) 236-3030
Fax: (360) 664-8058

☐ Eastern Drinking Water
Department of Health
16201 E Indiana Ave, Suite 1500
Spokane Valley, WA 99216
Phone: (509) 329-2100
Fax: (509) 329-2104

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Project Report Form
Water Rights Self Assessment – 6 Year Projection

Permit Certificate or	Name of rightholder or claimant	Priority Date	Source Name/Number	Primary or supplemental	Existing System Capacity - based on water right limits		Projects Production/withdrawal with New Project On-line		Projected System Capacity Status (excess or deficiency of water rights)	
					Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qi)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
*876-D	City of Fircrest	4/9/1940	SO1, SO5, & SO9	Primary	250	157/0	-	-	-	-
877-D	City of Fircrest	6/1/1941	SO2	Primary	500	315/0	-	-	-	-
1322-A	City of Fircrest	5/8/1950	SO3	Primary	400	123/0	-	-	-	-
G2-00862C	City of Fircrest	1/20/1971	SO2	Primary	100	65/0	-	-	-	-
G2-00863C	City of Fircrest	1/20/1971	SO4	Primary	500	200/0	-	-	-	-
*3150-A	City of Fircrest	4/17/1958	SO5 & SO9	Primary & Supplemental	1,000	193/595	-	-	-	-
4449-A	City of Fircrest	5/22/1962	SO6	Primary & Supplemental	750	337/788	-	-	-	-
5374	City of Fircrest	3/8/1965	SO7	Supplemental	500	0/800	-	-	-	-
G2-0024C	City of Fircrest	1/6/1969	SO8	Primary	720	546/0	-	-	-	-
Total	N/A	N/A	N/A	N/A	**4,720**	**1,936/2,183**	**1,535**	**738/2183**	**3,185 (excess)**	**1,198/2183 (excess)**

Intertie Name/Identifier	Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Projected Production/Withdrawal with New Project On-line		Current Intertie Supply Status (Excess/Deficiency)	
		Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (qi)	Maximum Annual Volume (Qa)
1.							
2.							
3.							
4.							
TOTAL **********	****** ********** **********						

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DOH Form 331-370 (Updated 08/10)

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☐ Eastern Drinking Water
Department of Health
16201 E Indiana Ave, Suite 1500
Spokane Valley, WA 99216
Phone: (509) 329-2100
Fax: (509) 329-2104

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Project Report Form
Water Rights Self Assessment – 20 Year Projection

Permit Certificate or	Name of rightholder or claimant	Priority Date	Source Name/Number	Primary or supplemental	Existing System Capacity - based on water right limits		Projects Production/withdrawal with New Project On-line		Projected System Capacity Status (excess or deficiency of water rights)	
					Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qi)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
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877-D	City of Fircrest	6/1/1941	SO2	Primary	500	315/0	-	-	-	-
1322-A	City of Fircrest	5/8/1950	SO3	Primary	400	123/0	-	-	-	-
G2-00862C	City of Fircrest	1/20/1971	SO2	Primary	100	65/0	-	-	-	-
G2-00863C	City of Fircrest	1/20/1971	SO4	Primary	500	200/0	-	-	-	-
*3150-A	City of Fircrest	4/17/1958	SO5 & SO9	Primary & Supplemental	1,000	193/595	-	-	-	-
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G2-0024C	City of Fircrest	1/6/1969	SO8	Primary	720	546/0	-	-	-	-
Total	N/A	N/A	N/A	N/A	**4,720**	**1,936/2,183**	**1,597**	**759/2183**	**3,123 (excess)**	**1,177/2183 (excess)**

Intertie Name/Identifier	Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Projected Production/Withdrawal with New Project On-line		Current Intertie Supply Status (Excess/Deficiency)	
		Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (qi)	Maximum Annual Volume (Qa)
1.							
2.							
3.							
4.							
TOTAL **********	****** ********** **********						

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Department of Health
16201 E Indiana Ave, Suite 1500
Spokane Valley, WA 99216
Phone: (509) 329-2100
Fax: (509) 329-2104

Attachment B

Historical Water Use

2000 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total
Jan-00	775,000	5,000	4,761,000	7,200,000	No Meter	**12,741,000**
Feb-00	1,757,000	8,000	3,105,000	4,033,000	No Meter	**8,903,000**
Mar-00	6,302,000	4,000	3,394,000	3,545,000	No Meter	**13,245,000**
Apr-00	3,939,000	8,000	7,048,000	Off for Repair	8,782,000	**19,777,000**
May-00	2,297,000	-	9,075,000	Off for Repair	13,784,000	**25,156,000**
Jun-00	2,710,000	13,000	5,276,000	5,161,000	15,341,000	**28,501,000**
Jul-00	8,433,000	-	10,226,000	12,242,000	32,925,000	**63,826,000**
Aug-00	4,655,000	8,000	5,562,000	6,660,000	17,593,000	**34,478,000**
Sep-00	5,694,000	4,000	8,198,000	9,848,000	27,006,000	**50,750,000**
Oct-00	1,803,000	3,000	3,564,000	4,314,000	12,109,000	**21,793,000**
Nov-00	1,837,000	7,000	759,000	5,704,000	10,477,000	**18,784,000**
Dec-00	1,714,000	5,000	2,104,000	3,339,000	8,776,000	**15,938,000**
Total	**41,916,000**	**65,000**	**63,072,000**	**62,046,000**	**146,793,000**	**313,892,000**

2001 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total
Jan-01	4,797,000	7,000	3,124,000	3,718,000	9,053,000	**20,699,000**
Feb-01	4,725,000	6,000	2,534,000	3,018,000	4,938,000	**15,221,000**
Mar-01	2,349,000	3,000	3,114,000	3,656,000	10,959,000	**20,081,000**
Apr-01	1,150,000	5,000	3,202,000	3,820,000	10,444,000	**18,621,000**
May-01	2,344,000	6,000	4,178,000	4,957,000	12,863,000	**24,348,000**
Jun-01	4,212,000	2,632,000	5,175,000	6,191,000	12,551,000	**30,761,000**
Jul-01	11,522,000	19,385,000	8,054,000	9,612,000	-	**48,573,000**
Aug-01	7,714,000	8,485,000	6,973,000	8,322,000	13,408,000	**44,902,000**
Sep-01	2,515,000	4,000	3,519,000	5,670,000	10,323,000	**22,031,000**
Oct-01	2,888,000	10,000	4,940,000	4,410,000	14,633,000	**26,881,000**
Nov-01	1,216,000	4,000	2,264,000	2,710,000	7,516,000	**13,710,000**
Dec-01	2,214,000	4,000	4,707,000	5,588,000	16,141,000	**28,654,000**
Total	**47,646,000**	**30,551,000**	**51,784,000**	**61,672,000**	**122,829,000**	**314,482,000**
6/20/01 Well #9 went down & Well #5 was turned on.						

2002 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
Jan-02	1,617,000	4,000	3,102,000	3,180,000	10,306,000	**18,209,000**	
Feb-02	1,571,000	4,000	1,918,000	3,645,000	8,996,000	**16,134,000**	
Mar-02	2,715,000	4,000	2,670,000	3,074,000	7,399,000	**15,862,000**	
Apr-02	1,769,000	3,000	3,002,000	3,442,000	10,564,000	**18,780,000**	
May-02	3,306,000	5,000	3,637,000	4,283,000	11,597,000	**22,828,000**	
Jun-02	5,705,000	7,000	5,309,000	6,286,000	16,753,000	**34,060,000**	125,873,000
Jul-02	7,937,000	5,000	7,148,000	8,479,000	22,135,000	**45,704,000**	
Aug-02	6,493,000	3,000	6,545,000	7,735,000	19,450,000	**40,226,000**	
Sep-02	3,735,000	5,000	4,826,000	5,855,000	15,017,000	**29,438,000**	
Oct-02	2,355,000	4,000	3,871,000	4,575,000	12,066,000	**22,871,000**	
Nov-02	1,844,000	-	2,465,000	2,929,000	7,855,000	**15,093,000**	
Dec-02	2,028,000	-	2,931,000	3,465,000	9,242,000	**17,666,000**	
Total	**41,075,000**	**44,000**	**47,424,000**	**56,948,000**	**151,380,000**	**296,871,000**	

2003 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
Jan-03	1,159,000	-	2,887,000	3,394,000	9,959,000	**17,399,000**	
Feb-03	1,835,000	-	2,547,000	2,981,000	8,469,000	**15,832,000**	
Mar-03	1,105,000	-	1,571,000	1,841,000	5,028,000	**9,545,000**	
Apr-03	8,128,000	-	3,883,000	4,613,000	6,051,000	**22,675,000**	
May-03	3,071,000	-	3,780,000	4,409,000	12,331,000	**23,591,000**	
Jun-03	7,450,000	-	6,987,000	8,120,000	21,273,000	**43,830,000**	132,872,000
Jul-03	9,018,000	-	7,646,000	9,227,000	23,791,000	**49,682,000**	
Aug-03	6,969,000	-	6,594,000	7,963,000	20,475,000	**42,001,000**	
Sep-03	4,892,000	-	5,514,000	6,614,000	17,423,000	**34,443,000**	
Oct-03	1,937,000	-	2,885,000	3,458,000	10,550,000	**18,830,000**	
Nov-03	1,408,000	-	1,959,000	2,365,000	7,300,000	**13,032,000**	
Dec-03	2,853,000	-	2,882,000	3,428,000	10,014,000	**19,177,000**	
Total	**49,825,000**	**-**	**49,135,000**	**58,413,000**	**152,664,000**	**310,037,000**	

2004 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
Jan-04	2,543,000	-	2,573,000	3,072,000	9,611,000	**17,799,000**	
Feb-04	2,297,000	-	1,642,000	2,281,000	8,660,000	**14,880,000**	2/27/04 Well 6 off for Repair
Mar-04	2,749,000	-	-	4,442,000	10,709,000	**17,900,000**	Well 8 picking up the slack
Apr-04	3,702,000	-	1,851,000	3,209,000	11,204,000	**19,966,000**	Well 6 back in service 4/12/04
May-04	5,174,000	-	3,750,000	4,025,000	14,331,000	**27,280,000**	
Jun-04	8,152,000	-	5,657,000	6,164,000	18,424,000	**38,397,000**	136,222,000
Jul-04	9,668,000	-	7,087,000	7,871,000	21,825,000	**46,451,000**	
Aug-04	9,134,000	-	5,566,000	7,137,000	18,581,000	**40,418,000**	
Sep-04	4,901,000	-	1,247,000	5,058,000	9,236,000	**20,442,000**	
Oct-04	11,480,000	-	2,566,000	2,773,000	126,000	**16,945,000**	Well 9 Electrical Problem/Well4
Nov-04	10,164,000	-	2,549,000	2,738,000	1,981,000	**17,432,000**	picking up slack
Dec-04	8,999,000	-	2,904,000	3,108,000	2,191,000	**17,202,000**	
Total	**78,963,000**	**-**	**37,392,000**	**51,878,000**	**126,879,000**	**295,112,000**	

2005 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
Jan-05	11,068,000	-	5,811,000	6,198,000	121,000	**23,198,000**	
Feb-05	-	-	7,340,000	7,805,000	-	**15,145,000**	Well 4 Backup & Well 9 down for repairs
Mar-05	-	-	8,347,000	9,033,000	-	**17,380,000**	Well 4 Backup & Well 9 down for repairs
Apr-05	569,000	-	6,799,000	6,417,000	2,444,000	**16,229,000**	
May-05	502,000	-	8,271,000	8,551,000	2,569,000	**19,893,000**	
Jun-05	1,610,000	-	8,966,000	9,619,000	7,369,000	**27,564,000**	
Jul-05	2,833,000	-	8,946,000	9,890,000	12,342,000	**34,011,000**	
Aug-05	14,262,000	-	10,127,000	11,331,000	8,347,000	**44,067,000**	
Sep-05	9,975,000	-	8,068,000	9,070,000	3,706,000	**30,819,000**	
Oct-05	1,491,000	-	5,868,000	6,623,000	4,666,000	**18,648,000**	
Nov-05	581,000	-	6,238,000	7,035,000	2,417,000	**16,271,000**	
Dec-05	661,000	-	4,367,000	4,879,000	2,990,000	**12,897,000**	
Total	**43,552,000**	**-**	**89,148,000**	**96,451,000**	**46,971,000**	**276,122,000**	

2006 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
Jan-06	1,180,000	-	7,941,000	8,713,000	3,984,000	**21,818,000**	
Feb-06	3,435,000	-	5,112,000	2,511,000	4,621,000	**15,679,000**	
Mar-06	4,901,000	-	5,143,000	-	7,156,000	**17,200,000**	Well 8 down
Apr-06	8,427,000	-	1,518,000	596,000	7,776,000	**18,317,000**	Well 8 back on line
May-06	15,574,000	-	3,577,000	4,065,000	4,579,000	**27,795,000**	Well 9 down for repairs
Jun-06	4,857,000	-	3,488,000	4,099,000	19,293,000	**31,737,000**	
Jul-06	7,253,000	-	5,898,000	6,796,000	28,437,000	**48,384,000**	132,546,000
Aug-06	6,771,000	-	4,251,000	4,934,000	26,762,000	**42,718,000**	
Sep-06	5,010,000	-	3,028,000	3,623,000	19,789,000	**31,450,000**	
Oct-06	3,525,000	-	2,302,000	2,533,000	14,140,000	**22,500,000**	Power outage caused meter to malfunction
Nov-06	2,729,000	-	1,835,000	1,963,000	10,913,000	**17,440,000**	Oct/Nov Consumption estimated for well 9
Dec-06	1,582,000	-	3,529,000	3,896,000	6,714,000	**15,721,000**	
Total	**65,244,000**	**-**	**47,622,000**	**43,729,000**	**154,164,000**	**310,759,000**	

2007 Well Totals

	Well	Well	Well	Well	Well		
Month	**#4**	**#5**	**#6 & 7**	**#8**	**#9**	**Total**	
Jan-07	2,163,000	-	4,054,000	4,598,000	8,341,000	**19,156,000**	
Feb-07	2,937,000	-	616,000	652,000	11,404,000	**15,609,000**	
Mar-07	2,955,000	-	770,000	821,000	11,354,000	**15,900,000**	
Apr-07	3,274,000	-	1,392,000	1,451,000	12,671,000	**18,788,000**	
May-07	4,814,000	-	2,504,000	2,596,000	17,819,000	**27,733,000**	
Jun-07	5,654,000	-	2,648,000	2,722,000	21,456,000	**32,480,000**	129,666,000
Jul-07	7,008,000	-	3,177,000	3,271,000	26,417,000	**39,873,000**	
Aug-07	6,588,000	-	2,640,000	2,659,000	24,852,000	**36,739,000**	
Sep-07	5,291,000	-	1,171,000	1,145,000	20,048,000	**27,655,000**	
Oct-07	4,110,000	-	199,000	180,000	15,698,000	**20,187,000**	
Nov-07	3,350,000	-	431,000	404,000	12,841,000	**17,026,000**	
Dec-07	2,967,000	-	718,000	663,000	11,341,000	**15,689,000**	
Total	**51,111,000**	**-**	**20,320,000**	**21,162,000**	**194,242,000**	**286,835,000**	

2008 Well Consumption

	Well	Well	Well	Well	Well			
Month	**#4**	**#5**	**#6 & 7**	**#8**	**#9**	**Total**		
Jan-08	2,678,000	-	1,389,000	1,249,000	13,733,000	**19,049,000**		
Feb-08	-	-	1,377,000	1,217,000	13,161,000	**15,755,000**	Well 4 off for repair	
Mar-08	1,000	-	1,503,000	1,331,000	12,591,000	**15,426,000**		
Apr-08	-	-	1,616,000	1,424,000	16,408,000	**19,448,000**		
May-08	475,000	-	1,658,000	1,427,000	19,714,000	**23,274,000**		
Jun-08	6,777,000	-	1,901,000	1,596,000	21,204,000	**31,478,000**	124,430,000	
Jul-08	8,370,000	-	3,729,000	4,534,000	26,119,000	**42,752,000**		
Aug-08	6,599,000	-	2,487,000	2,026,000	20,631,000	**31,743,000**		
Sep-08	6,333,000	-	3,303,000	351,000	20,945,000	**30,932,000**		
Oct-08	4,033,000	-	2,035,000	-	12,718,000	**18,786,000**	Well 8 off for repair	
Nov-08	3,323,000	-	574,000	278,000	10,466,000	**14,641,000**		
Dec-08	4,315,000	-	860,000	682,000	13,661,000	**19,518,000**		
Total	**42,904,000**	**-**	**22,432,000**	**16,115,000**	**201,351,000**	**282,802,000**		

2009 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
Jan-09	4,010,000	-	615,000	491,000	12,701,000	**17,817,000**	
Feb-09	3,366,000	-	1,792,000	68,000	10,627,000	**15,853,000**	
Mar-09	3,331,000	-	1,152,000	912,000	10,415,000	**15,810,000**	
Apr-09	4,792,000	-	383,000	306,000	15,113,000	**20,594,000**	
May-09	5,254,000		355,000	263,000	14,884,000	**20,756,000**	
Jun-09	9,084,000	-	3,163,000	2,351,000	19,975,000	**34,573,000**	
Jul-09	9,497,000	-	4,417,000	3,189,000	10,391,000	**27,494,000**	125,403,000
Aug-09	8,043,000	-	3,537,000	2,691,000	17,605,000	**31,876,000**	
Sep-09	4,587,000	-	3,407,000	2,355,000	14,079,000	**24,428,000**	
Oct-09	4,130,000	-	1,843,000	1,260,000	12,669,000	**19,902,000**	
Nov-09	3,475,000	-	2,420,000	1,636,000	10,595,000	**18,126,000**	
Dec-09	2,801,000	-	2,448,000	1,641,000	11,513,000	**18,403,000**	
Total	62,370,000	-	25,532,000	17,163,000	160,567,000	**265,632,000**	
July 09 Well 9 meter not working Replace meter							
August new meter on well 9 not registering - had to reset working correctly now.							

2010 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
Jan-10	3,314,000	-	1,972,000	1,336,000	10,249,000	**16,871,000**	
Feb-10	2,969,000	-	2,994,000	1,981,000	9,188,000	**17,132,000**	
Mar-10	1,927,000	-	6,485,000	4,369,000	6,006,000	**18,787,000**	
Apr-10	4,543,000	-	2,000	-	14,115,000	**18,660,000**	
May-10	4,303,000	-	611,000	357,000	13,890,000	**19,161,000**	
Jun-10	4,353,000	-	4,444,000	2,742,000	13,499,000	**25,038,000**	
Jul-10	6,425,000	-	6,827,000	4,154,000	19,777,000	**37,183,000**	115,649,000
Aug-10	7,328,000	-	7,164,000	4,215,000	22,496,000	**41,203,000**	
Sep-10	3,610,000	-	5,536,000	3,233,000	9,871,000	**22,250,000**	
Oct-10	2,474,000	-	4,861,000	2,429,000	7,608,000	**17,372,000**	
Nov-10	2,262,000	-	6,431,000	2,895,000	7,086,000	**18,674,000**	
Dec-10	2,356,000	-	5,054,000	1,841,000	7,262,000	**16,513,000**	
Total	45,864,000	-	52,381,000	29,552,000	141,047,000	**268,844,000**	
Low well totals on #6 & 7 and #8 during April/May is due to the recoating of the low tank.							

2011 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total	
January	2,664,000	-	6,123,000	2,063,000	8,148,000	**18,998,000**	
February	2,243,000	-	5,013,000	1,423,000	6,809,000	**15,488,000**	
March	2,287,000	-	5,091,000	996,000	7,171,000	**15,545,000**	
April	2,687,000	-	5,049,000	1,645,000	8,001,000	**17,382,000**	
May	3,022,000	-	3,342,000	3,649,000	9,221,000	**19,234,000**	
June	3,382,000	-	5,856,000	6,441,000	10,250,000	**25,929,000**	112,576,000
July	5,751,000	-	3,969,000	4,354,000	17,537,000	**31,611,000**	
August	7,450,000	-	5,754,000	6,280,000	22,414,000	**41,898,000**	
September	5,721,000	-	3,822,000	4,212,000	17,141,000	**30,896,000**	
October	3,687,000	-	2,172,000	2,397,000	11,112,000	**19,368,000**	
November	3,522,000	-	1,604,000	1,788,000	10,743,000	**17,657,000**	
December	3,361,000	-	1,909,000	1,986,000	10,162,000	**17,418,000**	
Total	45,777,000	-	49,704,000	37,234,000	138,709,000	**271,424,000**	
April 7th Well 8 down for repairs							
April 12th Well 8 back in operation							

2012 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total
January	3,179,000	-	2,029,000	2,208,000	11,055,000	**18,471,000**
February	3,134,000	-	1,822,000	2,019,000	9,423,000	**16,398,000**
March	3,193,000	-	1,985,000	2,304,000	9,665,000	**17,147,000**
April	3,533,000	-	2,136,000	2,387,000	10,566,000	**18,622,000**
May	4,375,000	-	3,327,000	3,702,000	12,982,000	**24,386,000**
June	4,202,000	-	3,812,000	4,253,000	12,512,000	**24,779,000**
July	5,114,000	-	7,439,000	8,332,000	15,266,000	**36,151,000**
August	7,765,000	-	4,735,000	5,303,000	23,207,000	**41,010,000**
September	5,558,000	-	4,040,000	4,530,000	16,106,000	**30,234,000**
October	2,349,000	-	3,294,000	7,687,000	7,068,000	**20,398,000**
November	2,423,000	-	-	3,574,000	7,264,000	**13,261,000**
December	1,765,000	-	-	6,931,000	5,322,000	**14,018,000**
Total	46,590,000	-	34,619,000	53,230,000	140,436,000	**274,875,000**
	Well #7 Shut down for repairs 10/16/12					

2013 Well Totals

Month	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Total
January	1,377,000	-	2,054,000	6,324,000	4,123,000	**13,878,000**
February	1,324,000	-	3,444,000	3,740,000	3,917,000	**12,425,000**
March	1,318,000	-	3,595,000	3,865,000	3,957,000	**12,735,000**
April	1,636,000	-	3,853,000	4,171,000	4,891,000	**14,551,000**
May	2,524,000	-	5,369,000	5,772,000	7,562,000	**21,227,000**
June	3,418,000	-	5,177,000	5,573,000	10,182,000	**24,350,000**
July	6,143,000	-	7,716,000	8,321,000	18,277,000	**40,457,000**
August	4,821,000	-	5,782,000	6,290,000	14,608,000	**31,501,000**
September	2,688,000	-	4,086,000	4,633,000	8,096,000	**19,503,000**
October	1,619,000	-	3,610,000	3,914,000	4,952,000	**14,095,000**
November	1,455,000	-	2,826,000	3,098,000	4,661,000	**12,040,000**
December	2,147,000	-	4,200,000	4,582,000	5,491,000	**16,420,000**
Total	30,470,000	-	51,712,000	60,283,000	90,717,000	**233,182,000**
July Consumption up due to flushing new main on Del Monte						

Yearly Well Total Comparisons

Year	Well #2	Well #4	Well #5	Well #6 & 7	Well #8	Well #9	Well #9 Blow-Off	Total
1985	63,970,800	54,971,200	119,661,000	97,114,000	81,781,800			417,498,800
1986	60,812,700	45,235,800	133,130,000	80,946,000	89,332,700			409,457,200
1987	69,431,700	46,769,600	138,490,000	84,834,000	102,024,400			441,549,700
1988	56,822,500	48,412,300	123,178,746	53,359,900	94,055,900			375,829,346
1989	55,335,700	50,256,700	109,325,800	49,666,300	123,426,200			388,010,700
1990	52,148,400	46,583,600	120,033,700	29,422,300	130,147,500			378,335,500
1991	48,519,100	55,562,800	115,039,000	50,410,980	101,682,300			371,214,180
1992	49,325,600	43,900,000	115,391,000	60,850,700	86,149,165			355,616,465
1993	70,790,900	45,968,000	115,839,000	39,228,000	66,664,700			338,490,600
1994	55,310,000	67,620,000	141,544,000	50,840,000	66,518,600			381,832,600
1995	57,234,600	99,186,000	81,067,000	57,120,000	72,242,400			366,850,000
1996	101,037,900	96,539,000	53,650,000	28,740,000	65,638,900			345,605,800
1997	93,136,000	114,498,000	4,964,000	39,106,000	61,014,400			312,718,400
1998	12,414,000	53,850,000	167,000	44,924,000	71,775,200	172,038,100		355,168,300
1999	Decommissioned	46,253,000	81,000	66,093,000	54,598,000	51,394,300		218,419,300
2000		41,916,000	65,000	63,072,000	62,046,000	146,793,000		313,892,000
2001		47,646,000	30,551,000	51,784,000	61,672,000	122,829,000		314,482,000
2002		41,075,000	44,000	47,424,000	56,948,000	151,380,000		296,871,000
2003		49,825,000	-	49,135,000	58,413,000	152,664,000		310,037,000
2004		78,963,000	-	37,392,000	51,878,000	126,879,000		295,112,000
2005		43,552,000	-	89,148,000	96,451,000	46,971,000		276,122,000
2006		65,244,000	-	47,622,000	43,729,000	154,164,000		310,759,000
2007		51,111,000	-	20,320,000	21,162,000	194,242,000		286,835,000
2008		42,904,000	-	22,432,000	16,115,000	201,351,000		282,802,000
2009		62,370,000	-	25,532,000	17,163,000	160,567,000		265,632,000
2010		45,864,000	-	52,381,000	29,552,000	141,047,000		268,844,000
2011		45,777,000	-	49,704,000	37,234,000	138,709,000		271,424,000
2012		46,590,000	-	34,619,000	53,230,000	140,436,000		274,875,000
2013		30,470,000	-	51,712,000	60,283,000	90,717,000		233,182,000
2014								
Total	**846,289,900**	**1,608,913,000**	**1,402,221,246**	**1,474,932,180**	**1,932,928,165**	**2,192,181,400**		**9,457,465,891**
Note:	**1999 Well No. 9 not working for part of the year.**							
	2005 Well No. 4 working as a backup/ Well No. 9 down for repairs 1st quarter of the year.							
	2007 Well No. 4 was down for pump repair from February - April							
	2007 Well No. 8 was down during October for cla-valve repair							
	2009 Well No. 9 stoped working in July & was corrected in August							

Yearly Well Total Comparisons

	2010 Well No. 6/7 & No. 8 are low during April/May due to recoating of the Low Tank						
	2011 Well No. 8 down for repair between 4/7 - 4/12/11						
	2012 Well No. 7 down for repair on 10/16/12						
	2014 Well No. 9 Blow-Off Added						

2011 - 2013 Commercial / Multi-Family Consumption

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3187	Liberty Baptist Church	09-00010.1	DARTMOUTH ST 909	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1158	915	1400	
April	1213	1022	2531	
June	1168	2162	5129	
August	3435	7581	7829	
October	3676	6431	8389	
December	1683	2369	1925	
TOTAL CONSUMPTION	12333	20480	27203	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3188	Temple Baptist	09-00015.0	COLUMBIA AVE 1108	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	940	760	1260	
April	880	1010	920	
June	970	1080	6580	
August	4950	10460	35000	
October	9600	6630	16550	
December	4000	1120	4590	
TOTAL CONSUMPTION	21340	21060	64900	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3189	Fircrest Methodist	09-00020.0	COLUMBIA AVE 1018	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	690	270	2080	
April	1290	370	900	
June	580	330	300	
August	880	5475	220	
October	1250	5117	360	
December	560	1273	440	
TOTAL CONSUMPTION	5250	12835	4300	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3190	Redeemer Lutheran	09-00030.0	PRINCETON ST 1001	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	2468	3989	1731	
April	673	1330	2393	
June	962	10639	8213	
August	39037	30588	19337	
October	29256	26955	20272	
December	3759	3228	3670	
TOTAL CONSUMPTION	76155	76729	55616	

3191	Tapco Credit Union	09-00035.1	COLUMBIA AVE 1210	6	COMM WATER BASE	6

Month	2011	2012	2013	
February	2700	2600	2600	
April	2800	2600	2200	
June	2600	2800	2500	
August	2600	2800	2300	
October	2800	2500	2400	
December	2600	2700	2400	
TOTAL CONSUMPTION	16100	16000	14400	

3192	Tapco Credit Union	09-00036.0	COLUMBIA AVE 1210 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	3330	4910	
April	400	0	3160	
June	0	11850	15850	
August	39680	32970	32180	
October	36910	32700	33140	
December	40	6570	2750	
TOTAL CONSUMPTION	77030	87420	91990	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3193	United Presbyterian	09-00040.0	EMERSON ST 1250	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	9781	4827	1505	
April	990	2550	2945	
June	1362	4309	11325	
August	4830	3438	2623	
October	5513	5596	6975	
December	1113	3141	2292	
TOTAL CONSUMPTION	23589	23861	27665	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3194	Jehovah Witness	09-00045.0	HOLLY CT 101	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1510	1520	2320	
April	1800	1980	2540	
June	1760	1790	5220	
August	1640	1550	9840	
October	1980	1790	5040	
December	1750	1750	1520	
TOTAL CONSUMPTION	10440	10380	26480	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3195	Wainwright School	09-00050.0	ALAMEDA AVE 130	96	WATER DISCONNECTED	1

Month	2011	2012	2013	
February	13670	0	0	
April	15950	0	0	
June	16850	0	0	
August	8770	0	0	
October	320	0	0	
December	680	0	0	
TOTAL CONSUMPTION	56240	0	0	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
4927	City Of Fircrest	09-000500.0	RAMSDELL ST 120	6	COMM WATER BASE	1

NEW METER INSTALLED MAY 2012

Month	2011	2012	2013	
February			340	
April			1060	
June		590	1360	
August		1890	2030	
October		1680	1710	
December		1950	980	
TOTAL CONSUMPTION	0	6110	7480	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3196	Whittier School	09-00070.0	ELM TREE LANE 777	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	37522	37699	54062	
April	36347	39542	54205	
June	36617	41107	58682	
August	20339	37987	46794	
October	34565	43784	57267	
December	34716	52058	65754	
TOTAL CONSUMPTION	200106	252177	336764	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3197	City Of Fircrest	09-00080.0	RAMSDELL ST 120	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	3577	727	674	
April	3520	670	1078	
June	667	671	794	
August	760	762	930	
October	691	680	1437	
December	617	626	691	
TOTAL CONSUMPTION	9832	4136	5604	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3200	City Of Fircrest	09-00094.0	COLUMBIA AVE 400 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	15	440	261	
August	512	1242	484	
October	499	1174	409	
December	0	0	0	
TOTAL CONSUMPTION	1026	2856	1154	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3201	City Of Fircrest	09-00095.0	RAMSDELL ST 115	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1130	1120	1000	
April	1200	1100	1020	
June	1190	1140	830	
August	1590	1150	1220	
October	1480	1020	1130	
December	980	1040	650	
TOTAL CONSUMPTION	7570	6570	5850	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3202	City Of Fircrest	09-00097.0	REGENTS BLVD 100 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	104	34	70	
August	117	48	98	
October	115	49	202	
December	0	5	0	
TOTAL CONSUMPTION	336	136	370	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3203	City Of Fircrest	09-00098.0	REGENTS BLVD 1600 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	193	149	156	
August	274	254	580	
October	116	0	521	
December	0	0	0	
TOTAL CONSUMPTION	583	403	1257	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3204	City Of Fircrest	09-00099.0	REGENTS BLVD 600 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	13	67	29	
August	141	182	298	
October	135	189	547	
December	0	19	0	
TOTAL CONSUMPTION	289	457	874	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3205	City Of Fircrest	09-00100.0	REGENTS BLVD 900 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	925	990	0	
August	3053	1460	888	
October	9393	926	739	
December	0	107	0	
TOTAL CONSUMPTION	13371	3483	1627	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3213	City Of Fircrest	09-00108.0	BERKELEY 0 SWIM HOLE BULB	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	261	173	182	
August	334	337	682	
October	222	352	562	
December	0	12	0	
TOTAL CONSUMPTION	817	874	1426	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3216	City Of Fircrest	09-00111.0	REGENTS BLVD 258 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	1888	0	
August	2558	4989	4428	
October	5338	5153	4153	
December	0	509	0	
TOTAL CONSUMPTION	7896	12539	8581	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3219	City Of Fircrest	09-00120.0	REGENTS BLVD 741 PRK STRIP	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	205	0	
August	2087	454	400	
October	2441	451	346	
December	0	52	0	
TOTAL CONSUMPTION	4528	1162	746	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3220	City Of Fircrest	09-00140.0	CONTRA COSTA AVE 555	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	2800	1662	2317	
April	2222	1909	1837	
June	3219	2361	2866	
August	7407	5575	6335	
October	5718	5896	4561	
December	2433	2251	2101	
TOTAL CONSUMPTION	23799	19654	20017	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3221	City Of Fircrest	09-00145.0	CONTRA COSTA AVE 555	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	435	59	70	
April	716	763	593	
June	35971	45025	65744	
August	77009	69437	69468	
October	50384	31730	66113	
December	83	69	9224	
TOTAL CONSUMPTION	164598	147083	211212	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3222	City Of Fircrest	09-00150.0	CONTRA COSTA AVE 555 IR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	0	0	
August	0	62	112	
October	0	0	0	
December	0	0	0	
TOTAL CONSUMPTION	0	62	112	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3223	City Of Fircrest	09-00170.0	SPRING ST 424	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	15	114	672	
April	52	10	1729	
June	912	220	2988	
August	2684	913	1078	
October	381	411	585	
December	18	210	12	
TOTAL CONSUMPTION	4062	1878	7064	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3224	City Of Fircrest	09-00210.0	CONTRA COSTA AVE 911	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	151	191	2286	
April	159	205	2036	
June	830	354	919	
August	569	604	1033	
October	524	653	1101	
December	326	1920	630	
TOTAL CONSUMPTION	2559	3927	8005	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
5568	City Of Fircrest	09-00212.0	CONTRA COSTA AVE 911 IR	5	COMMERCIAL IRR	1
	New Meter Install 6/10/13					

Month	2011	2012	2013	
February				
April				
June				
August			437	
October				
December				
TOTAL CONSUMPTION	0	0	437	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3225	City Of Fircrest	09-00215.0	CONTRA COSTA AVE 911 IR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	64590	24170	
August	76980	46910	78790	
October	50200	97780	51060	
December	0	0	0	
TOTAL CONSUMPTION	127180	209280	154020	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3226	City Of Fircrest	09-00220.0	CONTRA COSTA AVE 911 IR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	60	
April	0	0	20	
June	570	0	0	
August	10	0	30	
October	10	20	30	
December	0	70	0	
TOTAL CONSUMPTION	590	90	140	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3227	City Of Fircrest	09-00225.0	CONTRA COSTA AVE 615	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	41	40	16	
April	65	116	683	
June	214	255	1194	
August	9172	2183	6196	
October	8703	14594	2919	
December	82	488	144	
TOTAL CONSUMPTION	18277	17676	11152	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3228	City Of Fircrest	09-00227.0	CONTRA COSTA AVE 615 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	0	0	
August	8439	1443	5480	
October	8357	13678	2510	
December	0	0	1	
TOTAL CONSUMPTION	16796	15121	7991	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3229	City Of Fircrest	09-00260.0	WEST MOUNT 1207	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	3560	3450	
August	6500	16100	13930	
October	13800	23730	13980	
December	0	1090	0	
TOTAL CONSUMPTION	20300	44480	31360	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3232	City Of Fircrest	09-00340.0	RAMSDELL ST 115 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	1458	0	189	
April	2209	0	0	
June	2583	28387	12947	
August	30158	35050	39191	
October	32502	37173	22742	
December	4049	7403	232	
TOTAL CONSUMPTION	72959	108013	75301	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3233	City Of Fircrest	09-00350.0	CONTRA COSTA AVE 555 IR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	470	50610	
August	132370	128010	190300	
October	137190	166850	65430	
December	0	14590	0	
TOTAL CONSUMPTION	269560	309920	306340	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3234	City Of Fircrest	09-00360.0	RAMSDELL ST 120 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	9	0	0	
April	57	0	0	
June	64	5742	0	
August	23	18825	12135	
October	14176	17658	5479	
December	24	27	17	
TOTAL CONSUMPTION	14353	42252	17631	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3235	City Of Fircrest	09-00370.0	RAMSDELL ST 115 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	0	0	
August	7372	7245	5867	
October	8624	9991	2038	
December	20	1240	0	
TOTAL CONSUMPTION	16016	18476	7905	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3236	City Of Fircrest	09-00380.0	REGENTS BLVD 240 IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	2146	0	
August	17928	15475	16215	
October	19915	23452	14842	
December	0	1631	0	
TOTAL CONSUMPTION	37843	42704	31057	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
4678	City Of Fircrest	09-99999.5	HYDRANT MTR RENTAL 0	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February			1290	
April			2250	
June		29140	7250	
August		3230	44970	
October		14340	2720	
December		1560	2880	
TOTAL CONSUMPTION	0	48270	61360	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
5701	PHD America One LLC	10-00001.0	ORCHARD ST W 4040	6	COMM WATER BASE	9
3237	EMERSON COURTYARD					

Month	2011	2012	2013	
February	11980	10760	10440	
April	14790	17780	10640	
June	12760	12620	12680	
August	13160	14500	10610	
October	12940	11860	9760	
December	10890	11250	9740	
TOTAL CONSUMPTION	76520	78770	63870	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
5702	PHD America One LLC	10-00002.0	ORCHARD ST W 4040 IRR	5	COMMERCIAL IRR	1
3238	EMERSON COURTYARD					

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	0	0	
August	18444	35151	31398	
October	84617	57720	24316	
December	32452	10076	686	
TOTAL CONSUMPTION	135513	102947	56400	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3239	McNaughton, Marse L.	10-00020.0	RAINIER DR 1410	6	COMM WATER BASE	10

Month	2011	2012	2013	
February	18820	24140	18050	
April	19310	14750	13350	
June	19590	15760	13360	
August	21810	13340	19270	
October	19260	13750	19490	
December	24850	14560	17710	
TOTAL CONSUMPTION	123640	96300	101230	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3240	Cox, Tim	10-00025.2	RAINIER DR 1452	6	COMM WATER BASE	2

Month	2011	2012	2013	
February	1413	2277	2080	
April	1302	1849	1786	
June	1085	1743	2000	
August	1383	2238	2323	
October	1658	2752	2418	
December	1450	3064	2552	
TOTAL CONSUMPTION	8291	13923	13159	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3241	B L Management	10-00030.1	RAINIER DR 1422	6	COMM WATER BASE	14

Month	2011	2012	2013	
February	23518	26620	24160	
April	23605	23487	22762	
June	22363	21961	22213	
August	23275	20554	20413	
October	20297	23846	19389	
December	24088	23528	20185	
TOTAL CONSUMPTION	137146	139996	129122	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3242	Kap Investments LLC	10-00040.2	RAINIER DR 1442 & 1462	6	COMM WATER BASE	13

Month	2011	2012	2013	
February	14977	18062	9782	
April	20185	17389	11910	
June	16526	14866	17173	
August	29271	18888	24324	
October	26238	16063	19329	
December	19127	11382	13905	
TOTAL CONSUMPTION	126324	96650	96423	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3243	R S D Properties	10-00050.4	RAINIER CT 1461	6	COMM WATER BASE	12

Month	2011	2012	2013	
February	9980	12090	10210	
April	9530	11740	9830	
June	8260	12110	11640	
August	9550	11300	10720	
October	10440	8280	9110	
December	10820	10160	9370	
TOTAL CONSUMPTION	58580	65680	60880	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3244	Rainier Ct Ventures LLC	10-00060.2	RAINIER CT 1433	6	COMM WATER BASE	12

Month	2011	2012	2013	
February	37586	21801	10845	
April	32949	11585	9670	
June	17312	12204	10747	
August	25064	8381	9849	
October	31086	8443	9927	
December	19848	9519	11506	
TOTAL CONSUMPTION	163845	71933	62544	

3245	Fircrest Star LLC	10-00070.3	RAINIER DR 1425	6	COMM WATER BASE	15

Month	2011	2012	2013	
February	17758	22257	13881	
April	19043	17815	12996	
June	14431	18674	13074	
August	16554	14048	15115	
October	17639	17078	12045	
December	15934	13378	9903	
TOTAL CONSUMPTION	101359	103250	77014	

3246	Brink / Verge	10-00080.2	RAINIER DR 1415	6	COMM WATER BASE	12

Month	2011	2012	2013	
February	12960	13880	52290	
April	14520	11360	36120	
June	14470	27610	38800	
August	21910	48060	18450	
October	51330	38580	19400	
December	12530	42420	27580	
TOTAL CONSUMPTION	127720	181910	192640	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
5242	Hoover, Mark	10-00090.0	ALAMEDA AVE 1402	6	COMM WATER BASE	10
3247	ROBERT HOOVER					

Month	2011	2012	2013	
February	20930	23580	19670	
April	19430	18160	20420	
June	18580	18950	21160	
August	19760	20750	18000	
October	20490	20740	20020	
December	22210	21300	19310	
TOTAL CONSUMPTION	121400	123480	118580	

3248	Anderson, Steve	10-00100.2	ALAMEDA AVE 1426	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	4560	7200	10090	
April	3880	7060	9740	
June	3020	6170	10770	
August	5560	8240	12070	
October	7000	10370	14000	
December	6180	10420	13770	
TOTAL CONSUMPTION	30200	49460	70440	

3249	Alameda Station Condo	10-00102.1	ALAMEDA AVE 1434 /44 IRR	4	RESIDENTIAL IRR	1

Month	2011	2012	2013	
February	0	1	1	
April	0	1	12	
June	2	4938	3570	
August	7559	18398	11089	
October	13904	20313	8959	
December	1	1846	0	
TOTAL CONSUMPTION	21466	45497	23631	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3250	Park @ Alameda Condo HOA	10-00110.2	ALAMEDA AVE 1450	6	COMM WATER BASE	10

Month	2011	2012	2013	
February	8037	7854	7423	
April	7205	7229	6425	
June	6850	11638	9508	
August	16228	13345	12477	
October	21208	15142	15943	
December	6963	7056	7840	
TOTAL CONSUMPTION	66491	62264	59616	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3251	Fircrest Prof Bldg LLC	10-00120.3	ALAMEDA AVE 1320	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	130	225	28	
April	142	700	54	
June	112	1459	40	
August	1279	87	9	
October	4866	20	9	
December	1702	32	43	
TOTAL CONSUMPTION	8231	2523	183	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3252	Panorama Place Condos	10-00129.0	ALAMEDA AVE 1220 IRRIG	4	RESIDENTIAL IRR	1

Month	2011	2012	2013	
February	0	0	706	
April	0	0	0	
June	461	2806	3418	
August	5101	8417	8293	
October	7569	10477	8696	
December	142	1202	0	
TOTAL CONSUMPTION	13273	22902	21113	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3253	Alameda Dental	10-00130.1	ALAMEDA AVE 1300	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1089	1279	965	
April	1164	1441	1044	
June	1078	926	986	
August	1253	1580	1165	
October	1204	1263	919	
December	1253	1012	957	
TOTAL CONSUMPTION	7041	7501	6036	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3254	Crosby, Greg	10-00140.2	PANORAMA DR 1010 A-D	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	3060	3337	3561	
April	2355	3495	3729	
June	2926	3437	3999	
August	2744	3428	3504	
October	2720	4027	4226	
December	2291	3573	3606	
TOTAL CONSUMPTION	16096	21297	22625	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3255	Heldman, Leta	10-00150.1	PANORAMA DR 1012	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	4241	1658	663	
April	5090	1540	1000	
June	5889	1620	773	
August	7061	1929	4084	
October	4625	5556	8369	
December	1549	714	4541	
TOTAL CONSUMPTION	28455	13017	19430	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3256	Caviezel Group LLC	10-00160.3	PANORAMA DR 1014	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	3829	5909	3101	
April	5206	6105	3197	
June	5839	5725	4129	
August	5146	5271	3664	
October	5002	3885	3333	
December	5014	3605	3419	
TOTAL CONSUMPTION	30036	30500	20843	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3257	Overfield, Mark	10-00170.4	PANORAMA DR 1016	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	7556	5031	5812	
April	6029	5147	5722	
June	6933	5520	6002	
August	7873	6529	6342	
October	8455	6519	6859	
December	4976	6183	6306	
TOTAL CONSUMPTION	41822	34929	37043	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3258	Theoharis, Jacob	10-00180.4	PANORAMA DR 1018	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	0	2739	2717	
April	33	2756	3375	
June	588	3410	3523	
August	1992	3135	3394	
October	3533	3991	4366	
December	3234	3960	2768	
TOTAL CONSUMPTION	9380	19991	20143	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3259	Livesay, Marrell Dean	10-00190.1	PANORAMA DR 1020	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	8921	2858	2677	
April	6234	2121	4637	
June	3131	1297	4951	
August	5061	1976	5022	
October	5325	1782	5092	
December	3474	1689	5184	
TOTAL CONSUMPTION	32146	11723	27563	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3260	Kitchen, Donald	10-00200.1	MAR VISTA DR 1201 A-D	6	COMM WATER BASE	4

Month	2011	2012	2013	
February	1030	1890	2220	
April	1400	2400	1510	
June	1270	2020	1120	
August	3150	2870	2500	
October	3350	3220	1580	
December	2690	2410	520	
TOTAL CONSUMPTION	12890	14810	9450	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
4888	Fircrest Wellington Apt R-M WELLINGTON APT	10-00210.0	MAR VISTA DR 1303 1311	6	COMM WATER BASE	27

Month	2011	2012	2013	
February	37030	36930	23560	
April	37680	43280	24770	
June	41780	62190	33490	
August	75820	46050	40480	
October	81380	41510	33230	
December	44200	29230	22060	
TOTAL CONSUMPTION	317890	259190	177590	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
4887	Fircrest Wellington Apt R-M WELLINGTON APT	10-00240.0	EMERSON ST 1135 1113 / 25	6	COMM WATER BASE	45

Month	2011	2012	2013	
February	15931	31972	39399	
April	15733	30362	41194	
June	14755	40929	58936	
August	19300	67074	80420	
October	20888	69562	78965	
December	14618	49663	45008	
TOTAL CONSUMPTION	101225	289562	343922	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3267	Sterling Savings Bank	10-00320.1	REGENTS BLVD 1375	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	647	364	430	
April	521	416	410	
June	602	375	480	
August	1160	370	2400	
October	790	582	2407	
December	379	385	480	
TOTAL CONSUMPTION	4099	2492	6607	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3268	Fircrest Regents LLC	10-00330.2	REGENTS BLVD 1345 POOL	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	301	3544	2382	
April	307	9043	2249	
June	1496	4151	15348	
August	22857	33399	38041	
October	25852	31268	16289	
December	1851	6083	3026	
TOTAL CONSUMPTION	52664	87488	77335	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3269	Fircrest Regents LLC	10-00335.2	REGENTS BLVD 1329	6	COMM WATER BASE	32

Month	2011	2012	2013	
February	26381	24944	22325	
April	27444	23696	21968	
June	24815	24495	25230	
August	29666	24955	23560	
October	26459	22090	24967	
December	25045	24824	26250	
TOTAL CONSUMPTION	159810	145004	144300	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3270	Fircrest Regents LLC	10-00339.2	REGENTS BLVD 1313	6	COMM WATER BASE	32

Month	2011	2012	2013	
February	33746	20911	25429	
April	26425	29158	27169	
June	23243	26588	45351	
August	57515	50005	63483	
October	63188	59313	48299	
December	24392	30476	27679	
TOTAL CONSUMPTION	228509	216451	237410	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3271	Peoples Furniture Rent	10-00410.8	REGENTS BLVD 1251	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	60	59	52	
April	88	74	74	
June	69	82	103	
August	185	87	152	
October	130	95	157	
December	79	78	113	
TOTAL CONSUMPTION	611	475	651	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3272	Aqua Rec Company	10-00420.1	REGENTS BLVD 1221	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	405	296	665	
April	345	615	1000	
June	274	2095	2368	
August	4662	1326	1997	
October	8638	2002	1740	
December	4823	546	234	
TOTAL CONSUMPTION	19147	6880	8004	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3273	Coldwell Banker	10-00480.0	REGENTS BLVD 1215	6	COMM WATER BASE	5

Month	2011	2012	2013	
February	7250	4087	1503	
April	5646	5523	1441	
June	3914	3779	1503	
August	4222	1651	1185	
October	4269	1401	1194	
December	4693	1602	1404	
TOTAL CONSUMPTION	29994	18043	8230	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3274	Quarles, John	10-00565.0	REGENTS BLVD 1205 1205-11	6	COMM WATER BASE	3

Month	2011	2012	2013	
February	281	271	455	
April	270	602	342	
June	259	351	315	
August	383	490	386	
October	537	1263	456	
December	246	666	429	
TOTAL CONSUMPTION	1976	3643	2383	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3275	Quarles, John	10-00580.1	REGENTS BLVD 1203	6	COMM WATER BASE	6

Month	2011	2012	2013	
February	3288	4455	3796	
April	3336	3833	4958	
June	3079	3615	5447	
August	3270	4116	3313	
October	3014	3630	4345	
December	4186	3800	3395	
TOTAL CONSUMPTION	20173	23449	25254	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3276	Spearman Wilson Holding	10-00590.2	REGENTS BLVD 1201	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	308	312	269	
April	194	521	265	
June	176	157	288	
August	377	153	244	
October	422	288	183	
December	299	286	175	
TOTAL CONSUMPTION	1776	1717	1424	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3277	Johnson, Ivan	10-00600.1	PRINCETON ST 1230	96	WATER DISCONNECTED	1

Month	2011	2012	2013	
February				
April				
June				
August				
October				
December				
TOTAL CONSUMPTION				

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3278	Trans-Pacific Prop Inc	10-00610.6	REGENTS BLVD 1115	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	0	0	1638	
April	0	1000	1420	
June	0	1650	1125	
August	0	2017	506	
October	0	1194	446	
December	0	575	420	
TOTAL CONSUMPTION	0	6436	5555	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3279	Cost Less Prescriptions	10-00650.2	REGENTS BLVD 1109	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	659	714	527	
April	617	687	204	
June	560	706	169	
August	594	712	139	
October	681	749	127	
December	667	735	115	
TOTAL CONSUMPTION	3778	4303	1281	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3289	Trans-Pacific Prop Inc	10-00785.1	REGENTS BLVD 1029 1029-31	6	COMM WATER BASE	2

Month	2011	2012	2013	
February	368	1175	693	
April	419	148	768	
June	249	168	860	
August	272	634	764	
October	339	823	948	
December	401	781	812	
TOTAL CONSUMPTION	2048	3729	4845	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3290	Optimum Physical Therapy	10-00800.9	REGENTS BLVD 1027	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	110	184	301	
April	121	172	387	
June	108	174	396	
August	131	192	312	
October	129	243	274	
December	156	243	288	
TOTAL CONSUMPTION	755	1208	1958	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3291	Trans-Pacific Prop Inc	10-00810.7	REGENTS BLVD 1025	96	WATER DISCONNECTED	1

Month	2011	2012	2013	
February	28	4	0	
April	19	1504	0	
June	3	1504	0	
August	8	1507	0	
October	7	0	0	
December	7	0	0	
TOTAL CONSUMPTION	72	4519	0	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3301	Fircrest Regents East	10-00887.0	REGENTS BLVD 1401	6	COMM WATER BASE	3

Month	2011	2012	2013	
February	2534	2814	2253	
April	4447	2584	2325	
June	2493	7637	7999	
August	7013	12627	2460	
October	8340	1568	2016	
December	3099	2017	6585	
TOTAL CONSUMPTION	27926	29247	23638	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3302	JSP Regents LLC	10-00888.1	REGENTS BLVD 1501	6	COMM WATER BASE	2

Month	2011	2012	2013	
February	2592	2477	3238	
April	3379	3013	3740	
June	2842	3084	5115	
August	4129	4544	6351	
October	6448	6326	5504	
December	2833	3779	2600	
TOTAL CONSUMPTION	22223	23223	26548	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3303	Columbia Bank	10-00889.0	MILDRED ST S 2401 - IRR	5	COMMERCIAL IRR	1

Month	2011	2012	2013	
February	6914	0	0	
April	2	0	0	
June	135	5897	6785	
August	20712	18781	36082	
October	39518	46500	35302	
December	0	4091	0	
TOTAL CONSUMPTION	67281	75269	78169	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3304	Fircrest Golf Club	10-00891.0	REGENTS BLVD 1500 P.SHP	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	494	1010	1497	
April	1040	2316	3572	
June	1405	4580	2404	
August	2568	4167	2371	
October	1902	3587	2315	
December	1482	2065	1380	
TOTAL CONSUMPTION	8891	17725	13539	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3305	Fircrest Golf Club	10-00892.0	REGENTS BLVD 1500 POOL	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1397	2253	5389	
April	1422	2840	5933	
June	6601	17161	5673	
August	17722	13677	16546	
October	8556	9516	9387	
December	2787	1572	8567	
TOTAL CONSUMPTION	38485	47019	51495	

3306	Fircrest Golf Club	10-00894.0	REGENTS BLVD 1500 MAINT	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	11430	3350	2340	
April	8540	3970	3960	
June	4070	4450	3430	
August	7620	5080	5490	
October	8810	3930	4470	
December	3460	2680	3460	
TOTAL CONSUMPTION	43930	23460	23150	

3307	Fircrest Golf Club	10-00895.0	REGENTS BLVD 1500 POND	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1198	2417	75	
April	1025	3775	144	
June	180	75	253	
August	950	556	362	
October	1595	553	291	
December	1128	152	159	
TOTAL CONSUMPTION	6076	7528	1284	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3308	Fircrest Golf Club	10-00896.0	REGENTS BLVD 1500	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	0	0	0	
April	5	92	11	
June	5	31	8	
August	9	10	42	
October	10	12	250	
December	0	3	184	
TOTAL CONSUMPTION	29	148	495	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3309	Fircrest Golf Club	10-00897.0	REGENTS BLVD 1500 C.HSE	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	35090	36230	39020	
April	36800	31140	33110	
June	43990	43880	39560	
August	44830	47660	53740	
October	47410	49320	41540	
December	33320	38140	32810	
TOTAL CONSUMPTION	241440	246370	239780	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3319	J Alameda West	10-01090.0	ARLEO LN 1086	6	COMM WATER BASE	40

Month	2011	2012	2013	
February	39630	37100	31290	
April	40380	33770	29260	
June	38190	35400	38620	
August	69790	67900	74430	
October	81960	67710	56510	
December	37640	37560	32670	
TOTAL CONSUMPTION	307590	279440	262780	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3320	J Alameda West	10-01130.0	ARLEO LN 1086	6	COMM WATER BASE	28

Month	2011	2012	2013	
February	24340	27500	24760	
April	23980	24660	22210	
June	21440	24590	24780	
August	27910	23440	25240	
October	24930	24500	27560	
December	23160	24380	26640	
TOTAL CONSUMPTION	145760	149070	151190	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3321	Princeton Place	10-01210.1	GARDEN CIRCLE 1118 IRR	4	RESIDENTIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	10501	19386	34694	
August	54863	58104	60286	
October	60509	72192	35607	
December	0	1455	226	
TOTAL CONSUMPTION	125873	151137	130813	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3322	Princeton Place	10-01220.1	GARDEN CIRCLE 1108 IRR	4	RESIDENTIAL IRR	1

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	8105	15427	25303	
August	43369	46190	43996	
October	48808	57803	25222	
December	0	1224	8	
TOTAL CONSUMPTION	100282	120644	94529	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3323	Fircrest Regents LLC	10-10083.2	REGENTS BLVD 1301	6	COMM WATER BASE	32

Month	2011	2012	2013	
February	26253	50036	21206	
April	29052	48348	20735	
June	26690	46661	23160	
August	29667	40985	17736	
October	28343	40911	19875	
December	52851	29152	23043	
TOTAL CONSUMPTION	192856	256093	125755	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3280	Trans-Pacific	10-00660.9	REGENTS BLVD 1105-G	6	COMM WATER BASE	1
5438	FIRCREST PHARMACY					

Month	2011	2012	2013	
February	1	2	109	
April	0	0	67	
June	0	0	124	
August	1	0	244	
October	0	0	210	
December	0	1	189	
TOTAL CONSUMPTION	2	3	943	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3281	WANDAS STYLING SALON	10-00670.0	REGENTS BLVD 1105-F	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	881	909	757	
April	829	680	737	
June	833	776	897	
August	843	765	783	
October	865	721	785	
December	802	752	768	
TOTAL CONSUMPTION	5053	4603	4727	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3282	INNOVATIVE FITNESS	10-00685.8	REGENTS BLVD 1105-E	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	270	398	347	
April	345	484	379	
June	393	466	411	
August	467	433	435	
October	468	369	206	
December	426	342	331	
TOTAL CONSUMPTION	2369	2492	2109	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3283	GREENER BEAN	10-00700.8	REGENTS BLVD 1039	6	COMM WATER BASE	1
5343	TWO					

Month	2011	2012	2013	
February	2273	2306	4041	
April	2522	2557	7002	
June	2316	2835	5623	
August	2321	2366	4533	
October	2402	2787	2544	
December	1918	3105	2305	
TOTAL CONSUMPTION	13752	15956	26048	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3284	INNOVATIVE FITNESS	10-00710.6	REGENTS BLVD 1105-C&D	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1000	1924	1536	
April	1429	1976	1635	
June	1374	1954	1877	
August	1967	2027	2047	
October	2083	2051	1751	
December	1883	1693	1833	
TOTAL CONSUMPTION	9736	11625	10679	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3285	TRANS-PACIFIC PROP	10-00720.7	REGENTS BLVD 1105-B	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	43	100	98	
April	108	102	116	
June	102	101	102	
August	81	109	74	
October	93	214	88	
December	95	99	0	
TOTAL CONSUMPTION	522	725	478	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3286	CHOON KIM	10-00730.4	REGENTS BLVD 1105-A	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	1838	1973	2036	
April	1767	2049	1869	
June	1822	2171	2446	
August	2415	4023	3048	
October	2504	3102	2939	
December	2102	2863	2225	
TOTAL CONSUMPTION	12448	16181	14563	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3287	Exercise Science Center	10-00740.2	REGENTS BLVD 1101	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	2094	1664	1236	
April	2183	1445	1172	
June	1832	1339	1279	
August	1768	1239	1133	
October	1617	1204	1184	
December	1863	1287	1248	
TOTAL CONSUMPTION	11357	8178	7252	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3288	Tacoma Cat Hospital	10-00770.5	REGENTS BLVD 1035	6	COMM WATER BASE	1

Month	2011	2012	2013	
February	732	946	798	
April	843	837	706	
June	1004	999	953	
August	933	895	810	
October	1033	915	865	
December	948	817	700	
TOTAL CONSUMPTION	5493	5409	4832	

Cust #	Account Name	Svc #	Service Address	Wtr	Description
3292	Richard J Jensen Ps	10-00820.5	REGENTS BLVD 1021-1023	6	COMM WATER BASE

Month	2011	2012	2013	
February	198	222	186	
April	226	261	214	
June	216	1797	251	
August	272	225	195	
October	265	234	148	
December	845	195	148	
TOTAL CONSUMPTION	2022	2934	1142	

Cust #	Account Name	Svc #	Service Address
3293	Names Family Limited	10-00835.1	REGENTS BLVD 1033

Month	2011	2012	2013	
February	2424	2497	3401	
April	2605	2724	2795	
June	2657	2772	3562	
August	2565	2827	2993	
October	2951	2860	3342	
December	2540	3276	3392	
TOTAL CONSUMPTION	15742	16956	19485	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3294	Names Family Limited	10-00836.0	REGENTS BLVD 1033 IRR			

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	6311	7409	
August	12640	20160	13073	
October	18351	18656	9202	
December	30	3648	0	
TOTAL CONSUMPTION	31021	48775	29684	

3295 Names Family Limited 10-00840.0 REGENTS BLVD 1019

Month	2011	2012	2013	
February	3742	15266	2332	
April	9380	8744	2921	
June	3914	20582	20323	
August	21119	37687	20729	
October	22980	23255	18928	
December	4736	3574	3040	
TOTAL CONSUMPTION	65871	109108	68273	

3296 Bryce Kalland 10-00845.4 REGENTS BLVD 1009

Month	2011	2012	2013	
February	2335	2204	3347	
April	2458	2361	3121	
June	2139	2782	3264	
August	2514	2994	3519	
October	2941	3039	4399	
December	2308	3239	7386	
TOTAL CONSUMPTION	14695	16619	25036	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3297	Geraldine Snow	10-00860.1	REGENTS BLVD 1001 A&B			

Month	2011	2012	2013	
February	628	634	858	
April	706	715	821	
June	589	734	2007	
August	814	753	1404	
October	1223	671	4626	
December	731	678	1606	
TOTAL CONSUMPTION	4691	4185	11322	

3298 John Mishko 10-00880.2 REGENTS BLVD 741 - A

Month	2011	2012	2013	
February	2778	3951	3618	
April	3577	4558	3634	
June	3716	5092	4668	
August	6925	9065	6271	
October	6598	6865	4785	
December	4384	3784	3286	
TOTAL CONSUMPTION	27978	33315	26262	

3299 Eaton Family LLC 10-00884.2 MILDRED ST S 2119

Month	2011	2012	2013	
February	0	0	0	
April	0	0	0	
June	0	0	0	
August	0	0	0	
October	0	0	0	
December	0	0	0	
TOTAL CONSUMPTION	0	0	0	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3300	Columbia Bank	10-00886.0	MILDRED ST S 2401			

Month	2011	2012	2013	
February	7683	895	865	
April	2324	956	927	
June	2252	990	1002	
August	870	934	1091	
October	858	847	1235	
December	780	900	1144	
TOTAL CONSUMPTION	14767	5522	6264	

3310 Mary Baurichter 10-00925.1 REGENTS BLVD 616

Month	2011	2012	2013	
February	1741	5229	5439	
April	2323	5699	5073	
June	3125	5088	5062	
August	5528	4472	4322	
October	4409	4600	4049	
December	5102	5267	4750	
TOTAL CONSUMPTION	22228	30355	28695	

3311 Mary Baurichter 10-00945.1 REGENTS BLVD 612 - 614

Month	2011	2012	2013	
February	2285	2545	2653	
April	2406	2514	2450	
June	2256	2477	2756	
August	2598	2437	2595	
October	2559	2324	2293	
December	2456	2750	2505	
TOTAL CONSUMPTION	14560	15047	15252	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3312	Shaklee Products	10-00965.0	REGENTS BLVD 602 - 606			

Month	2011	2012	2013	
February	2065	2090	1999	
April	1676	1817	1446	
June	1678	2462	1674	
August	1450	2407	1482	
October	1713	2638	1492	
December	1780	2504	1795	
TOTAL CONSUMPTION	10362	13918	9888	

3313 Tacoma Fire HQ 10-00985.0 REGENTS BLVD 302

Month	2011	2012	2013	
February	3997	3517	2705	
April	3662	3499	2412	
June	3603	4168	2673	
August	13604	13893	11526	
October	18280	16335	14160	
December	8617	6231	2504	
TOTAL CONSUMPTION	51763	47643	35980	

3314 BCD2 LLC 10-01010.2 BOWES DR 412

Month	2011	2012	2013	
February	1632	1695	326	
April	1696	1978	315	
June	1571	1577	844	
August	2200	1547	2239	
October	5070	2261	3124	
December	3279	403	1928	
TOTAL CONSUMPTION	15448	9461	8776	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3315	Marc Tollefson	10-01020.3	REGENTS BLVD 701			

Month	2011	2012	2013	
February	1774	1725	2162	
April	1895	1495	2601	
June	1859	2050	1989	
August	4057	4661	4717	
October	6592	2081	5152	
December	1729	2147	1238	
TOTAL CONSUMPTION	17906	14159	17859	

3316 Hawkins-Poe Inc 10-01030.1 REGENTS BLVD 112, 1-6

Month	2011	2012	2013	
February	5420	5810	6850	
April	5070	6800	6440	
June	4550	6710	7800	
August	6970	6150	7790	
October	8880	6280	11120	
December	6030	7860	17170	
TOTAL CONSUMPTION	36920	39610	57170	

3317 J Alameda West 10-01060.0 ARLEO LN 1086

Month	2011	2012	2013	
February	34533	33108	34389	
April	31845	32161	31234	
June	31256	31990	45277	
August	56164	55843	70037	
October	64668	71063	56430	
December	32901	45663	36566	
TOTAL CONSUMPTION	251367	269828	273933	

Cust #	Account Name	Svc #	Service Address	Wtr	Description	# Units
3318	J Alameda West	10-01070.0	ARLEO LN 1086			

Month	2011	2012	2013	
February	28310	28610	28550	
April	27350	32720	25840	
June	25740	30930	38460	
August	82960	64370	77380	
October	83500	92650	54730	
December	27960	36340	27750	
TOTAL CONSUMPTION	275820	285620	252710	

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Date Submitted: 5/21/2020

Water Use Efficiency
Annual Performance Report - 2019

WS Name: FIRCREST CITY OF

Water System ID# : 25150 WS County: PIERCE

Report submitted by: *Vicky Walston*

Meter Installation Information:

Estimate the percentage of metered connections: *100%*

If not 100% metered – Did you submit a meter installation plan to DOH? No

Within your meter installation plan, what date did you commit to completing meter installation?

Current status of meter installation:

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period *01/01/2019* To *12/31/2019*

Incomplete or missing data for the year? *No*

If yes, explain:

Total Water Produced & Purchased (TP) – Annual volume gallons	*244,226,774* gallons	
Authorized Consumption (AC) – Annual Volume in gallons	*236,145,251* gallons	
Distribution System Leakage – Annual Volume TP – AC	*8,081,523* gallons	
Distribution System Leakage – DSL = [(TP – AC) / TP] x 100 %	*3.3 %*	
3-year annual average - %	*5.2 %*	*2017, 2018, 2019*

Goal-Setting Information:

Enter the date of most recent public forum to establish WUE goal: *07/08/2014*

Has goal been changed since last performance report? *No*

Note: Customer goal must be re-established every 6 years through a public process.

Customer WUE Goal (Demand Side):

The City's goal was established in the update Water System Plan's conservation plan. It was set at 0.2% per year.

(Question 6)

Customer (Demand Side) Goal Progress:

The City of Fircrest continues to promote water conservation, which was established in the Water System Plan's conservation plan in 2014, which we are currently working on updating, by offering customers free low flow/water efficiency items and educational materials at the Public Works Building as well as at community events in Fircrest. Our focus on efficient use of water in homes, schools and businesses is helping us maintain our progress toward the goal set on the demand side at 0.2% average annual consumption.

Additional Information Regarding Supply and Demand Side WUE Efforts

We have completed our water main audit to determine what was causing the extreme amount of water loss by comparing the production vs. consumption and found it was a combination of both. The City did determine the production side was our biggest culprit. The City of Fircrest hired a leak detection company to help us locate and find, hopefully, all potential problems within our water system and have since repaired them. Throughout the year we located and fixed 8 major water main breaks. We will continue to monitor the rest of the City's supply side to rule out any other potential problems currently effecting our system. We are also aware that much of our meters were installed before 2000 making them well past their expected life expectancy and are continuing to work on a meter replacement program to deter any future problems that may arise from the meters not calculating consumption used correctly.

Describe Progress in Reaching Goals:

- Estimate how much water you saved.
- Report progress toward meeting goals within your established timeframe.
- Identify any WUE measures you are currently implementing.
- If you established a goal to maintain a historic level (such as maintaining daily consumption at 65 gallons per person per day for the next two years) you must explain why you are unable to reduce water use below that level.

The following questions will help DOH better understand water usage, water resources management and drought response. The data will be used to provide technical assistance, not for regulatory purposes.

All questions are voluntary

Month	Date of Measurement	Static Water Level (feet below measuring point)	Dynamic Water Level (feet below measuring point)
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

Water level data:

Please provide the following information (if known) to help us better utilize the water level data.

Well tag Id number:

Well depth:

Water level accuracy (within 0.01 ft < 1 ft ~ 1 ft)

Completion type (e.g., cased open interval, cased open-ended, cased open-ended with perforations, etc...)

Location coordinates (latitude, longitude) and accuracy of the coordinates (< 1ft, ~1ft, >1000ft)

Water level parameter name (e.g. depth below measuring point, depth below top of casing, depth below ground surface)

Elevation of top of casing OR elevation of measuring point if different than top of casing (as specified in question 7)

Monthly/Seasonal Water Usage:

What was your maximum daily water demand for the previous year (in gallons per day)? _____

Month	**Volume of Water Produced in gallons**
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Water shortage response:

Did you activate any level of water shortage response plan the previous year?

☐ Yes ☐ No ☐ There was no need to

If you activated a water shortage response plan the previous year, what level did you activate? (Check all that apply)

☐ Advisory Conservation ☐ Voluntary Conservation

☐ Mandatory Conservation ☐ Rationing ☐ Other

What factors caused your water shortage the previous year?

☐ Drought ☐ Fire ☐ Landslides ☐ Earthquakes

☐ Flooding ☐ Water Supply Limitations ☐ Other

Do not mail, fax, or email this report to DOH

2018 Consumption Usage

SERVICE METERS

Month	Billing	Final Bills	Corrections / Misreads	Total cu.ft. Usage	Unmetered (gal)	Gallons (7.48 gal. - 1 cu.ft.)
JANUARY		4,068	-1,049	3,019	175,500	198,082
FEBRUARY	3,180,130	1,423	-2,000	3,179,553	510,009	24,293,065
MARCH		3,526	0	3,526	400,500	426,874
APRIL	3,147,723	2,764	0	3,150,487	3,966,009	27,531,652
MAY		8,554	0	8,554	3,901,500	3,965,484
JUNE	5,300,977	17,485	0	5,318,462	4,686,009	44,468,105
JULY		21,540	-3,721	17,819	4,063,500	4,196,786
AUGUST	9,072,688	18,556	0	9,091,244	4,958,068	72,960,573
SEPTEMBER		17,689	0	17,689	4,063,500	4,195,814
OCTOBER	7,363,103	4,214	-369,000	6,998,317	4,398,009	56,745,420
NOVEMBER		10,949	-400,000	-389,051	4,063,500	1,153,399
DECEMBER	3,400,561	9,373	-4,000	3,405,934	6,198,009	31,674,395
			-779,770	30,805,553	41,384,113	271,809,649

Unmetered Information

Month	What/Where	Wtr Loss Information	Total (gal) Lost	Additional Information	
Mar-18	Ramsdell Wtr Main Proj.Blow Off	750 GPM for 5 hrs	225,000		225,000 March
May-18	Fire on 300 Bl Summit Ave	1500 GPM for 3 hrs	270,000		270,000 May
Jun-18	315 Harvard Ave - Lk City Side	25 GPM for 20 days	720,000		720,000 June
Aug-18	1149 Garden Circle - Lk City Side	25 GPM for 5 days	180,000		180,000 Aug
Aug-18	Wtr Truck Fill - Golf Course Proj.	50,810 cf used during proj	380,059		380,059 Aug
Dec-18	100 bl Contra Costa - Main Break	250 GPM for 5 days	1,800,000		1,800,000 Dec
2018	Sample Station Testing	15 GPM for 5 min x4 Sites (Monthly)	3,600	Split 12 Months	300 Jan-Dec
2018	4 Wells Analyzer - Unmetered	1 GPM ea. (Daily)	2,102,400	Split 12 Months	175,200 Jan-Dec
2018	Whittier Compound Meter Not reading right (Low Consumption)	Ave 334,509 Loss per Bill Cycle gal (based on 4 yr ave.)	2,007,054	Split 6 Bill Cycles based on 4 Yr Average	334,509 Jul-Dec
2018	Service Leak on Cityside of Meter - Leak approx 6mo of 2018	10 GPM for 6 mo	2,592,000	Split 6 Months	432,000 Jul-Dec
4/2018-12/2018	Leak in Main Shut off Valve East of Estate Place - Leak was	80 GPM for 9 months	31,104,000	Split 9 Months	3,456,000 Apr-Dec
			41,384,113		

(Question F)
(LAST 2 YEARS)

2018 WELL TOTALS

Month	Well #4	Well # 7	Well #8	Well #9	Total
JANUARY	2,587,000	1,877,313	2,622,000	9,704,000	16,790,313
FEBRUARY	2,252,000	1,545,776	2,231,000	8,458,000	14,486,776
MARCH	3,087,000	1,649,836	2,290,000	8,820,000	15,846,836
APRIL	2,834,000	1,629,575	2,241,000	10,559,000	17,263,575
MAY	5,089,000	3,437,672	3,714,000	15,708,000	27,948,672
JUNE	5,235,000	3,818,886	5,269,000	19,723,000	34,045,886
JULY	6,743,000	5,388,286	7,364,000	25,099,000	44,594,286
AUGUST	6,143,000	4,462,420	6,097,000	22,711,000	39,413,420
SEPTEMBER	4,208,000	2,009,536	2,681,000	15,473,000	24,371,536
OCTOBER	3,893,000	1,090,934	1,449,000	13,984,000	20,416,934
NOVEMBER	3,335,000	863,488	1,202,000	12,302,000	17,702,488
DECEMBER	3,775,000	1,003,678	1,313,000	11,460,000	17,551,678
	49,181,000	28,777,400	38,473,000	174,001,000	290,432,400

COMPARISON 2018

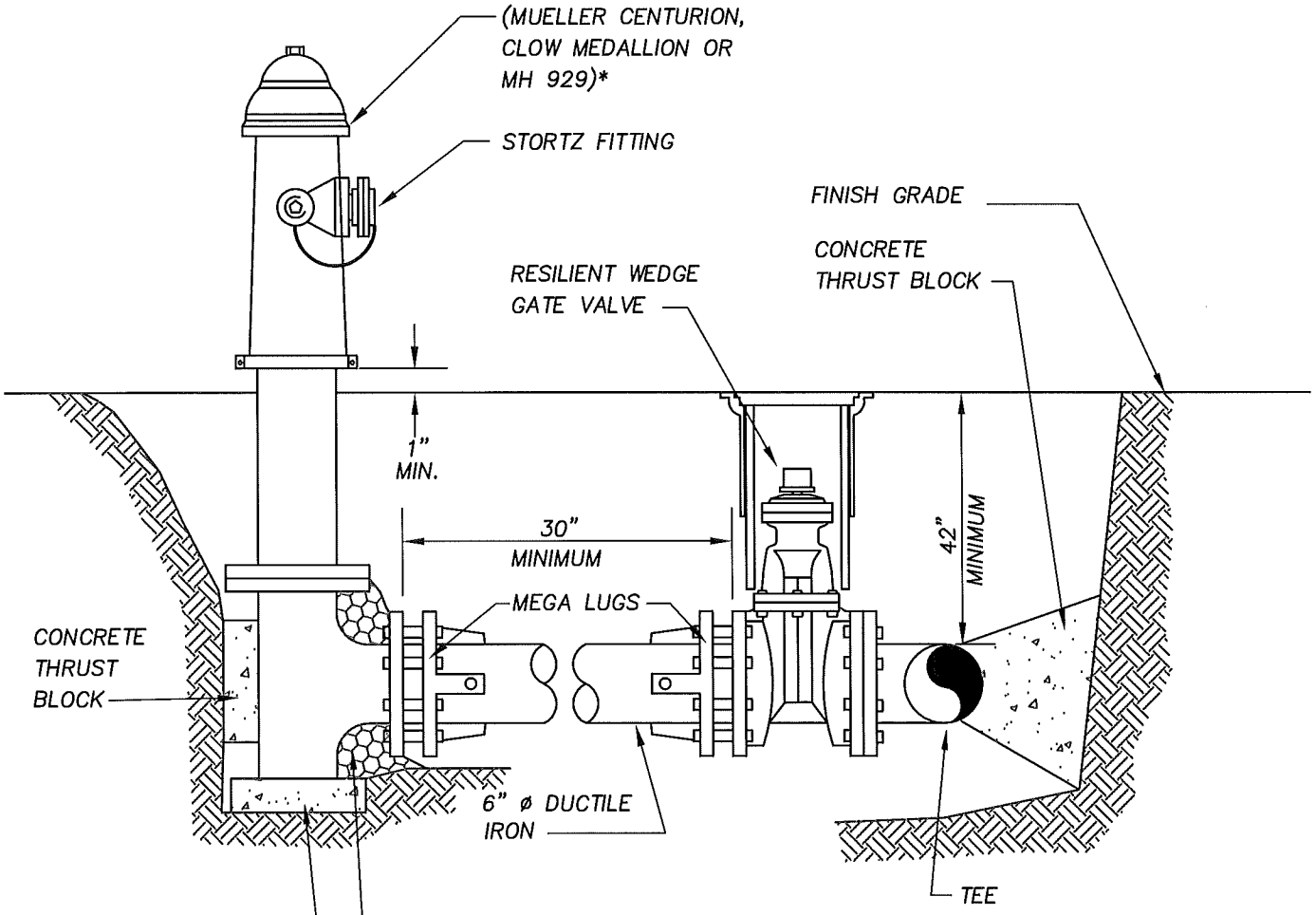
MONTH	Well Totals	Meter Totals	Difference	
JANUARY/FEBRUARY	31,277,089	24,491,148	6,785,941	% Wtr Loss
MARCH/APRIL	33,110,411	27,958,526	5,151,885	
MAY/JUNE	61,994,558	48,433,589	13,560,969	
JULY/AUGUST	84,007,706	77,157,359	6,850,347	
SEPTEMBER/OCTOBER	44,788,470	60,941,234	-16,152,764	
NOVEMBER/DECEMBER	35,254,166	32,827,794	2,426,372	
	290,432,400	271,809,649	18,622,751	6.6%

PROJECTED LEAK - COMPARISON 2018

Leak in main East of Estate Pl (between Estate Pl and Boise) 1" pipe / 90 PSI (was dumping into Leach Creek - Jeff decided to go over to Leach Creek to check and heard water running and upon further investigation found water shooting into the air from the broken pipe) - leak found and fixed on 5/9/19.

Write-up 2018 Water Loss at 80 GPM for Wtr Main Pipe Break

80	GPM	
4800	GPH	
115,200	Gal/Day	
3,456,000	Gal/Month (30day)	
31,104,000	Projected Gal. Lost	(9-months)



TYPICAL FIRE HYDRANT DETAIL

NO SCALE

* (OR APPROVED EQUAL)

NOTES:

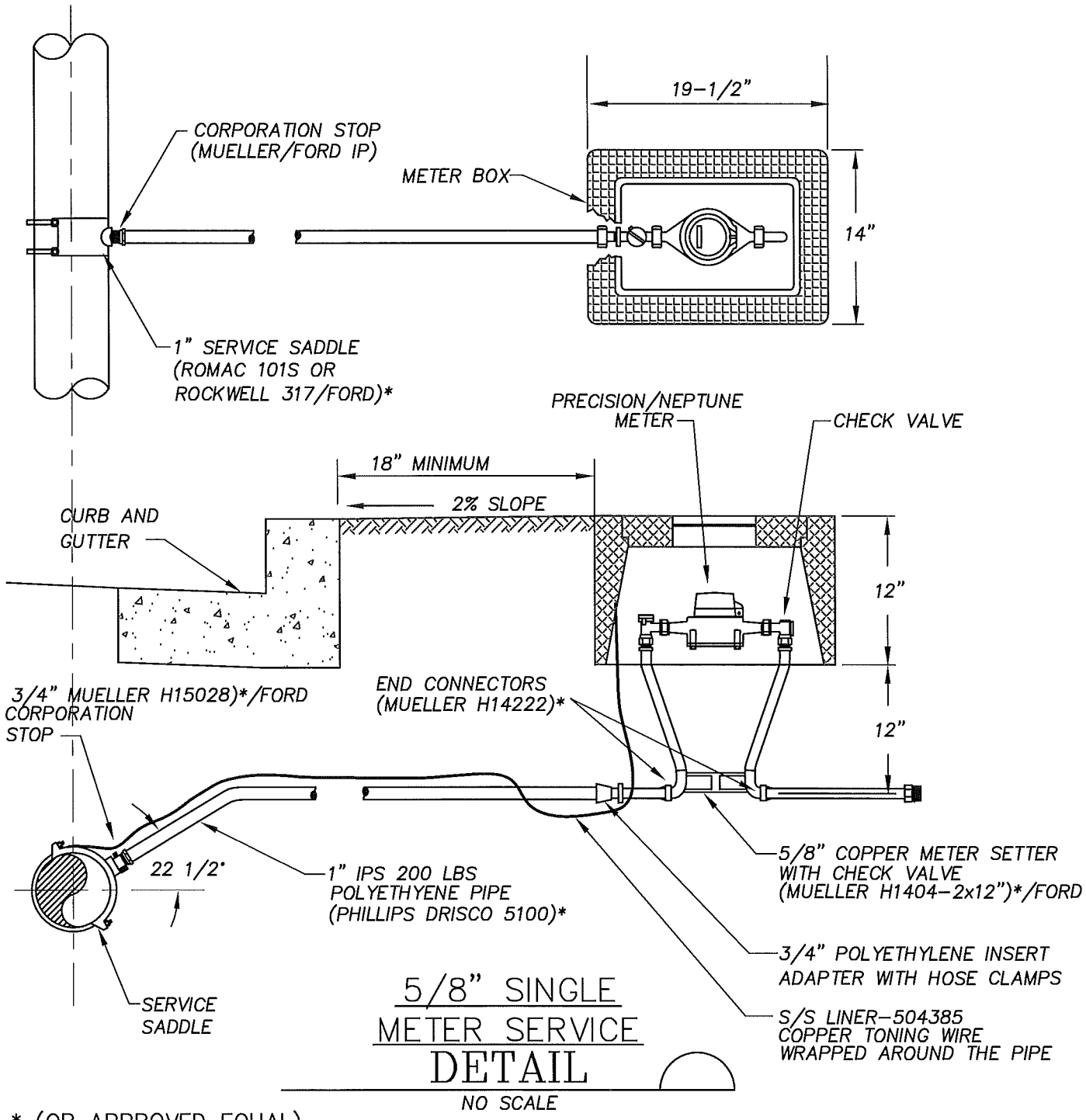
1. DEAD END MAIN EXTENSIONS OVER 50' SHALL BE 8" MINIMUM.
2. USE PORT 5" STORZ, MVO 5–1/4", WITH ALL OPERATING NUTS THE SAME SIZE.
3. AN UNOBSTRUCTED THREE FOOT MINIMUM WORKING AREA RADIUS SHALL BE PROVIDED AROUND ALL HYDRANTS.

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

TYPICAL FIRE HYDRANT

APPROVED BY CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	TDW	TJL	12/2/04	FIG 4-01



5/8" SINGLE METER SERVICE DETAIL

NO SCALE

* (OR APPROVED EQUAL)

ENVIRONMENT	METER BOX	LID TYPE
CONCRETE SIDEWALK	*BROOKS SERIES 36 CONCRETE OR CHRISTY B9X	CONCRETE
CONCRETE DRIVEWAY AND OTHER TRAFFIC AREAS	*BROOKS SERIES 36 CONCRETE OR FOGTITE I-D	CAST IRON TRAFFIC COVER
EARTH	*CARSON SERIES 1419-B PLASTIC	*CARSON PLASTIC 1419 READER LID

NOTES:

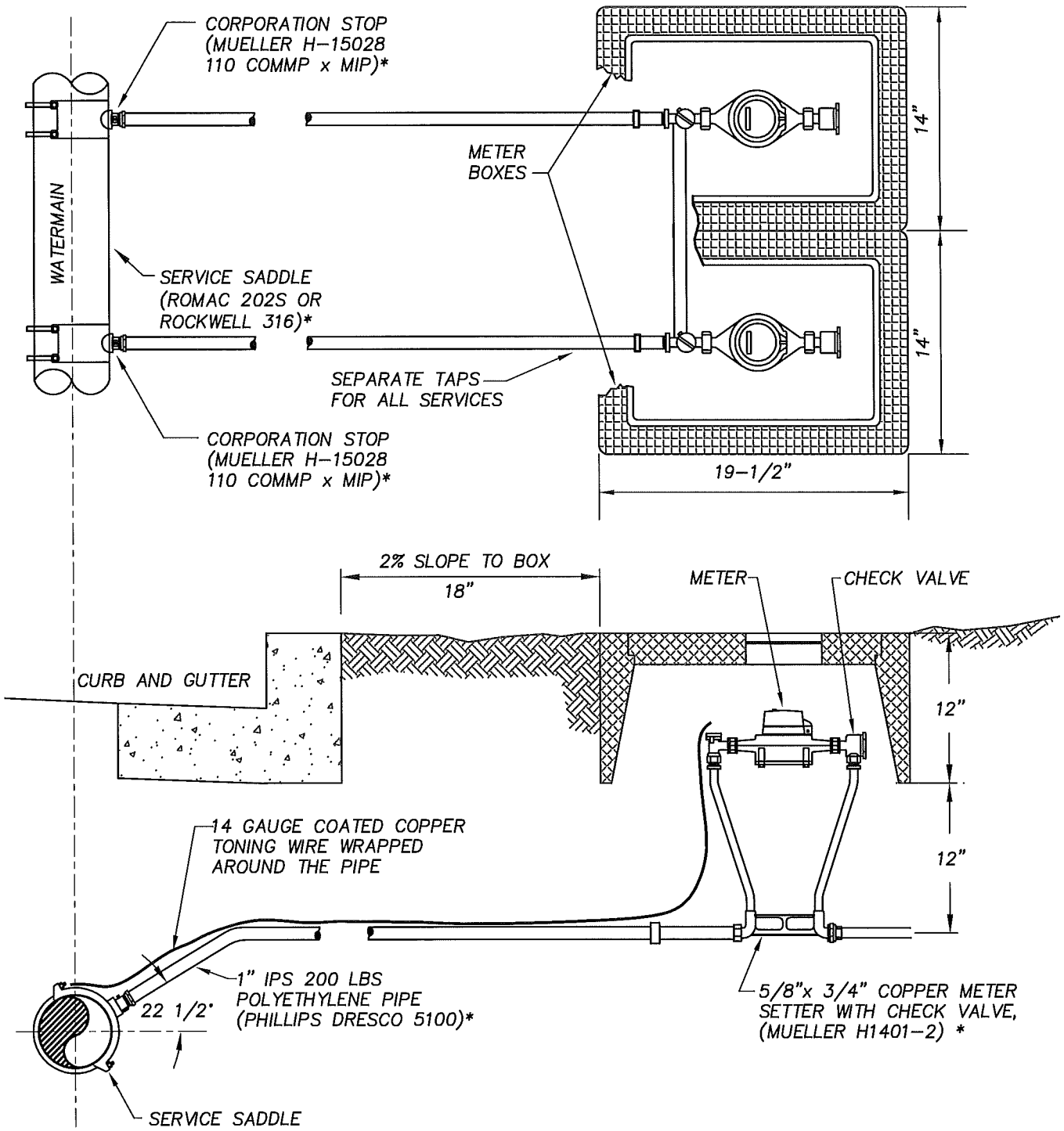
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL MUELLER 110 COMPRESSION FITTINGS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

5/8" SINGLE METER SERVICE

APPROVED BY CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	TDW	TJL	07/17/00	FIG 4-02



5/8" METER SERVICE DETAIL

NO SCALE

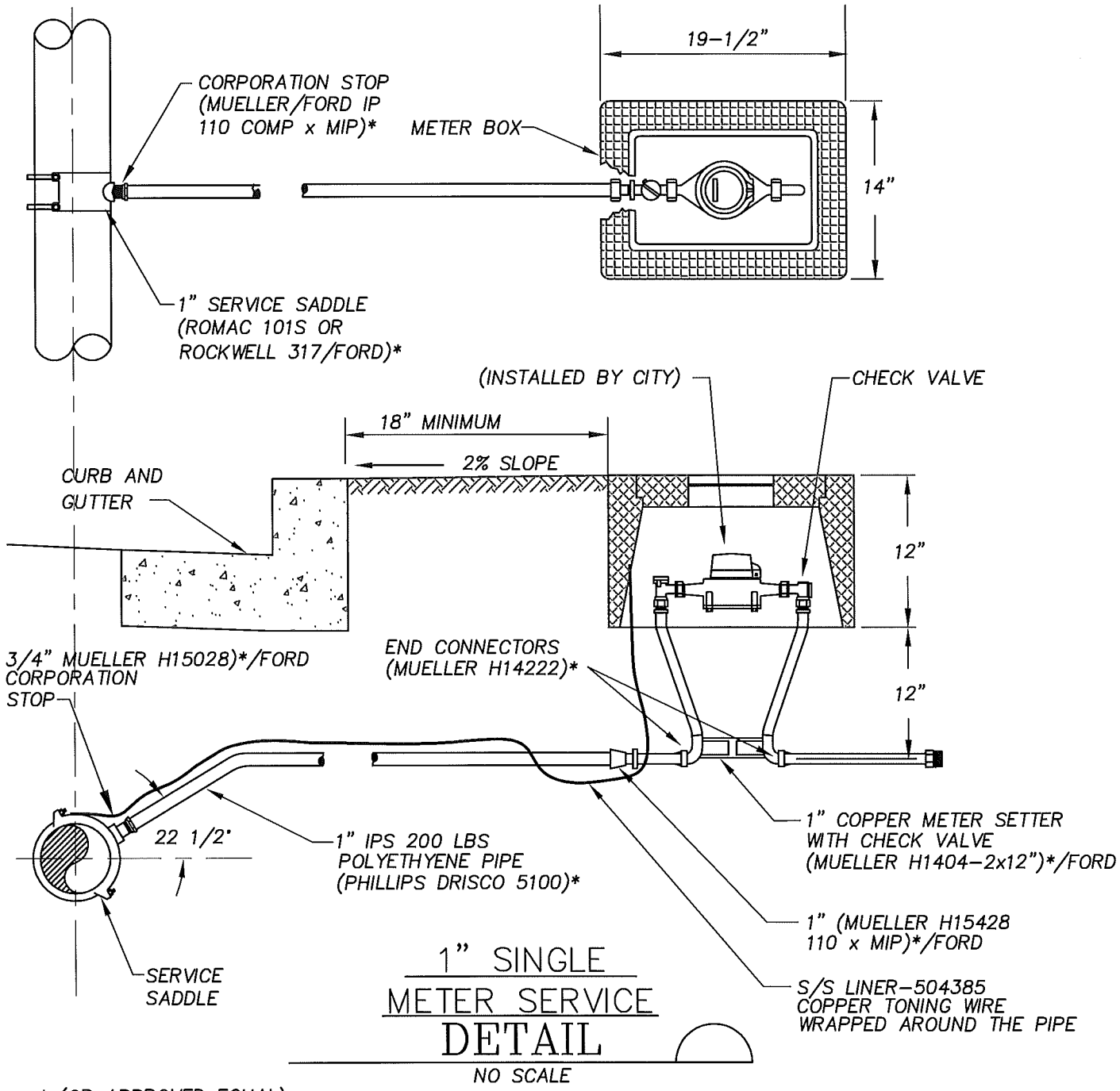
NOTES:
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL COMPRESSION FITTINGS
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

5/8" METER SERVICE

APPROVED BY
CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	TDW	TJL	07/17/00	FIG 4-03



1" SINGLE METER SERVICE DETAIL

NO SCALE

* (OR APPROVED EQUAL)

ENVIRONMENT	METER BOX	LID TYPE
CONCRETE SIDEWALK	(BROOKS SERIES 36 CONCRETE OR CHRISTY B9X)*	CONCRETE
CONCRETE DRIVEWAY AND OTHER TRAFFIC AREAS	(BROOKS SERIES 36 CONCRETE OR FOGTITE I-D)*	CAST IRON TRAFFIC COVER
EARTH	(CARSON SERIES 1419-B PLASTIC)*	(CARSON PLASTIC 1419 READER LID)*

NOTES:

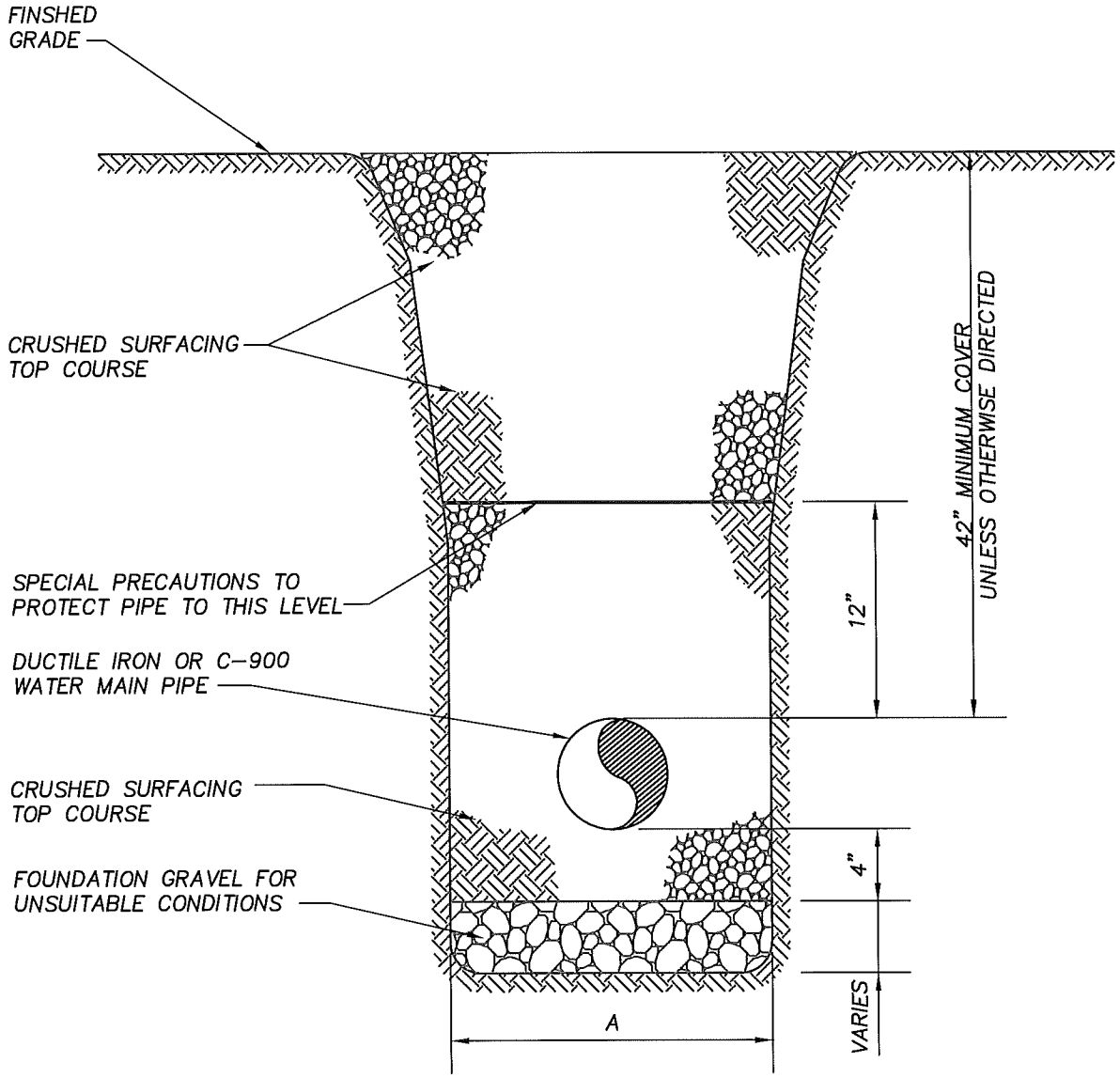
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL MUELLER 110 COMPRESSION FITTINGS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

1" SINGLE METER SERVICE

APPROVED BY CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	TDW	TJL	11/21/01	FIG 4-04



C-900 OR DUCTILE IRON WATER MAIN TRENCH SECTION

DETAIL

NO SCALE

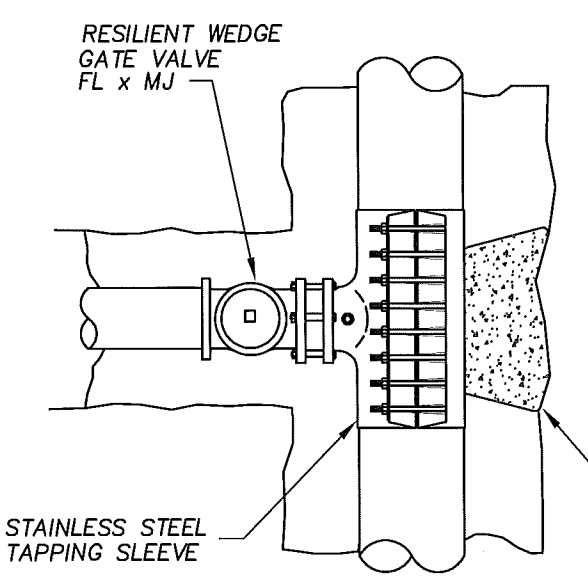
PIPE SIZE	A	PIPE TYPE
6"	24"	C-900
8"	30"	OR
10" & 12"	36"	DUCTILE
16" & 18"	42"	DUCTILE ONLY

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

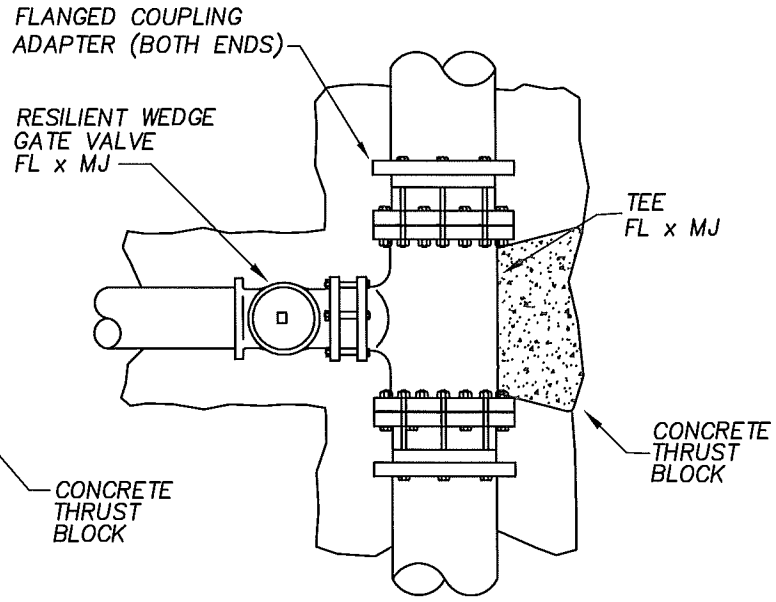
DUCTILE IRON WATER MAIN TRENCH SECTION

APPROVED BY CITY ENGINEER _____ DATE: _____

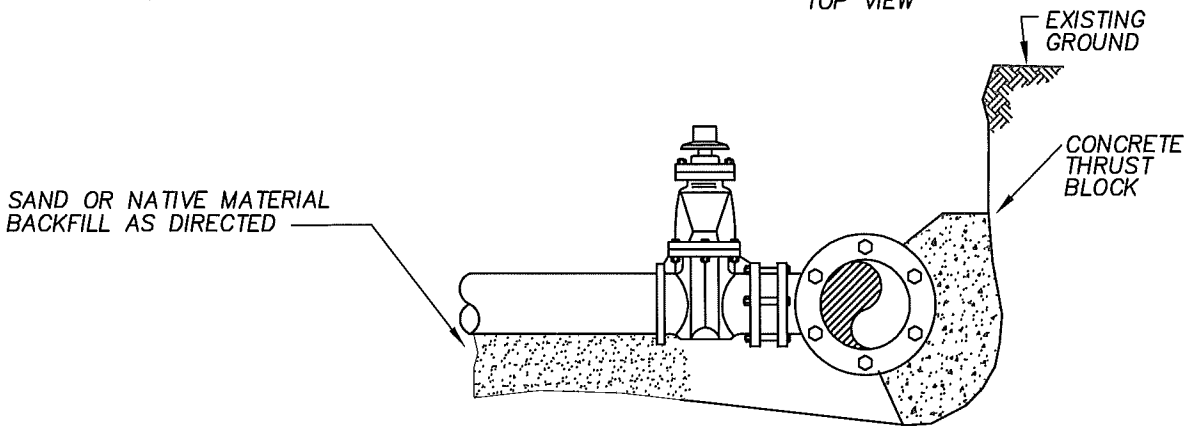
REF	DWN	CKD	DATE	FILE
	TWK	TJL	12/2/04	FIG 4-07



LIVE TAP



CUT–IN–TEE
TOP VIEW



CUT–IN–TEE
SIDE VIEW

CONNECTION TO EXISTING MAIN DETAIL

NO SCALE

NOTES:

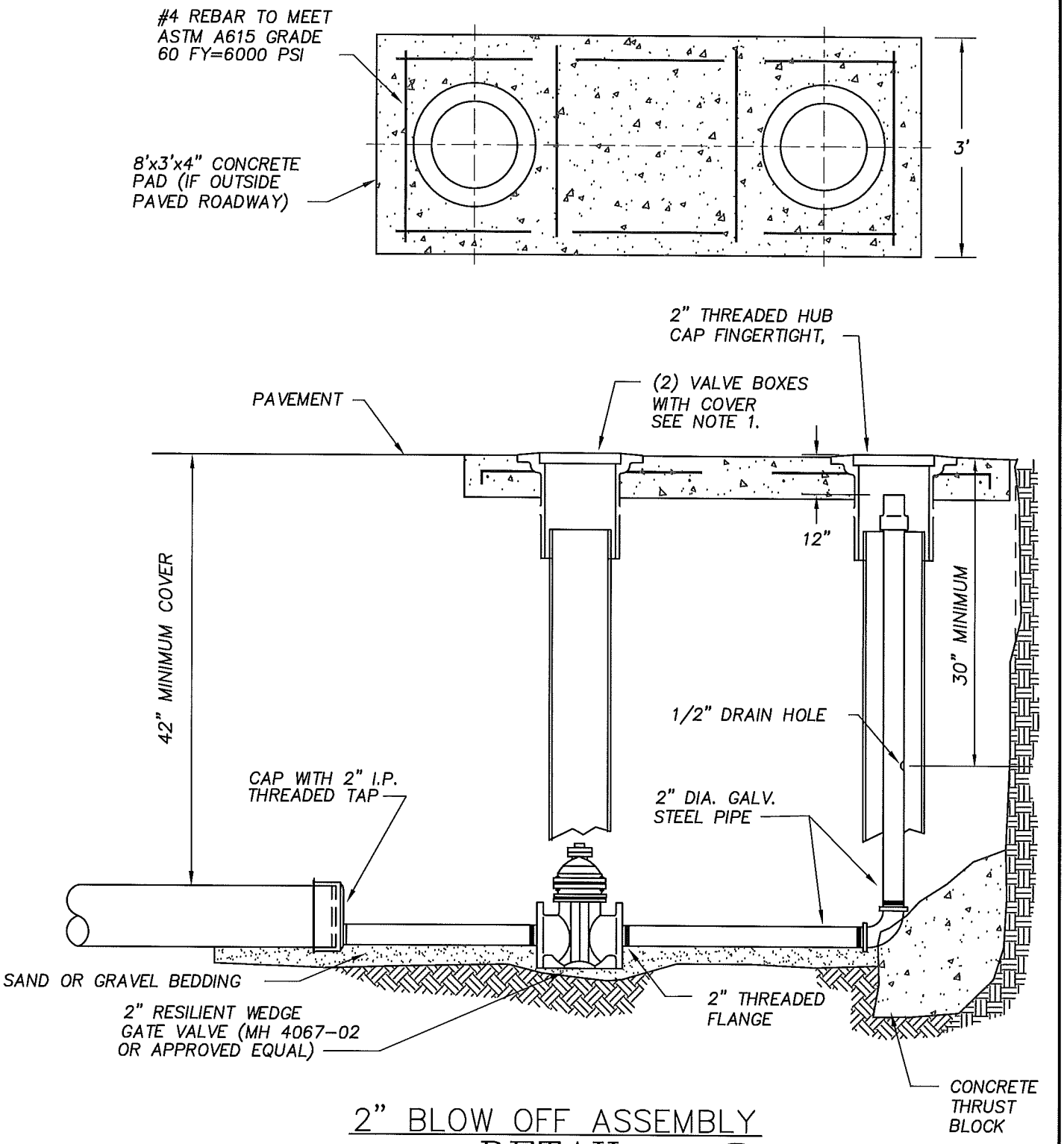
1. *SUPPORT VALVE AND SLEEVE CONTINUOUSLY THROUGH INSTALLATION.*
2. *11 MIL PLASTIC OR CONSTRUCTION FABRIC SHALL BE WRAPPED AROUND PIPE AND FITTINGS BEFORE THRUST BLOCK AND BACKFILL ARE POURED.*

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

CONNECTION TO EXISTING MAIN

APPROVED BY CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	TDW	TJL	07/17/00	FIG 4–08



2" BLOW OFF ASSEMBLY DETAIL

NO SCALE

NOTES:

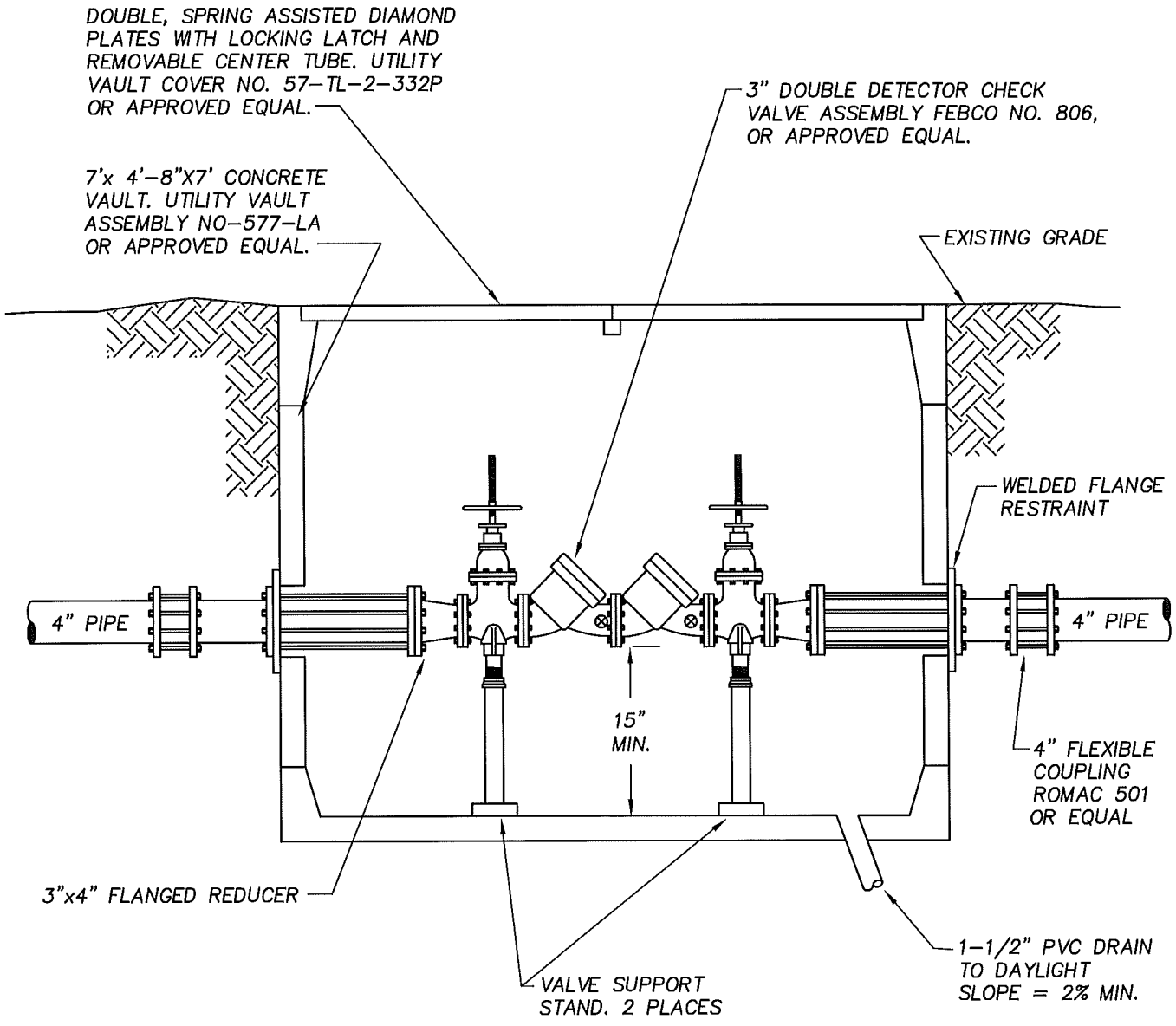
1. ON WATERMAINS WHICH WILL BE EXTENDED IN THE FUTURE, THE VALVE WHICH OPERATES THE BLOWOFF ASSEMBLY SHALL BE THE SAME SIZE AND PROVIDED WITH A CONCRETE THRUST BLOCK.

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

2 " BLOW-OFF ASSEMBLY

APPROVED BY CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	TDW	TJL	12/2/04	FIG 4-10



DOUBLE DETECTOR CHECK VALVE DETAIL

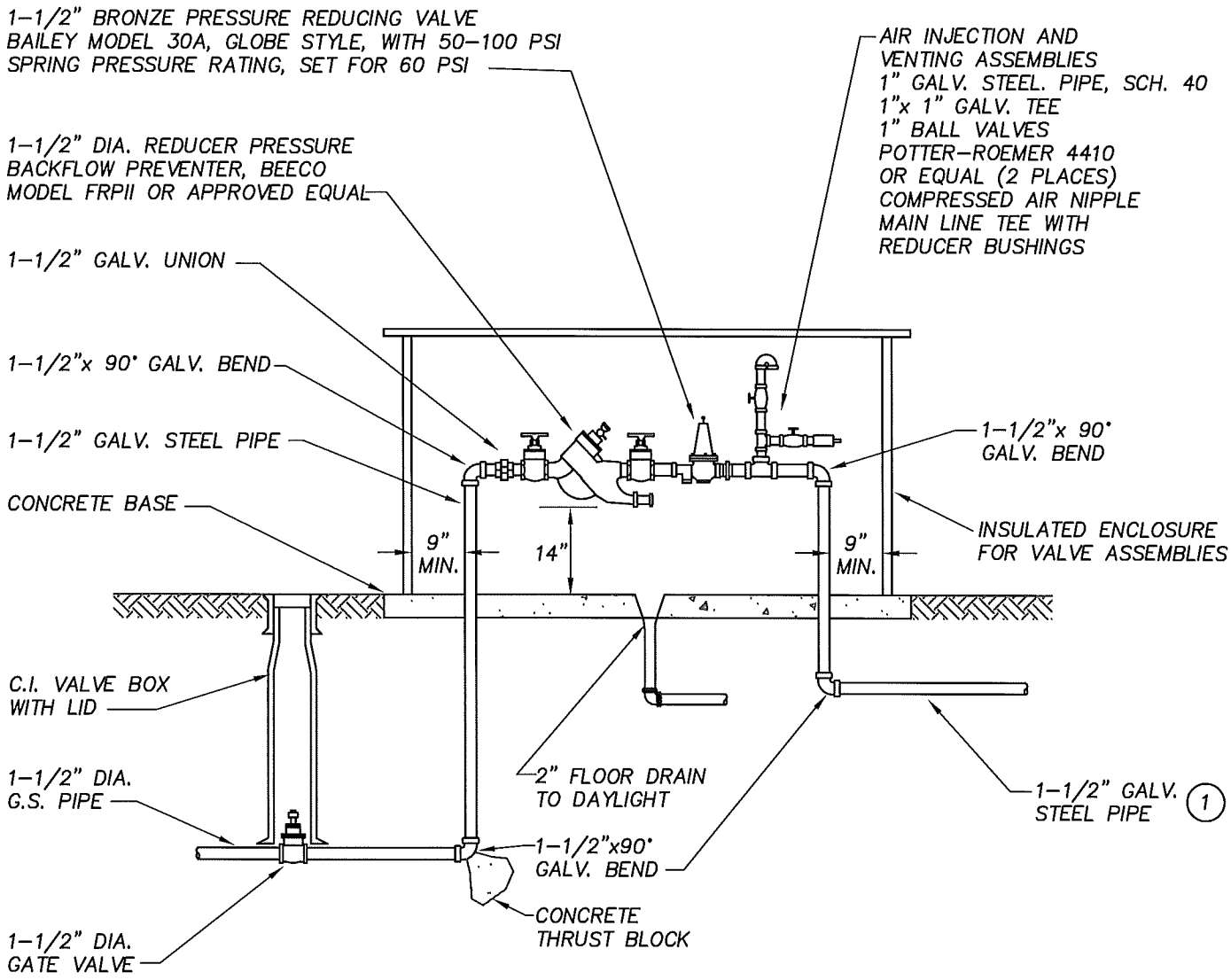
NO SCALE

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

DOUBLE DETECTOR CHECK VALVE

APPROVED BY CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	TDW	TJL	07/17/00	FIG 4-15



REDUCE PRESSURE BACKFLOW PREVENTER DETAIL

NO SCALE

NOTES:

1. THIS DETAIL IS INTENDED TO SHOW THE GENERAL ARRANGEMENT OF THE REQUIRED VALVES AND ACCESSORIES. IT IS NOT INTENDED TO PROVIDE COMPLETE PLUMBING DETAILS

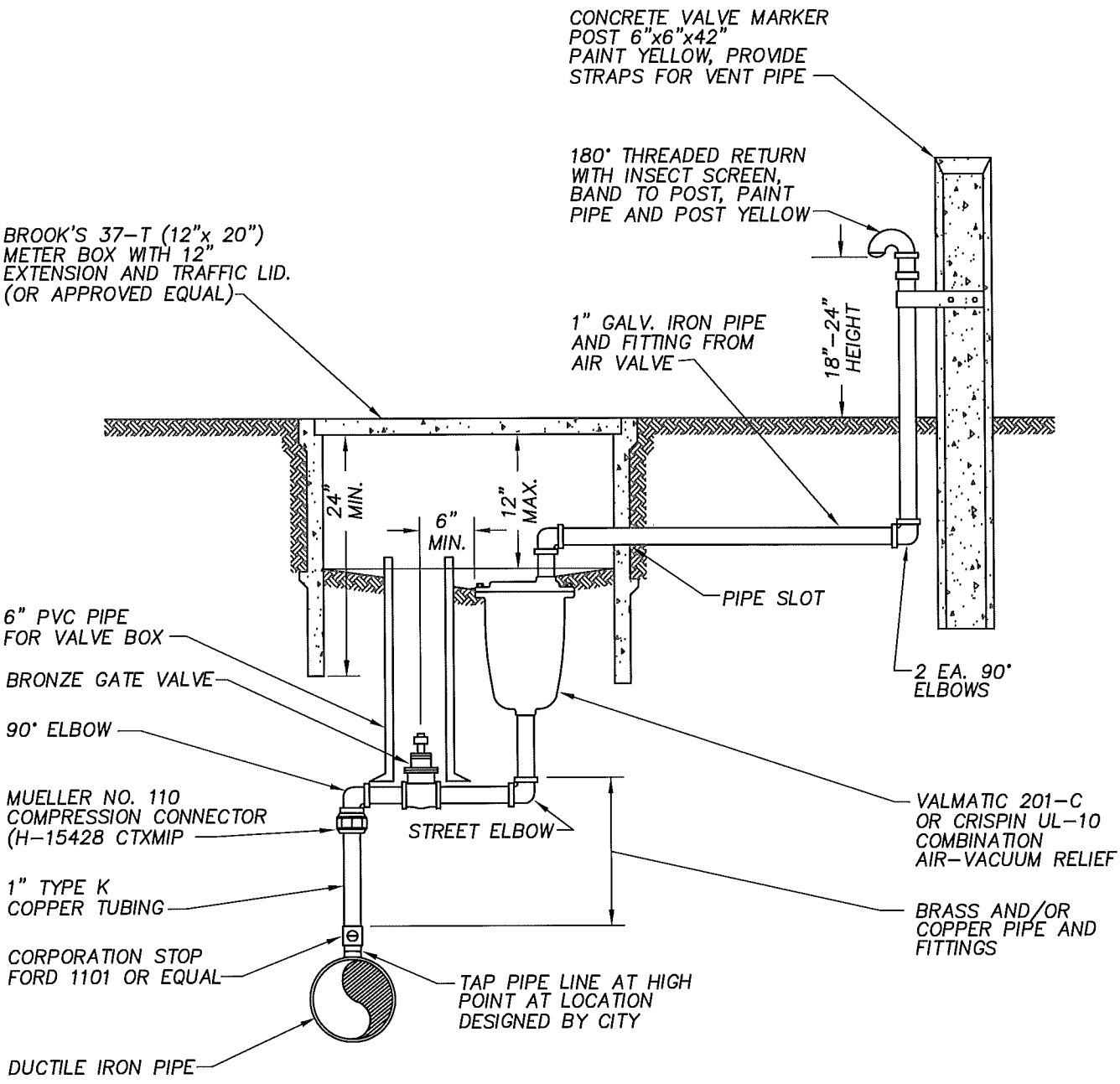
(1) MAINTAIN LEVEL PIPE TO END OR PROVIDE AIR-VAC VALVE AT ANY HIGH POINTS AND DRAIN VALVE AT ANY LOW POINTS

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

REDUCE PRESSURE BACKFLOW PREVENTER

APPROVED BY
CITY ENGINEER _____ DATE: _____

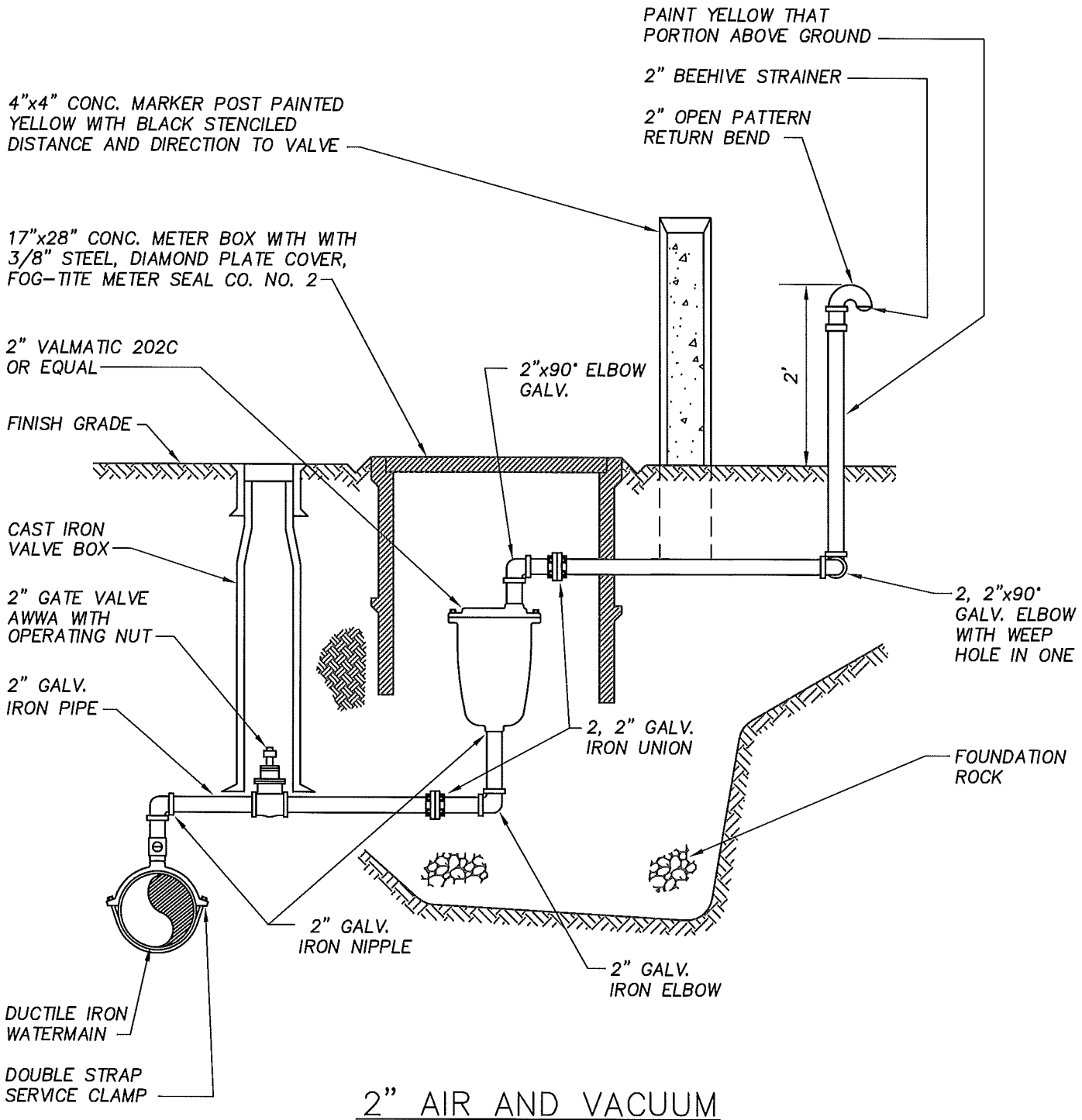
REF	DWN	CKD	DATE	FILE
	T.W.K.	TJL	07/18/00	FIG 4-16



1" AIR AND VACUUM RELEASE ASSEMBLY DETAIL

NO SCALE

CITY OF FIRCREST DEPARTMENT OF PUBLIC WORKS			
1" AIR AND VACUUM RELEASE ASSEMBLY			
APPROVED BY CITY ENGINEER _____ DATE: _____			
REF	DWN: TWK	CKD: TJL	DATE: 07/19/00	FILE: FIG 4-17



2" AIR AND VACUUM RELEASE ASSEMBLY DETAIL

NO SCALE

CITY OF FIRCREST DEPARTMENT OF PUBLIC WORKS			
2" AIR AND VACUUM RELEASE ASSEMBLY			
APPROVED BY CITY ENGINEER _____ DATE: _____			
REF	DWN TWK	CKD TJL	DATE 11/21/01	FILE FIG 4-18

THRUST LOADS

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

PIPE DIAMETER	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	DEAD END OR TEE
4"	3,600	2,000	1,000	500	2,600
6"	8,000	4,400	2,300	1,200	5,700
8"	14,300	7,700	4,000	2,000	10,100
10"	22,300	12,100	6,200	3,100	15,800
12"	32,000	17,400	8,900	4,500	22,700
14"	43,600	23,600	12,100	6,100	30,800
16"	57,000	30,800	15,700	7,900	40,300

NOTES:

1. BLOCKING SHALL BE CEMENT CONCRETE CLASS "B" POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.

2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (S.F.):

   EXAMPLE : 12" – 90° BEND IN SAND AND GRAVEL
   32,000 LBS ÷ 3000 LB/S.F. = 10.7 S.F. OF AREA

3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZE, PRESSURES AND SOIL CONDITIONS.

4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

5. MEGA LUGS MAYBE USED IN MOST MJ FITTING RESTRAINTS.

SAFE SOIL BEARING LOADS

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

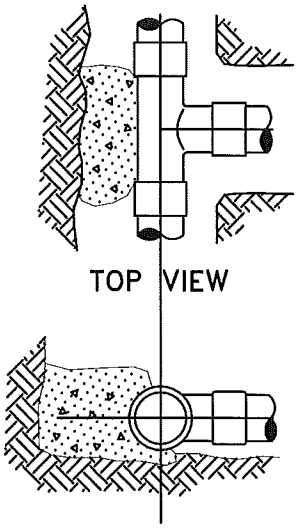
SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

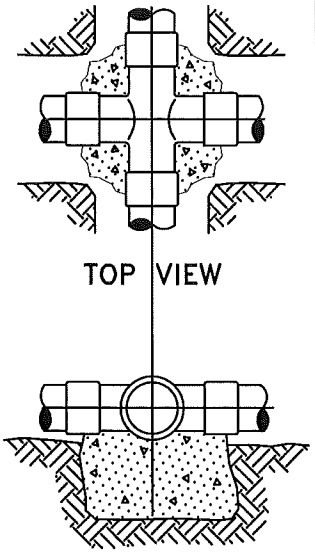
THRUST LOADS

APPROVED BY CITY ENGINEER _____ DATE: _____

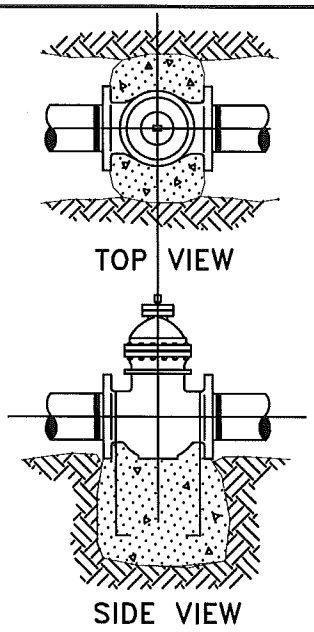
REF	DWN	CKD	DATE	FILE
	TDW	TJL	07/19/00	FIG 4-19



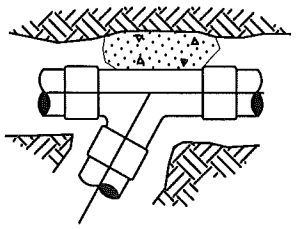
TEE



CROSS

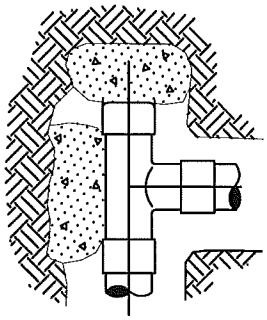


GATE VALVE

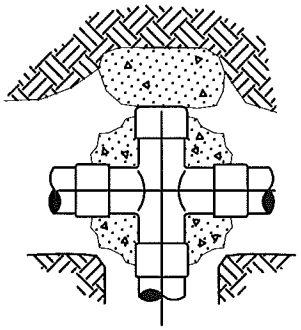


WYE

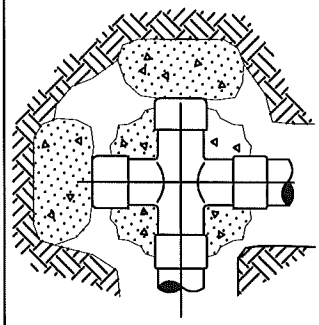
HORIZ. BEND



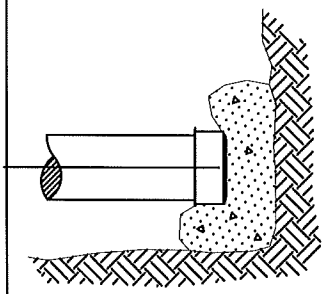
TEE WITH PLUG



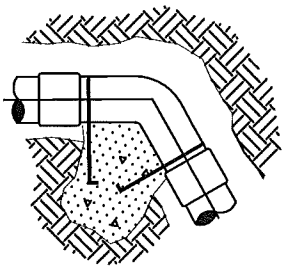
CROSS WITH PLUG



CROSS WITH PLUGS



PLUG OR CAP



45° – 90° VERTICAL BEND

STANDARD BLOCKING DETAIL

NO SCALE

NOTES:

1. *CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.*
2. *PLASTIC BARRIER SHALL BE PLACED BE-TWEEN ALL THRUST BLOCKS & FITTINGS.*
3. *ANCHOR REBAR SHALL BE 5/8" MINIMUM DIAMETER.*

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

STANDARD BLOCKING

APPROVED BY CITY ENGINEER _____ DATE: _____

REF	DWN	CKD	DATE	FILE
	T.W.K.	TJL	07/18/00	FIG 4–20

General Watermain Installation Notes

1. All workmanship and materials shall be in accordance with City of Fircrest requirements and Public Works standards and the most current copy of the Washington Standard Specifications for Road, Bridge, and Municipal Construction, Department of Health regulations, and American Water Works Association standards.

2. A preconstruction meeting shall be held with the City of Fircrest prior to the start of construction.

3. Watermains 2-inch to 12-inch diameter will be PVC C900 Class 150 or Ductile Iron Class 52 or better. All 16-inch watermains will be PVC C905 Class 165 or Ductile Iron class 52 or better.

4. System gate valves shall be resilient wedge, NRS (non-rising stem) with o-ring seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509-80. Valves will be Mueller, M & H, Kennedy, Clow R/W, or Waterous Series 500. Existing valves shall be operated by City of Fircrest employees only.

5. Fire Hydrants shall be Dresser M & H Reliant Style 929, Clow Medallion, or Mueller Centurion. Hydrants will be bagged until system is approved. Hydrants will be painted with Parker paint, Marathon enamel safety yellow paint, or approved equal. All chains between caps and hydrants shall be cut and removed.

6. All lines will be chlorinated and tested in conformance with the above referenced specification (see note 1).

7. All pipe and services will be installed with continuous tracer tape installed 12-inches to 18-inches under the final ground surface. The marker will be plastic non-biodegradable, metal core, or backing marked water which can be detected by a standard metal detector. Tape will be Terra Tape “D” or approved equal. In addition to the tracer tape, toning (tracer) wire will be installed over all pipe and services. Toning wire will be UL listed, type UF, 14-gauge coated copper taped to the top of the pipe to prevent movement during backfilling. The wire will be laid loosely enough to prevent stretching and damage. The wire will be brought up and tied off at the valve body or meter setter, with the end of the wire accessible to hook up to a locator (two feet of slack). A one pound magnesium anode will be buried with the pipe every 1,000 linear feet (maximum) for cathodic protection of the toning wire. All toning wire splices and connections will join wires both mechanically and electrically and will employ epoxy resin or heat-shrink tape insulation. Toning wire will be tested prior to acceptance of the pipe system. A written notice from the Contractor to the City of Fircrest two (2) days prior to the test is required.

8. The Contractor will provide traffic control plan(s) as required in accordance with the MUTCD.

9. All watermains will be staked for grades and alignment by an engineering or surveying firm capable of performing such work. Staking will be maintained throughout construction.

10. All water system connections to serve buildings or properties with domestic potable water, fire sprinkler systems, or irrigation systems will comply with the minimum backflow prevention requirements as established by the Department of Health (DOH) and the City of Fircrest in its cross connection program manual.

11. Call the underground locate line at 1-800-424-555 a minimum of 48 hours prior to any excavations.

12. The City of Fircrest will be given 10 working days notice prior to scheduling a shutdown. The City of Fircrest Water Section of City Inspector will perform the shutdown. Where connections require “field verification,” connection points will be exposed by the Contractor and fittings verified 2 working days prior to scheduling

City of Fircrest

Cross Connection Control Plan

Prepared on: February, 2014

Prepared by:

Jerome W. Morrissette and Associates Inc., P.S.
1700 B2 Cooper Point Road SW
Olympia, WA 98502
(360) 352-9456

Cross Connection Control Program

As stipulated in WAC 248-54, all cross connection between the City of Fircrest water systems and a non-potable supply of water are prohibited. It is the water purveyor's responsibility to prevent contamination of public water systems by cross connections. An effective program requires coordination between the purveyor, customer, building inspector and health department. Basic to an effective program is allowing local ordinances and trained personnel to enforce and monitor the elimination of cross connections.

The Utilities standards prohibits the installation of cross connections and directs that "furnishing of water service be contingent upon the customer providing cross connection control approved by the Utility for protecting Utility water supply from backflow."

The purpose of this policy is to protect the water supplies of Fircrest from contamination or pollution from potential cross connections, and assure that approved backflow devices are tested annually. The installation or maintenance of any cross connection (i.e. yard hydrants or sprinkler irrigation systems) that would endanger the water supplies of Fircrest is prohibited. Any such cross connection now existing or hereafter installed is hereby declared unlawful and shall be abated immediately.

The control or elimination of cross connections shall be in accordance with the State of Washington, Drinking Water Regulations WAC 249-290. The policies, procedures and criteria for determining appropriate levels of protection shall be in accordance with the Accepted Procedure and Practice in Cross Connection Control Manual - Pacific Northwest Section - American Water Works Association, fourth edition or any superseding edition. Furthermore, it requires that cross connection control be furnished by the service customer.

It shall be the responsibility of the City of Fircrest to protect the potable water system from contamination or pollution due to cross connections. Existing customers will be notified by mail of Fircrest's cross-connection control program. This will be accomplished through a repeat customer survey form (will be mailed out every six years) and the availability of Resolution No. 829 and the document entitled "Policies and Procedures: Cross Connection Control & Backflow Prevention Devices." All new customers wishing to be hooked-up to any system Fircrest owns or manages will be given the Cross Connection Report Form survey and a copy of the "Policies and Procedures: Cross Connection Control & Backflow Prevention Devices", which must be reviewed and/or completed before hook-up is granted. All notification letters and the Cross Connection Report Form are located in Attachment D. Flow charts showing the procedure for Cross Connection identification and correction are also located in Attachment D (Notification and Installation/Inspection).

Water service to any premises shall be contingent upon the customer providing cross connection control in a manner approved by City of Fircrest. Backflow devices required to be installed shall be a model approved by the State of Washington, Department of Health. An authorized employee of the City of Fircrest with proper identification shall have free access at reasonable hours of the day, to all parts of a premise or within buildings to which water is supplied. Water service may be refused or terminated to any premise for failure to allow necessary inspections.

PROGRAM ELEMENTS

Per WAC 246-290-490, the following elements and scheduling of implementation of the Cross Connection Control Program are provided to protect the water system from contamination due to the presence of cross connections:

- Element #1: The City of Fircrest currently does not have an ordinance that established the City's legal authority to implement a cross connection control program. The City is making a commitment to adopt an ordinance that meets the three requirements listed in WAC 246-290-490(3b) during the lifespan of this Comprehensive Water System Plan.
- Element #2: For new service connections, the City of Fircrest identifies possible cross connections during the "plan review" phase of the permitting process. If a cross-connection potential is identified, the City requires the applicant to provide adequate protection as necessary to protect the water system. Additionally, the City is making a commitment to send out surveys every six years to update customer data to ensure no further possible cross connections are installed after the initial survey with the City's knowledge.
- Element #3: The requirements of this element will be carried out during the enforcement portion of Element #2. Customers will be notified of possible cross connections and will be given the options available for eliminating possible water system contamination (eliminate cross connection, install approved backflow preventers, or have the water service terminated).
- Element #4: The following Fircrest employee will develop and implement the cross connection control program: Jeffery P. Davis, Utility Foreman (WDM 2, WDS 2, CCS 1; Certificate No. 3443).
- Element #5: It is current practice that any customer installing a backflow prevention device, prior to approval of the service, must have the device tested and inspected by an independent tester certified to conduct the testing. All connections are also required to be inspected by City staff prior to backfill of any excavation for utilities.
- Element #6: It is current practice that all customers that have a backflow prevention device must have the device tested annually during the months of January through March. The testing report must provide test kit calibration, report results, and proof of certification of the tester. The testing report must be submitted to the City by May 31st, and the evaluations are completed by June 30th.

The test reports are then kept on file at the City of Fircrest, Department of Public Works.

- Element #7: The Fircrest water system has never had to respond to a backflow incident. However, the following response procedure has been prepared upon such an incident: public notification, chlorine disinfection, flush system through hydrants, test for contamination, public notification update, further action as required.
- Element #8: The City of Fircrest has historically provided system customers with cross connection education. The City is making a commitment to provide handouts at the information centers, and send billing inserts every six years. The water system currently sends consumer confidence reports to the consumers. The reports will also include this information.
- Element #9: The City of Fircrest currently maintains basic records for cross connection control. Upon completion of Elements #1 through #8, the City maintains records that include: Master list of service connections that contain approved backflow prevention devices with the assessment of the hazard level, inventory of all approved backflow prevention assemblies including testing/repair history, and program summary/incident reports.
- Element #10: This element is not applicable to the City of Fircrest water system (no facilities receive reclaimed water within the service area).

POLICIES FOR CROSS CONNECTION

Definitions

1. Air Gap - the vertical physical separation between free flowing discharge end of the potable water supply line and the overflow rim of the receiving vessel. The separation must be at least twice the inside diameter of the discharge end of the supply line, but never less than one (1) inch.

2. Auxiliary Water Supply - any water source or supply located on, or available to, the premise other than that furnished through a water system operated by the Fircrest.

3. Backflow - Any flow of foreign material, water, gasses, or solids in the opposite direction of normal flow.

4. Backflow Prevention Assembly - A device or assembly of devices to prevent backflow occurring from back pressures or back siphonage. This device must be listed under the devices approved by the Washington State Department of Health (DOH).

5. Contamination - A condition or act that, when present in a public water supply, creates an actual hazard to public health.

6. Cross Connection - Any physical arrangement where a public water system is connected directly, or potentially connected, with any other non-potable water system or auxiliary system, sewer, drain conduit, swimming pool, storage reservoir, plumbing fixture, or any other device which contains, or may contain, contaminated water, sewage, or any other substance not inherent to a public water supply. Bypass arrangements, removable sections, and all other temporary devices where backflow does, or may occur, is considered a Cross Connection.

7. Fircrest - City of Fircrest.

8. PNWS/AWWA - Pacific Northwest Section - American Water Works Association.

9. Potable Water Supply - Any water supply deemed safe by DOH and intended for human consumption and/or domestic use.

10. Reduced Pressure Principal Device - An assembly containing two independently operating approved check valves, spring loaded to the closed position, separated by a hydraulically-operated, mechanically independent pressure differential pressure relief valve located between the check valves. It shall include properly located test cocks and shall be installed as a unit between two resilient seated shutoff valves. This device (and check valves) must be listed under the devices approved by DOH.

Prohibition of Cross Connections

1. Any Cross Connection, existing or potential, is subject to immediate termination of water service, and such Cross Connection shall be corrected immediately. In the event the responsible party should fail to take correction measures, Fircrest shall take the required corrective action and hold the responsible party liable for all costs incurred.

2. Fircrest shall deny or discontinue water service to any customer failing to cooperate in the installation, maintenance, testing, or inspection of backflow prevention assemblies required, pursuant to WAC 246-290-490.

Requirements for Backflow Prevention Assemblies - Approved backflow prevention assemblies shall be installed at the service connection or on the premises, and maintained by all customers, whenever the following conditions exist:

1. A Cross Connection is identified to be located on the premises.

2. A customer is defined as industrial or commercial.

3. Irrigation systems are connected to the public water supply.

4. Customers maintain Cross Connections that are not correctable, or when it cannot be ascertained as to whether a Cross Connection exists or not.

5. Materials or substances are stored or used on the premises that could potentially contaminate the public water system.

6. Materials or substances stored on the premises are determined to be toxic or hazardous in nature.

7. Any mobile apparatus which uses public water on any premises within a Fircrest water system area.

8. Repeated history of Cross Connections, or Cross Connection violations.

9. Restricted entry to the premises so that inspections, be it initial or routine, cannot be made with regular frequency or sufficient notice to assure that Cross Connections do not exist or have been amended.

10. Installation of an approved backflow prevention assembly was required as outlined in these regulations.

A list of land uses that require backflow prevention devices appears in Attachment C.

Installation of Backflow Prevention Assemblies - Approved backflow prevention assemblies required by Fircrest shall be installed per manufacturer's instructions, State and local regulations, and/or under the direction of Fircrest. Assemblies must be installed at the point of use, or at the service connection, as directed by Fircrest. The assembly shall be kept from freezing, flooding, severe weather, and hazardous atmospheres. All assemblies installed shall be readily accessible with adequate room for maintenance and testing.

Types of Cross Connection Control Devices - Several different backflow prevention assemblies are available for various applications. Some of these assemblies are as follows:

Approved air gap (physical separation between the free flowing discharge end of a potable water supply and the receiving tank/vessel/container etc.).

Mechanical devices (mechanical devices that physically prevent water form flowing back into the supply by way of mechanical valves). Some of the various types of devices are reduced pressure backflow assemblies, double check valve assemblies, pressure vacuum breaker assemblies and atmospheric vacuum breakers. The actual

device that should be selected is dependent of the application, the degree of potential hazard and level of desired protection.

Table 1 describes the type of prevention devices and their associated level of protection.

Table 1:
Cross Connection Prevention Devices

Device abbreviation	Description	Level of protection
AG	Air gap	1
RPBA	Reduced pressure backflow assembly	2
RPDA	Reduced pressure detector assembly	2
DCVA	Double check valve assembly	3
DCDA	Double check detector assembly	3
PVBA	Pressure vacuum breaker assembly	4
AVB	Atmospheric vacuum breaker	5

A complete list of prevention devices is provided in Attachment A, and a complete list of fixtures, equipment, and areas that require backflow protection is provided in Attachment B of this plan.

Testing of all Backflow Prevention Assemblies - Approved backflow prevention assemblies shall be tested immediately upon installation, annually on a system schedule, when required, and when deemed necessary by Fircrest.

Annual Testing - Every backflow prevention device shall be tested annually to ensure that the device is operating properly. It is the responsibility of the water system to ensure that this testing takes place. The testing shall be conducted by an individual certified to perform the testing. Certification requirements are defined by the WSDOH. The water system shall deep records for all backflow prevention devices within its system and these shall be available for inspection upon request.

Each backflow prevention device shall be tested to insure that it functions properly at the time of installation, annually, after any repairs, after being relocated to another area, and reinstalled. The water system manager may elect to notify the device owner prior to any testing and request that the owner provide the testing (certified tester and written test results).

If the City of Fircrest elects to perform the testing for the various private device owners, the water system engineer should be contacted and arrangements be made for the engineer to provide testing guidelines and procedures to the system manager. Certification shall be obtained for the WSDOH or other certifying agency. The water system engineer can provide testing forms and support documents to the water system should the water system

choose to take advantage of this service. A cross connection control survey report, backflow incident report form and assembly test record card are provided in Attachment D of this plan.

Any assembly found not functioning properly shall be immediately repaired or replaced by the water user. If such repairs and/or replacements are not promptly made, the Fircrest shall discontinue water service to the premise.

Access to Premise - Employees of the City of Fircrest, with proper identification, shall have access during reasonable hours to those parts of a premise or building which are accessible to ensure compliance with these policies and procedures. If access is denied to a premise or structure during reasonable hours or after reasonable notice of inspection, an approved reduced pressure principle device will be required to be installed at the service connection.

Termination of Service - Failure to comply with these policies and procedures as setforth by Resolution No. 829 dated August 12,1996, and compliance with all State regulation regarding Cross Connections, is sufficient cause to terminate water service to WAC 246-290-490.

Safety - Safety precautions must be taken whenever the cover of a check valve is removed. Always close both shutoff valves and release any pressure form the assembly before removing its cover. If for any reason the device is unfamiliar to the tester/repairer, the device manufacturer should be consulted prior to service of the device. Additionally, the Washington State Department of Labor and Industries has specific safety regulations that pertain to confined spaces. No work shall proceed that is in violation of these regulations. The water system manager is encouraged to periodically review these procedures and educate system personnel on approved operation procedures for work within confined spaces. Several excellent publications are available from the National Institute for Occupational Safety and Health: "Working in Confined Spaces" December 1979, publication #80-160 and "Confined Spaces", publication #87-113.

Attachment A

WSDOH Approved List of Backflow Prevention Devices

USC University of Southern California

List of Approved Backflow Prevention Assemblies

23 January 2014

Supersedes All Prior Lists

Foundation for Cross-Connection Control and Hydraulic Research

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ADDITIONS

Type	Manufacturer	Model	Size	Orientation(s)	Approved
DC	Wilkins	350AST	2 1/2	VU	9-Nov-2012
DC	Wilkins	350AST	3	VU	9-Nov-2012
DC	Wilkins	350AST	4	VU	9-Nov-2012
PVB	Wilkins	420XL	1	VUH	3-Aug-2011
DCDA	Wilkins	350ASTDA	2 1/2	H	18-Apr-2013
DCDA	Wilkins	350ASTDA	2 1/2	VU	18-Apr-2013
DCDA	Wilkins	350ASTDA	3	H	18-Apr-2013
DCDA	Wilkins	350ASTDA	3	VU	18-Apr-2013
DCDA	Wilkins	350ASTDA	4	H	18-Apr-2013
DCDA	Wilkins	350ASTDA	4	VU	18-Apr-2013
DCDA	Ames	Maxim 300NGV	10	VUVD	28-May-2013
DCDA	Ames	Maxim 300NGV	8	VUVD	28-May-2013
DCDA	Ames	Colt 300NBF	10	VUVD	28-May-2013
DCDA	Ames	Maxim 300NBF	10	VUVD	28-May-2013
DCDA	Ames	Maxim 300NBF	8	VUVD	28-May-2013
DCDA	Watts	757NDCDAGV	10	VUVD	28-May-2013
DCDA	Watts	767NDCDAGV	10	VUVD	28-May-2013
DCDA	Watts	767NDCDAGV	8	VUVD	28-May-2013
DCDA	Watts	757NDCDABF	10	VUVD	28-May-2013
DCDA	Watts	767NDCDABF	10	VUVD	28-May-2013
DCDA	Watts	767NDCDABF	8	VUVD	28-May-2013
RP	Febco	LF860	2 1/2	H	28-May-2013
RP	Febco	LF860	3	H	28-May-2013
RP	Febco	LF880V	2 1/2	VUVD	28-May-2013
RP	Febco	LF880V	2 1/2	VUVU	28-May-2013
RP	Febco	LF880V	3	VUVD	28-May-2013
RP	Febco	LF880V	3	VUVU	28-May-2013
RP	Febco	LF880V	4	VUVD	28-May-2013
RP	Febco	LF880V	4	VUVU	28-May-2013
RP	Febco	LF860	4	H	14-Jun-2013
RP	Febco	LF860	6	H	14-Jun-2013
RPDA	Wilkins	375ASTDA	2 1/2	H	14-Jun-2013
RPDA	Wilkins	375ASTDA	3	H	14-Jun-2013
RPDA	Wilkins	375ASTDA	4	H	14-Jun-2013

Type	Manufacturer	Model	Size	Orientation(s)	Approved
RP	Ames	Colt 400N	8	VUVD	14-Jun-2013
RP	Ames	Colt 400Z	8	VUVU	14-Jun-2013
RP	Ames	Colt 400Z	8	VUVU	14-Jun-2013
RP	Ames	Maxim 400N	6	VUVD	14-Jun-2013
RP	Ames	Maxim 400N	6	VUVD	14-Jun-2013
RP	Ames	Maxim 400Z	6	VUVU	14-Jun-2013
RP	Ames	Maxim 400Z	6	VUVU	14-Jun-2013
RPDA	Ames	Colt 500NBF	8	VUVD	14-Jun-2013
RPDA	Ames	Colt 500NGV	8	VUVD	14-Jun-2013
RPDA	Ames	Colt 500ZBF	8	VUVU	14-Jun-2013
RPDA	Ames	Colt 500ZGV	8	VUVU	14-Jun-2013
RPDA	Ames	Maxim 500NBF	6	VUVD	14-Jun-2013
RPDA	Ames	Maxim 500NGV	6	VUVD	14-Jun-2013
RPDA	Ames	Maxim 500ZBF	6	VUVU	14-Jun-2013
RPDA	Ames	Maxim 500ZGV	6	VUVU	14-Jun-2013
RP	Watts	957N	8	VUVD	14-Jun-2013
RP	Watts	957N	8	VUVD	14-Jun-2013
RP	Watts	957Z	8	VUVU	14-Jun-2013
RP	Watts	957Z	8	VUVU	14-Jun-2013
RP	Watts	967N	6	VUVD	14-Jun-2013
RP	Watts	967N	6	VUVD	14-Jun-2013
RP	Watts	967Z	6	VUVU	14-Jun-2013
RP	Watts	967Z	6	VUVU	14-Jun-2013
RPDA	Watts	957NRPDA-BF	8	VUVD	14-Jun-2013
RPDA	Watts	957NRPDA-GV	8	VUVD	14-Jun-2013
RPDA	Watts	957ZRPDA-BF	8	VUVU	14-Jun-2013
RPDA	Watts	957ZRPDA-GV	8	VUVU	14-Jun-2013
RPDA	Watts	967NRPDA-BF	6	VUVD	14-Jun-2013
RPDA	Watts	967NRPDA-GV	6	VUVD	14-Jun-2013
RPDA	Watts	967ZRPDA-BF	6	VUVU	14-Jun-2013
RPDA	Watts	967ZRPDA-GV	6	VUVU	14-Jun-2013
RPDA	Ames	Colt 500NBF	2 1/2	VUVD	24-Jun-2013
RPDA	Ames	Colt 500ZBF	2 1/2	VUVU	24-Jun-2013
RPDA	Ames	Colt 500ZBF	3	VUVU	24-Jun-2013

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ADDITIONS (continued)

Type	Manufacturer	Model	Size	Orientation(s)	Approved
RPDA	Ames	Colt 500ZBF	4	VUVU	24-Jun-2013
RPDA	Ames	Colt 500ZGV	2 1/2	VUVU	24-Jun-2013
RPDA	Ames	Colt 500ZGV	3	VUVU	24-Jun-2013
RPDA	Ames	Colt 500ZGV	4	VUVU	24-Jun-2013
RPDA	Ames	Maxim 500NBF	2 1/2	VUVD	24-Jun-2013
RPDA	Ames	Maxim 500ZBF	2 1/2	VUVU	24-Jun-2013
RPDA	Ames	Maxim 500ZBF	3	VUVU	24-Jun-2013
RPDA	Ames	Maxim 500ZGV	2 1/2	VUVU	24-Jun-2013
RPDA	Ames	Maxim 500ZGV	3	VUVU	24-Jun-2013
RPDA	Watts	957NRPDA-BF	2 1/2	VUVD	24-Jun-2013
RPDA	Watts	957ZRPDA-BF	2 1/2	VUVU	24-Jun-2013
RPDA	Watts	957ZRPDA-BF	3	VUVU	24-Jun-2013
RPDA	Watts	957ZRPDA-BF	4	VUVU	24-Jun-2013
RPDA	Watts	957ZRPDA-GV	2 1/2	VUVU	24-Jun-2013
RPDA	Watts	957ZRPDA-GV	3	VUVU	24-Jun-2013
RPDA	Watts	957ZRPDA-GV	4	VUVU	24-Jun-2013
RPDA	Watts	967NRPDA-BF	2 1/2	VUVD	24-Jun-2013
RPDA	Watts	967ZRPDA-BF	2 1/2	VUVU	24-Jun-2013
RPDA	Watts	967ZRPDA-BF	3	VUVU	24-Jun-2013
RPDA	Watts	967ZRPDA-GV	2 1/2	VUVU	24-Jun-2013
RPDA	Watts	967ZRPDA-GV	3	VUVU	24-Jun-2013
RPDA	Apollo	RPDALF4A	4	H	24-Jun-2013
RPDA	Apollo	RPDALF4A	6	H	24-Jun-2013
DC	Febco	LF850	10	H	24-Jun-2013
DC	Febco	LF850	10	VU	24-Jun-2013
DC	Apollo	DCLF4A	4	H	24-Jun-2013
DC	Apollo	DCLF4A	4	VU	24-Jun-2013
DC	Apollo	DCLF4A	6	H	24-Jun-2013
DC	Apollo	DCLF4A	6	VU	24-Jun-2013
RP	Wilkins	375AST	6	H	24-Jun-2013
RP	Apollo	RPLF4A	4	H	24-Jun-2013
RP	Apollo	RPLF4A	6	H	24-Jun-2013
DCDA	Apollo	DCDALF4A	4	H	24-Jun-2013

Type	Manufacturer	Model	Size	Orientation(s)	Approved
DCDA	Apollo	DCDALF4A	4	VU	24-Jun-2013
DCDA	Apollo	DCDALF4A	6	H	24-Jun-2013
DCDA	Apollo	DCDALF4A	6	VU	24-Jun-2013
DC	Ames	LF200B	1/2	H	3-Jul-2013
DC	Ames	LF200B	1/2	VD	3-Jul-2013
DC	Ames	LF200B	1/2	VU	3-Jul-2013
DC	Ames	LF200B	3/4	H	3-Jul-2013
DC	Ames	LF200B	3/4	VD	3-Jul-2013
DC	Ames	LF200B	3/4	VU	3-Jul-2013
DC	Watts	LF719QT	1/2	H	3-Jul-2013
DC	Watts	LF719QT	1/2	VD	3-Jul-2013
DC	Watts	LF719QT	1/2	VU	3-Jul-2013
DC	Watts	LF719QT	3/4	H	3-Jul-2013
DC	Watts	LF719QT	3/4	VD	3-Jul-2013
DC	Watts	LF719QT	3/4	VU	3-Jul-2013
DC	Ames	200B-AR10	1/2	VUVD	3-Jul-2013
DC	Ames	200B-AR10	3/4	VUVD	3-Jul-2013
DC	Watts	719AOTR10	1/2	VUVD	3-Jul-2013
DC	Watts	719AQTR10	3/4	VUVD	3-Jul-2013
DCDA	Wilkins	350ASTDA	6	H	3-Jul-2013
DCDA	Wilkins	350ASTDA	6	VU	3-Jul-2013
DC	Wilkins	950XLD	3/4	H	3-Jul-2013
DC	Wilkins	950XLD	3/4	VU	3-Jul-2013
RP	Wilkins	975XLD	3/4	H	3-Jul-2013
DCDA	Febco	856ST	10	H	3-Sep-2013
DCDA	Febco	856ST	10	VU	3-Sep-2013
DC	Febco	LF850U	1/2	H	3-Sep-2013
DC	Febco	LF850U	3/4	H	3-Sep-2013
DC	Febco	LF850U	1	H	3-Sep-2013
DC	Febco	LF850U	1 1/4	H	3-Sep-2013
DC	Febco	LF850U	1 1/2	H	3-Sep-2013
DC	Febco	LF850U	2	H	3-Sep-2013
RP	Febco	LF860U	1/2	H	3-Sep-2013

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Type	Manufacturer	Model	Size	Orientation(s)	Approved
RP	Febco	LF860U	3/4	H	3-Sep-2013
RP	Febco	LF860U	1	H	3-Sep-2013
RP	Febco	LF860U	1 1/4	H	3-Sep-2013
RP	Febco	LF860U	1 1/2	H	3-Sep-2013
RP	Febco	LF860U	2	H	3-Sep-2013
RP	Febco	LF880V	6	VUVD	3-Sep-2013
RP	Febco	LF880V	6	VUVU	3-Sep-2013
RP	Febco	LF860	8	H	3-Sep-2013
DC	Ames	LF2000BM1	1	H	25-Sep-2013
DC	Ames	LF2000BM1	1	VU	25-Sep-2013
DC	Ames	LF2000BM1	2	H	25-Sep-2013
DC	Ames	LF2000BM1	2	VU	25-Sep-2013
DC	Ames	LF2000BM2	1 1/4	H	25-Sep-2013
DC	Ames	LF2000BM2	1 1/4	VU	25-Sep-2013
DC	Ames	LF2000BM2	1 1/2	H	25-Sep-2013
DC	Ames	LF2000BM2	1 1/2	VU	25-Sep-2013
DC	Ames	LF2000BM3	3/4	H	25-Sep-2013
DC	Ames	LF2000BM3	3/4	VU	25-Sep-2013
DC	Ames	LF2000B	1/2	H	25-Sep-2013
DC	Ames	LF2000B	1/2	VU	25-Sep-2013
RP	Ames	LF4000BM2	1	H	25-Sep-2013
RP	Ames	LF4000BM2	1 1/4	H	25-Sep-2013
RP	Ames	LF4000BM2	1 1/2	H	25-Sep-2013
RP	Ames	LF4000BM2	2	H	25-Sep-2013
RP	Ames	LF4000BM3	3/4	H	25-Sep-2013
RP	Ames	LF4000B	1/2	H	25-Sep-2013
RP	Febco	LF860	10	H	25-Sep-2013
DCDA	Apollo	DCDALF4A	2 1/2	H	30-Oct-2013
DCDA	Apollo	DCDALF4A	2 1/2	VU	30-Oct-2013
DCDA	Apollo	DCDALF4A	3	H	30-Oct-2013
DCDA	Apollo	DCDALF4A	3	VU	30-Oct-2013
DC	Apollo	DCLF4A	2.5	H	5-Nov-2013
DC	Apollo	DCLF4A	2 1/2	VU	5-Nov-2013
DC	Apollo	DCLF4A	3	H	5-Nov-2013
DC	Apollo	DCLF4A	3	VU	5-Nov-2013
RP	Wilkins	375ASTR	6	H	5-Nov-2013
DC	Apollo	DCLF4AN	4	VUVD	22-Nov-2013

Type	Manufacturer	Model	Size	Orientation(s)	Approved
RP	Febco	LF880V	8	VUVD	26-Nov-2013
RP	Febco	LF880V	8	VUVU	26-Nov-2013
RP	Wilkins	375AST	8	H	26-Nov-2013
RP	Wilkins	375AST	10	H	26-Nov-2013
RP	Apollo/Conbraco	RP4A	1 1/4	H	11-Dec-2013
RP	Apollo/Conbraco	RP4A	1 1/2	H	11-Dec-2013
RP	Apollo/Conbraco	RPLF4A	1 1/4	H	11-Dec-2013
RP	Apollo/Conbraco	RPLF4A	1 1/2	H	11-Dec-2013
DC	ARI	DC 500	1 1/4	H	8-Jan-2014
DC	ARI	DC 500	1 1/2	H	8-Jan-2014
DC	ARI	DC 500	2	H	8-Jan-2014
DCDA	Ames	LFColt 300GV	2 1/2"	H	8-Jan-2014
DCDA	Ames	LFColt 300GV	2 1/2	VU	8-Jan-2014
DCDA	Ames	LFColt 300GV	3	H	8-Jan-2014
DCDA	Ames	LFColt 300GV	3	VU	8-Jan-2014
DCDA	Ames	LFColt 300GV	4	H	8-Jan-2014
DCDA	Ames	LFColt 300GV	4	VU	8-Jan-2014
DCDA	Ames	LFColt 300GV	6	H	8-Jan-2014
DCDA	Ames	LFColt 300GV	6	VU	8-Jan-2014
DCDA	Ames	LFColt 300GV	8	H	8-Jan-2014
DCDA	Ames	LFColt 300GV	8	VU	8-Jan-2014
DCDA	Ames	LFColt 300GV	10	H	8-Jan-2014
DCDA	Ames	LFColt 300GV	10	VU	8-Jan-2014
DCDA	Ames	LFColt 300BF	2 1/2"	H	8-Jan-2014
DCDA	Ames	LFColt 300BF	2 1/2	VU	8-Jan-2014
DCDA	Ames	LFColt 300BF	3	H	8-Jan-2014
DCDA	Ames	LFColt 300BF	3	VU	8-Jan-2014
DCDA	Ames	LFColt 300BF	4	H	8-Jan-2014
DCDA	Ames	LFColt 300BF	4	VU	8-Jan-2014
DCDA	Ames	LFColt 300BF	6	H	8-Jan-2014
DCDA	Ames	LFColt 300BF	6	VU	8-Jan-2014
DCDA	Ames	LFColt 300BF	8	H	8-Jan-2014
DCDA	Ames	LFColt 300BF	8	VU	8-Jan-2014
DCDA	Ames	LFColt 300BF	10	H	8-Jan-2014
DCDA	Ames	LFColt 300BF	10	VU	8-Jan-2014
DCDA	Ames	LFColt 300NBF	2 1/2"	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NBF	3	VUVD	8-Jan-2014

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Type	Manufacturer	Model	Size	Orientation(s)	Approved
DCDA	Ames	LFColt 300NBF	4	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NBF	6	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NBF	8	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NBF	10	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NGV	2 1/2"	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NGV	3	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NGV	4	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NGV	6	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NGV	8	VUVD	8-Jan-2014
DCDA	Ames	LFColt 300NGV	10	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	2 1/2"	H	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	2 1/2	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	3	H	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	3	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	4	H	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	4	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	6	H	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	6	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	8	H	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	8	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	10	H	8-Jan-2014
DCDA	Ames	LFMaxim 300GV	10	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	2 1/2"	H	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	2 1/2	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	3	H	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	3	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	4	H	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	4	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	6	H	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	6	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	8	H	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	8	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	10	H	8-Jan-2014
DCDA	Ames	LFMaxim 300BF	10	VU	8-Jan-2014
DCDA	Ames	LFMaxim 300NBF	2 1/2"	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300NBF	3	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300NBF	4	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300NBF	6	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300NBF	8	VUVD	8-Jan-2014

Type	Manufacturer	Model	Size	Orientation(s)	Approved
DCDA	Ames	LFMaxim 300N	10	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300N	2 1/2"	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300N	3	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300N	4	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300N	6	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300N	8	VUVD	8-Jan-2014
DCDA	Ames	LFMaxim 300N	10	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500NGV	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500NGV	3	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500NGV	4	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500ZGV	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500ZGV	3	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500ZGV	4	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500NBF	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500NBF	3	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500NBF	4	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500ZBF	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500ZBF	3	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500ZBF	4	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500N	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500N	3	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500Z	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500Z	3	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500N	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500N	3	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500Z	2 1/2"	VUVD	8-Jan-2014
RPDA	Ames	LFMaxim 500Z	3	VUVD	8-Jan-2014
RPDA	Ames	LFColt 500GV	2 1/2"	H	8-Jan-2014
RPDA	Ames	LFColt 500GV	3	H	8-Jan-2014
RPDA	Ames	LFColt 500GV	4	H	8-Jan-2014
RPDA	Ames	LFColt 500GV	6	H	8-Jan-2014
RPDA	Ames	LFMaxim 500G	2 1/2"	H	8-Jan-2014
RPDA	Ames	LFMaxim 500G	3	H	8-Jan-2014
RPDA	Ames	LFMaxim 500G	4	H	8-Jan-2014
DCDA	Watts	LF757DCDAGV	2 1/2"	H	8-Jan-2014
DCDA	Watts	LF757DCDAGV	2 1/2	VU	8-Jan-2014
DCDA	Watts	LF757DCDAGV	3	H	8-Jan-2014
DCDA	Watts	LF757DCDAGV	3	VU	8-Jan-2014
DCDA	Watts	LF757DCDAGV	4	H	8-Jan-2014

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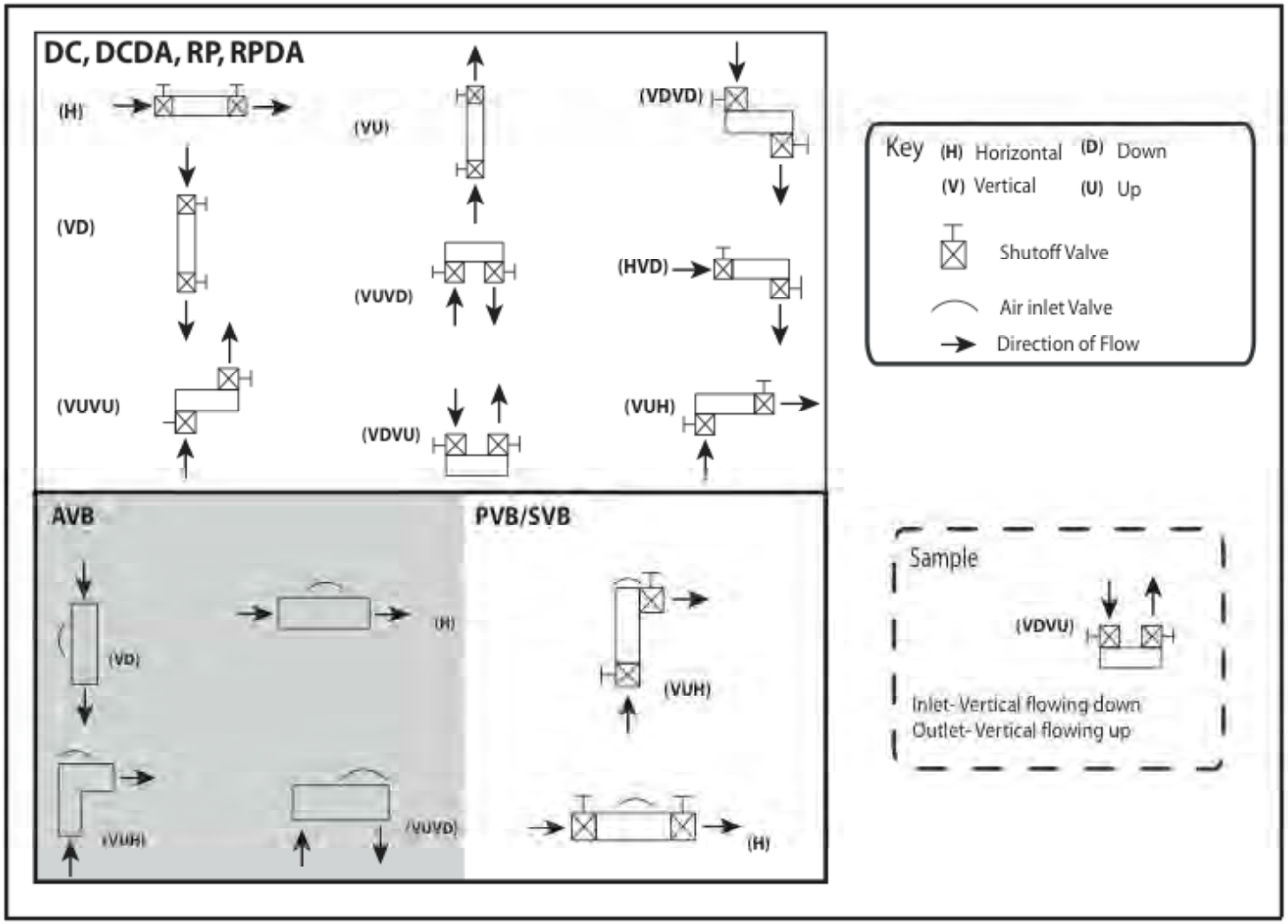
Type	Manufacturer	Model	Size	Orientation(s)	Approved
DCDA	Watts	LF757DCDAGV	4	VU	8-Jan-2014
DCDA	Watts	LF757DCDAGV	6	H	8-Jan-2014
DCDA	Watts	LF757DCDAGV	6	VU	8-Jan-2014
DCDA	Watts	LF757DCDAGV	8	H	8-Jan-2014
DCDA	Watts	LF757DCDAGV	8	VU	8-Jan-2014
DCDA	Watts	LF757DCDAGV	10	H	8-Jan-2014
DCDA	Watts	LF757DCDAGV	10	VU	8-Jan-2014
DCDA	Watts	LF757DCDABF	2 1/2"	H	8-Jan-2014
DCDA	Watts	LF757DCDABF	2 1/2	VU	8-Jan-2014
DCDA	Watts	LF757DCDABF	3	H	8-Jan-2014
DCDA	Watts	LF757DCDABF	3	VU	8-Jan-2014
DCDA	Watts	LF757DCDABF	4	H	8-Jan-2014
DCDA	Watts	LF757DCDABF	4	VU	8-Jan-2014
DCDA	Watts	LF757DCDABF	6	H	8-Jan-2014
DCDA	Watts	LF757DCDABF	6	VU	8-Jan-2014
DCDA	Watts	LF757DCDABF	8	H	8-Jan-2014
DCDA	Watts	LF757DCDABF	8	VU	8-Jan-2014
DCDA	Watts	LF757DCDABF	10	H	8-Jan-2014
DCDA	Watts	LF757DCDABF	10	VU	8-Jan-2014
DCDA	Watts	LF757NDCDABF	2 1/2"	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDABF	3	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDABF	4	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDABF	6	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDABF	8	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDABF	10	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDAGV	2 1/2"	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDAGV	3	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDAGV	4	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDAGV	6	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDAGV	8	VUVD	8-Jan-2014
DCDA	Watts	LF757NDCDAGV	10	VUVD	8-Jan-2014
RPDA	Watts	LF957NRPDA-GV	2 1/2"	VUVD	8-Jan-2014
RPDA	Watts	LF957NRPDA-GV	3	VUVD	8-Jan-2014
RPDA	Watts	LF957NRPDA-GV	4	VUVD	8-Jan-2014
RPDA	Watts	LF957ZRPDA-GV	2 1/2"	VUVD	8-Jan-2014
RPDA	Watts	LF957ZRPDA-GV	3	VUVD	8-Jan-2014
RPDA	Watts	LF957ZRPDA-GV	4	VUVD	8-Jan-2014
RPDA	Watts	LF957NRPDA-BF	2 1/2"	VUVD	8-Jan-2014
RPDA	Watts	LF957NRPDA-BF	3	VUVD	8-Jan-2014

Type	Manufacturer	Model	Size	Orientation(s)	Approved
RPDA	Watts	LF957NRPDA-B	4	VUVD	8-Jan-2014
RPDA	Watts	LF957ZRPDA-B	2 1/2"	VUVD	8-Jan-2014
RPDA	Watts	LF957ZRPDA-B	3	VUVD	8-Jan-2014
RPDA	Watts	LF957ZRPDA-B	4	VUVD	8-Jan-2014
RPDA	Watts	LFColt 500-GV	2 1/2"	H	8-Jan-2014
RPDA	Watts	LFColt 500-GV	3	H	8-Jan-2014
RPDA	Watts	LFColt 500-GV	4	H	8-Jan-2014
RPDA	Watts	LFColt 500-GV	6	H	8-Jan-2014
DCDA	Apollo/Conbraco	DCDALF4AN	4	VUVD	23-Jan-2014
RP	Wilkins	375ASTR	8	H	23-Jan-2014
RP	Wilkins	375ASTR	10	H	23-Jan-2014


DC, DCDA, RP, RPDA
(H)
(VD)
(VUVU)
(VU)
(VUVD)
(VDVU)
(VDVD)
(HVD)
(VUH)
AVB
PVB/SVB
(VD)
(H)
(VUH)
(VUVD)
(VUH)
(H)
Key
(H) Horizontal
(D) Down
(V) Vertical
(U) Up
Shutoff Valve
Air inlet Valve
Direction of Flow
Sample
(VDVU)
Inlet- Vertical flowing down
Outlet- Vertical flowing up

Shutoff Valve Designations

The backflow prevention assemblies shown on this list have been evaluated with a specific set of shutoff valves as an integral part of the assembly. The specific shutoff valves are coded by a parenthetic code shown with each assembly. This coding of shutoff valves is defined below. Other shutoff valves having similar performance characteristics which permit the assembly to comply with the standards are also shown immediately after the original shutoff valves. The use of any shutoff valve on a specific assembly, other than those listed for that specific assembly invalidates the Approval. Assemblies listed with a Y in the "spare parts only" column may not include the shutoff valve designation.

(aa)	American Figure 1-QT
(bb)	American Figure 17-NRS RW
(cc)	American Figure 370OSY RW
(dd)	Apollo Series 7B-QT
(ee)	AVK Series 25-NRS
(ff)	AVK Series 25-OSY (Nibco F607RW OSY)
(gg)	Clow R/W Model 2640 (FxF) - NRS
	(formerly Clow R/W F6102-NRS)
(hh)	Clow R/W Model 2640 (FxF) - OSY
	(formerly Clow R/W F6136-OSY)
(ii)	Fortune Series 620/623 (C84400 Bronze) (Formerly Figure 601)
	Private labeled as: Ames, Buckner, Febco, Flomatic, Hersey and Wilkins
(jj)	Kennedy Ken Seal I-NRS
(kk)	Kennedy Ken Seal-OSY
(ll)	Kennedy Model KS-FW Figure 8561 (FxF) - NRS (2 1/2" - 10")
	Kennedy Model KS-RW Figure 7561 (FxF) - NRS (4" - 10")
	(formerly Kennedy Ken Seal II-NRS)
(mm)	Kennedy Model KS-FW Figure 8068 (FxF) - OSY (2 1/2" - 10")
	Kennedy Model KS-RW Figure 7068 (FxF) - OSY (4" - 10")
	(formerly Kennedy Ken Seal II-OSY)
(nn)	Lee Brass-QT
(oo)	Watts 405-RW
(pp)	Watts 408-OSY
(qq)	Mueller R/W HP NRS
(rr)	Mueller R/W HP OSY
(ss)	Toro.Orion Integral Ball Valve-QT
(tt)	American Flow Control (Waterous) Series 500-NRS
(uu)	American Flow Control (Waterous Series 500-OSY
(vv)	Watts Figure FBV (FBV-E)-QT [Ames Figure FBV (FBV-E)-QT]
(ww)	Watts G4000FDA-QT
(xx)	Watts Series 6080 (& 6080-E)-QT
(yy)	Matco-Norca 10RW (NRS)
(zz)	Matco-Norca 105U (OSY)
(aaa)	American Flow Control Series 2500-NRS
(bbb)	American Flow Control Series 2500-OSY
(ccc)	M&H Model 4067-02 (NRS)
(ddd)	M&H Model 4068-02(OSY)
(eee)	Stockham Model G-610 (OSY)
(fff)	Febco Series 620 QT
(ggg)	Fortune Figure 620U-QT
(hhh)	Watts Figure S-FBV (S-FBV-E)-QT
(iii)	Mueller Model A2360-NRS
(int)	Shutoff Valve is integral part of assembly
(jjj)	Febco Series 621-QT
(kkk)	Febco Series 620U-QT
(lll)	Mueller Model R2360-OSY
(mmm)	Conbraco Series IBVE-125-QT
(nnn)	Kennedy Model KS-FW Figure 8701 (FxF) - NRS (3" - 10") Post Indicator/Tapping
	Kennedy Model KS-RW Figure 7701 (FxF) - NRS (4" - 10") Post Indicator/Tapping
	(formerly Kennedy Ken Seal II Post Indicator/Tapping)
(ooo)	Ningbo Ball Valves (Febco Series 622-QT, Watts Series 855-QT & Wilkins Series 850-QT
(ppp)	Clow R/W Model 2639 (GxF) - NRS (2 1/2" - 3")
	Clow R/W Model 2638 (GxF) - NRS (4" - 10")
(qqq)	Clow R/W Model 2639 (GxF) - OSY (2 1/2" - 3")
	Clow R/W Model 2638 (GxF) - OSY (4" - 10")
	(formerly Clow Series F6138-OSY)
(rrr)	Apollo Series 7B-308-01 (& 7B-308-31)
(sss)	Clow R/W Model 2639 (GxG) - NRS (2 1/2" - 3")
	Clow R/W Model 2638 (GxFG) - NRS (4" - 10")
	(formerly Clow Series F6104-NRS)
(ttt)	Clow R/W Model 2639 (GxG) - OSY (2 1/2" - 3")
	Clow R/W Model 2638 (GxFG) - OSY (4" - 10")
	(formerly Clow Series F6137-OSY)
(uuu)	Apollo Series 7H-QT
(vvv)	Clow R/W Model 2640 (FxF) - OSY Post Indicator/Tapping Valve
	(formerly Clow R/W F6136-OSY Post Indicator/Tapping Valve)
(www)	Clow R/W Model 2639 (GxF) - OSY (2 1/2" - 3") Post Indicator/Tapping Valve
	Clow R/W Model 2640 (GxF) - OSY (4" - 10") Post Indicator/Tapping Valve
	(formerly Clow R/W F6138-OSY Post Indicator/Tapping Valve)
(xxx)	Ningbo Union Ball Valves (FEBCO 622UQT & Wilkins 850U-QT)
(yyy)	Victaulic Series 702 (Butterfly valves)
(zzz)	Kennedy Model KS-RW Figure 7092ABF (FxG) - OSY
	(formerly Kennedy Series 7092ABF-OSY)
(aaaa)	Union Model GV12 (flange by groove)-OSY
(bbbb)	Enbee Model GV12 (flange by groove)-OSY
(cccc)	Kennedy Model KS-RW Figure 7092 (FxG) - OSY
	(formerly Kennedy Series 7092 (GxF) - OSY)
(dddd)	Kennedy Model KS-RW Figure 7592 (FxG) - NRS
	(formerly Kennedy Series 7592ABF - NRS)
(eeee)	Kennedy Model KS-RW Figure 7592PABF (FxG) - NRS Post Indicator/Tapping Valve
	(formerly Kennedy Series 7592PABF-Post Indicator/Tapping Valve)
(ffff)	Watts 409RW (FxF)- OSY
(gggg)	Watts 409RW (FxG)- OSY
(hhhh)	Watts Figure LF-FBV-QT (1/2"-2")
(iiii)	Wilkins Series 850XL - QT
(jjjj)	Watts 409 RW 2" - OSY
(kkkk)	Kennedy Model KS-RW Figure 7093 (GxG) - OSY
(llll)	Kennedy Model KS-RW Figure 7593 (GxG) - NRS
(mmmm)	Kennedy Model KS-RW Figure 7093ABF (GxG) - OSY
(nnnn)	Kennedy Model KS-RW Figure 7593ABF (GxG) - NRS
(oooo)	Kennedy Model KS-RW Figure 7593PABF (GxG) - NRS Post Indicator
(pppp)	Watts Figure L-FBV-QT, Ames Figure L-FBV-QT, FEBCO Figure L-FBV-QT
(qqqq)	Kennedy Figure G300E - Butterfly Valve (4",6")
(rrrr)	Kennedy Figure 02G - Butterfly Valve (8")
(ssss)	Wilkins Model 48 (GXF) - NRS (2-1/2" - 12")
(tttt)	Wilkins Model 48 (FXF) - NRS (2-1/2" - 12")
(uuuu)	Wilkins Model 48 (GXG) - NRS (2-1/2" - 12") Post Indicator/Tapping Valve
(vvvv)	Wilkins Model 48 (GXF) - NRS (2-1/2" - 12") Post Indicator/Tapping Valve
(wwww)	Wilkins Model 48 (FXF) - NRS (2-1/2" - 12") Post Indicator/Tapping Valve
(xxxx)	Wilkins Model 48 (GXG) - OSY (2-1/2" - 12")
(yyyy)	Wilkins Model 48 (GXF) - OSY (2-1/2" - 12")
(zzzz)	Wilkins Model 48 (FXF) - OSY (2-1/2" - 12")
(aaaaa)	Wilkins Model 48 (GXG) - NRS (2-1/2" - 12")
(bbbbb)	Milwaukee BB-SC100 - Butterfly Valve
(ccccc)	Milwaukee BB-SCS02 - Butterfly Valve (with gearbox)
(ddddd)	Flomatic Model NRS
(eeeee)	Watts Model FBV-FP (FBV-E-FP)-QT
(fffff)	Watts L-FBV-QT (2 1/2" - 4")
(ggggg)	Wilkins Model 850MSS
(hhhhh)	Fortune Series 620/623 (c89520 unleaded bronze)
(iiiii)	Apollo Series 77B-100 and 77C-100 - QT
(jjjjj)	Apollo Series 77BLF-100 and 77CLF-100 - QT
(kkkkk)	Wilkins Model 49 (GXF) - (2 1/2" - 10")
(lllll)	Wilkins Model 49 (GXG) - (2 1/2" - 10")
(mmmmm)	Wilkins 850UXL (850TUXL) -QT
(nnnnn)	Watts Series 405-NRW-RW (FxG)
(ooooo)	ARI HC260 and HC262 Ball Valves - QT
(ppppp)	Febco LF622U-QT
(qqqqq)	Febco LF622-QT
(rrrrr)	Watts Model LFFBV-FRG (LFFBV-E-FRG)-QT
(sssss)	Apollo Series 91B and 91C-QT (1/2 - 2")
(ttttt)	Apollo Series 91BLF and 91CLF-QT (1/2 - 2")

Detector Assembly Meters

The Double Check Detector Assemblies (DCDA) and Reduced Pressure Principle Detector Assemblies (RPDA) contained herein have been evaluated with a specific meter as the detector element of the assembly. That specific meter is coded by a parenthetic letter shown in the "meters" column. The coding of meters is shown in this Section. Other meters having similar performance characteristics to permit the assembly to meet the Specifications are shown immediately after the original evaluation meter. The use of any other meter or modified bypass piping invalidates the Approval.

Some of the DCDA's and RPDA's utilize a line-size assembly, which is not a standard or stock Approved assembly. Increased loads are required in these line-size units to allow the assembly to accurately record low flow rates in the bypass meter. Therefore, various 'off the shelf' components can not be assembled and expected to perform satisfactorily. The bypass backflow preventer Approved with the detector assembly is listed under the "bypass" column. This is only for verification purposes. Should replacement parts or a complete by-pass be needed the model number of the complete detector assembly should be used in ordering these components.

A Hersey Model F-F 5/8" x 3/4"
B Carlon 5/8" x 3/4"
C Dandé Model D-3 5/8" x 3/4"
D Gamon-Calmet 5/8"
E Hays Acumeter 5/8" x 3/4"
F Arad 5/8" x 3/4" (Master Meter)
G Schlumberger 5/8" x 3/4" Model MBRF
H Rockwell (Sensus) SR-II 5/8" x 3/4"
I Hersey Model 430 - 5/8"
J Elster AMCO Model C700 5/8"x3/4" (Formerly Kent, ABB)
K Precision 5/8"
L Neptune Trident 8 5/8"
M Neptune T-10 5/8"
N Badger Model 25 3/4"
O Badger 5/8" x 3/4" Model 25 (Lead free compliant version identified with NSF61 mark on meter)
P Hersey Model 430 Series II 5/8"
Q Hersey Model MVR-30 3/4"
R Neptune T-10 1"
S Neptune T-10 1 1/2"

Manufacturers of Approved Backflow Prevention Assemblies

Ames Fire & Waterworks - A Watts Water Technologies Company
http://www.amesfirewater.com/
1427 N. Market Blvd., Ste. 9
Sacramento, CA 95834
(916) 928-0123

Apollo/Conbraco Industries, Inc.
http://www.apollovalves.com/
P. O. Box 247
Matthews, NC 28105
(704) 847-9191

A.R.I. FLOW CONTROL ACCESSORIES
http://www.arivalves.com
Kibbutz Kfar Charuv
M.P. South Golan
ISRAEL, 12932
972-4-6761800 or 972-4-6761988

Arrowhead Brass
http://www.arrowheadbrass.com/
5147 Alhambra Ave.
Los Angeles, CA 90032
(323) 343-9790

Cash Acme
http://www.cashacme.com
2400 7th Avenue S.W.
Cullman, Alabama 35055
(256) 775-8200

Cla-Val Company
http://www.cla-val.com/
P. O. Box 1325
Newport Beach, CA 92659-0325
(949) 722-4800

FEBCO - A Watts Water Technologies Company
http://www.febcoonline.com
P. O. Box 8070
Fresno, CA 93747
(559) 252-0791

Flomatic
http://www.flomatic.com/
15 Pruyn's Island Dr.
Glen Falls, NY 12801-4424
(800) 833-2040

Hersey Meters
http://www.herseymeters.com/
10210 Statesville Blvd.
Cleveland, NC 27013
(800) 323-8584

Watts - A Watts Water Technologies Company
http://www.wattsreg.com/
815 Chestnut Street
North Andover, MA 01845
(978) 688-1811

Wilkins Regulator Company
http://www.zurn.com/operations/wilkins/pages/home.asp
1747 Commerce Way
Paso Robles, CA 93446
(800) 817-8177

Special Notices

From time to time the Foundation issues Special Notices when specific information needs to be brought before the Members of the Foundation. A copy of the notices are sent to Foundation Members as they are published. Notices may also be found on the Internet at the World Wide Web address of http://www.usc.edu/fccchr/notice.html

Notices are summarized as follows.

Notice 96-001
This notice lists Ames assemblies which have been reported with low check valve readings. Corrections to the problem are discussed.
Notice 97-001
This Notice discusses changes in the Wilkins 975 8" and 10" reduced pressure principle assemblies. A change in the retaining cup in the relief valve stem.
Notice 97-002
This notice identifies Ames 2000SS, 3000SS, and 4000SS series assemblies were discovered to have unapproved components.
Notice 97-003
This notice lists assemblies which were NOT Approved by the Foundation, although advertisements may have implied otherwise.
Notice 98-001
This notice advises members of certain action in the Federal Register regarding cross-connection control programs.
Notice 98-002
This notice advises members of Wilkins 950 series and 975 series modifications.
Notice 99-001
This notice lists assemblies which were NOT Approved by the Foundation, although advertisements may have implied otherwise.
Notice 99-002
This notice lists assemblies which were NOT Approved by the Foundation, although advertisements may have implied otherwise.
Notice 99-003
This notice lists assemblies which were NOT Approved by the Foundation, although advertisements may have implied otherwise.
Notice 01-001
Discuss silicon parts in certain Febco relief valves
Notice 01-002/Revised Notice 01-002-R1
This notice discusses some check valves not approved in certain Ames and Watts asemblies
Notice 01-003
This notice lists assemblies which were NOT Approved by the Foundation, although advertisements may have implied otherwise.
Notice 02-001
This notice explains there are some specific Febco assemblies with unapproved check valve retainers.
Notice 03-001
This notice explains there are some improper markings of model designations on some Wilkins assemblies
Notice 03-002
This notice explains there is the possibility of the interference of the check valves on some Ames and Watts assemblies
Notice 04-001
This notice identifies some Febco 825YA assemblies sold with a dimensional variation
Notice 05-001
This Notice identifies some Ames and Watts assemblies sold with unapproved disc material.
Notice 06-001
This notice identifies unapproved guides found in certain Febco assemblies
Notice 06-002
This notice identifies a change in the design of the Flomatic PVBs
Notice 06-003
Notice regarding Cash-Acme Assemblies
Notice 07-001
Out of tolerance springs on Conbraco assemblies
Notice 09-001
Unapproved Third party components are being distributed
Notice 13-001

Attachment B

Fixtures, Equipment and Areas that Require Backflow Prevention Devices

Fixtures, Equipment, and Areas Requiring Backflow Protection

Fixtures, Equipment, and Areas	Protection	Fixtures, Equipment, and Areas	Protection
Air compressors	DCVA	Fume hoods	AVB
Air conditioning systems	RPBA	Garbage can washers	AVB/PVBA
Air washers	RPBA	Garbage disposals	AVB
Aquarium make-up water	AG/RPBA	Heat exchangers	
Aspirators, medical	AVB	Heat pumps	RPBA
Aspirators, weedicide, herbicide, and pesticide	AVB	High pressure washers	DCVA
Autoclaves	RPBA	Hose bibs	AVB
Autopsy tables	RPBA	Hoses, kitchen rinse	AVB
Baptismal fountains	AG/AVB	Hot tubs	AG/RPBA
Bathtub, below rim filler	Not Allowed	Hot water heating systems	RPBA
Bedpan washers	AVB	Hot water boilers	RPBA
Beverage dispensers using CO_2	RPBA	Humidifier tanks and boxes	AG
Bidets	AVB	Hydraulically operated equipment	DCVA
Boat lifts	RPBA	Hydrotherapy baths	AVB
Boiler feed lines	AG/RPBA	Ice makers	AG
Bottle washing equipment	RPBA	Industrial fluid systems	RPBA
Box hydrants	PVBA/DCVA	Intertied (looped) water systems	DCVA
Brine tanks	AG/DCVA	Irrigation systems	RPBA
Can washing equipment	AVB/PVBA	Janitor sinks	AVB
Chemical feeder tanks	AG/RPBA	Kitchen equipment	AVB
Chilled water systems	RPBA	Laboratory equipment	RPBA
Chlorinators	RPBA	Laundry machines, commercial	RPBA
Coffee urns	AG/AVB	Lavatories	AVB
Computer cooling lines	AG/RPBA	Lawn sprinkler systems	
Condensate tanks	AG/RPBA	Livestock drinking tanks	AG/AVB
Cooking kettles	AG/AVB	Make-up tanks	AG/RPBA
Cooling towers	AG/RPBA	Mobile carpet cleaners	RPBA
Decorative ponds	AG/RPBA	Mop sinks	AVB
Degreasing equipment	RPBA	Outboard motor test tanks	AG/AVB
Demineralized water systems	RPBA	Perchlorethylene reclaim machines	RPBA
Dental cuspidors	RPBA	Pesticide applicator trucks	AG/RPBA
Detergent dispensers (dishwasher)	AVB	Photo developing tanks and sinks	RPBA
Dialysis equipment	RPBA	Photostat equipment	RPBA
Dishwashers	AVB	Pipette washers	AVB
Drinking fountains	AG	Potato peelers	AVB
Dye vats and tanks	AG/RPBA	Poultry feeders	RPBA
Dynamometers	DCVA	Private hydrants	DCVA
Emergency generators	RPBA	Processing tanks	AG/RPBA
Etching tanks	AG/RPBA	Pump seal water	AG
Fermenting tanks	AG/RPBA	Pumps, pneumatic ejector	RPBA
Fertilizer injection equipment	RPBA	Pump prime lines	DCVA
Film processors	RPBA	Pumps, water operated ejector	RPBA
Fire department connections	DCVA	Radiator flushing equipment	RPBA
Fire sprinkler systems	DCVA	Recreational vehicle dump stations	RPBA
Floor drains	AG	Serrated faucets	AVB
Flushing floor drains	AVB	Service sinks	AVB
Foamite systems	RPBA	Sewer connected equipment	AG
Fountains, ornamental	AG/RPBA	Sewer flushing	AG

Fixtures, Equipment, and Areas Requiring Backflow Protection

Fixtures, Equipment, and Areas	Protection
Shampoo basins / hose rinse	AVB
Showers, telephone	AVB
Sitz baths	AVB
Soap mixing tanks	AG/AVB
Solar heating systems	
Solution tanks	AG/RPBA
Spas	AG/RPBA
Specimen tanks	AG/RPBA
Starch tanks	AG/DCVA
Steam-air sprays	RPBA
Steam cleaners	RPBA
Steam ejectors	RPBA
Steam generating facilities	RPBA
Sterilizers	RPBA
Stills	RPBA
Sumps	AG
Swimming pools	AG/RPBA
Toilets	AVB
Trap primers	AG
Ultrasonic baths	AG
Urinals	AVB
Used water systems	RPBA
Vats	AG/AVB
Wading pools	AG/RPBA
Wall hydrants	AVB
Wash basins	AG/AVB
Wash-up sinks	AG/AVB
Wash tanks	AG/AVB
Waste water lines	AG
Water-air sprays	DCVA
Water closets	AVB
Water cooled equipment	DCVA
Water ejectors	RPBA
Water reirculating systems	DCVA
Water settling	DCVA
Water treatment tanks	AG/RPBA
Water trucks	DCVA
Wet vacuum systems	RPBA
Whirlpool baths	AVB
Windshield washer fluid aspirators	RPBA
X-ray processors	RPBA

Attachment C

Typical Land Uses that Require Backflow Prevention Devices

Land Uses That Are Likely to Require Backflow Prevention Devices

- Commercial businesses
- Any water connection that has a separate water treatment system
- Any irrigation system
- Any connection that has a fire system
- Parks and playgrounds
- All industrial connections
- Churches
- Public buildings
- Laboratories
- Medical and dental offices
- Hospitals
- Mortuaries
- Nursing homes
- Beverage bottling plants
- Food processing plants
- Manufacturing facilities
- Sewage lift stations
- Sewage treatment facilities
- Any building over 30 feet above the domestic water supply
- Battery manufacturing or repair facilities
- Boat marinas
- Canneries
- Cold storage facilities
- Laundromats
- Concrete mixing plants
- Lumber processing plants
- Dairies
- Dry cleaners
- Film processing facilities
- Mobile home parks
- Slaughter houses
- Paper product plants
- Sand and gravel plants
- Shopping centers
- Petroleum production and distribution facilities
- Farms that produce public consumer goods
- Auto repair shops

Attachment D

Cross Connection Control Plan Documents, Forms, and Flow Charts

Cross Connection Report Form

1. Are you renting or do you own?

   If you are renting, please provide the name and address of the owner below:

   _____

   _____

   _____

2. Do you have any of the following:

			Comments
Swamp Cooler	YES	NO	
Hot Tub	YES	NO	
Swimming Pool	YES	NO	
Jacuzzi	YES	NO	
Underground Sprinkler System	YES	NO	
Drip Irrigation System	YES	NO	
Green House	YES	NO	
Solar System	YES	NO	
Utility Sink (with threaded faucet)	YES	NO	
Fire Sprinkler System	YES	NO	
Ghost Pipes	YES	NO	
Waterbed	YES	NO	
Ornamental Fountain	YES	NO	
Bird Bath	YES	NO	

3. Do you use:

Antifreeze Flush Kits	YES	NO
Insecticide/Fertilizer Sprayers (that attach to a garden hose)	YES	NO
Dark Room Equipment	YES	NO

4. Do you or anyone in your home use a portable dialysis machine?

5. Do you have a bathtub that fills from the bottom; or does not have an overflow drain and is not air-gapped?

6. Do you have a water softener or any other type of treatment system connect to the drinking water supply?
7. Do you have an auxiliary water supply on your premises?
8. Do you receive irrigation water from another source?
9. Does a creek, river, or spring run through your property?
10. Is there 30 feet in elevation from your meter to the point of use?
11. Do you have a backflow preventer on your property at this time?
12. Do you have a booster pump?
13. Do you have any situation that you are aware of that could create a cross connection?

Please notify City of Fircrest if the above conditions ever change on your property.

_____

Signature of Water Client

_____

Name Printed

Mailing Address:

_____

_____

_____

Physical address of property (county address):

_____

_____

_____ Div: _____ Lot: _____

Phone Number: _____

Please answer all of the above questions and return no later than _____

This form will be kept on file.

Return to: The City of Fircrest
Public Works Department
115 Ramsdell Street
Fircrest, WA 98466-6999

CROSS CONNECTION CONTROL SURVEY REPORT

DATE	FILE NO.	TIME

Firm Name: _____ Type Of Business: _____

Address: _____ Zip: _____ Phone No.: _____

Party Contacted: _____ Address: _____

Letter To:

Firm Name: _____ Address: _____

City: _____ State: _____ Zip: _____ Phone No.: _____

City Water Service	Size	Pressure	Meter No.	
Domestic				
Fire				
Irrigation				
Other Water Supply				Source _____ Use _____

No.	Type Of Cross-Connection And Location	Recommended Remedy

(Sketch)

No.	Type Of Cross-Connection And Location	Recommended Remedy

(Sketch)

BACKFLOW INCIDENT REPORT FORM

There are many backflow incidents which occur that are not reported. This is usually because they are of short duration and are not detected, the customer is not aware they should be reported, or it may not be known to whom they should be reported.

The PNWS/AWWA Cross Connection Control Committee is making an effort to bring these incidents to the attention of water purveyors and the public. If you have any knowledge regarding backflow incidents, please fill out a copy of this form and return it to any member of the committee, or to the individual named on the reverse side. In addition, the state health agency must be notified.

Reporting Agency: _____ Report Date: _____

Reported By: _____ Title: _____

Mail Address: _____ City: _____

State: _____ Zip Code: _____ Telephone: _____

Date of Incident: _____ Time of Occurrence: _____

General Location (Street, Block, etc.): _____

Backflow Originated From:

Name of Premise: _____

Street Address: _____ City: _____

Contact Person: _____ Telephone: _____

Type of Business: _____

Description of Contaminants:
(Attach chemical analysis or MSDS if available)

_____

_____

Distribution of Contaminant:

Contained within customer's premise: Yes: _____ No: _____

Number of persons affected: _____

Effect of Contamination:

Illness reported: _____

Physical irritation reported: _____

Cross Connection Source of Contaminant:
(boiler, chemical pump, irrigation system, etc.)

_____

_____

Cause of Backflow:
(main break, fire flow, etc.)

_____

_____

Corrective Action Taken to Restore Water Quality:
(main flushing, disinfection, etc.)

_____

_____

Corrective Action Ordered to Eliminate or Protect Cross Connection:
(type of backflow preventer, location, etc.)

_____

_____

Previous Cross Connection Survey of Premise:

Date: _____ By: _____

Type of Backflow Preventer Isolating Premise:

RPBA: _____ RPDA: _____ DCVA: _____ DCDA: _____ None: _____

Type of Backflow Preventer Isolating Source of Contaminant:

RPBA: _____ RPDA: _____ DCVA: _____ DCDA: _____ PVBA: _____ AVB: _____

Air Gap: _____ None: _____

Date of latest Test of Assembly: _____

Notification of State Health Department:

Date: _____ Time: _____ Person Notified: _____

Notified By: _____

Attach sheets with additional remarks, sketches, and/or media information.

BACKFLOW PREVENTION ASSEMBLY TEST REPORT

Return No Later Than: _____

Name of Premises: _____ File No.: _____

Service Address: _____

Location of Assembly: _____

Assembly: _____ *Manufacturer* _____ *Model* _____ *Size* _____ *Serial No.*

Line Pressure at Time of Test: _____ LBS. Type of Assembly: _____

	Reduced Pressure Assemblies			Pressure Vacuum Breaker	
	Double Check Assemblies		Relief Valve	Air Inlet	Check Valve
	1st Check	2nd Check		Opened at _____ psid	_____ psid
Initial Test	DC-closed tight ..... ☐ RP- _____ psid Leaked ..... ☐	Closed tight ..... ☐ Leaked ..... ☐	Opened at _____ psid	Did not open ..... ☐	Leaked ..... ☐
Repairs and Materials Used					
Test After Repair	DC-closed tight ..... ☐ RP- _____ psid	Closed tight ..... ☐	Opened at _____ psid	Opened at _____ psid	_____ psid

Air Gap Inspection: Required minimum air gap separation provided .....Yes ☐ No ☐

Remarks: _____

_____

The Above Report Is Certified To Be True:

Initial Test Performed By: _____ Cert. No.: _____ Date: _____

Repaired By: _____ Date: _____

Final Test Performed By: _____ Cert. No.: _____ Date: _____

Water Service Restored Yes ☐ No ☐

_____
Customer's Signature

BACKFLOW PREVENTION ASSEMBLY TEST RECORD CARD

FIRM NAME	FILE NO.	ASSEMBLY NO.
ADDRESS	ZIP	PHONE NO.
PARTY CONTACTED	TITLE	

TYPE OF ASSEMBLY

☐ Reduced Pressure Backflow Assembly ☐ Double Check Valve Assembly ☐ Pressure Vacuum Breaker Assembly

MAKE OF ASSEMBLY	MODEL	SERIAL NO.	SIZE
DATE INSTALLED		METER NO.	

CROSS-CONNECTION CONTROLLED

LOCATION OF ASSEMBLY

(Reverse Side of Card)

DATE TESTED	CHECK VALVE #1	CHECK VALVE #2	RELIEF VALVE	POPPET (PVBA)	DATE REPAIRS MADE	REMARKS

Water Right Self-Assessment Form for Water System Plans

331-372 • 1/13/2017

All water right permits, claims, and certificates must be evaluated in a water right self-assessment for all sources used to supply the water system. The self-assessment compares the parameters and other limitations of existing water rights against current and forecasted water production, as described in your water system plan, to determine whether the rights are adequate to serve your system's current and future water needs.

You must account for all sources of supply and total quantities of water withdrawn from the source. If you purchase water from another purveyor through a non-emergency intertie, you must complete the INTERTIES section of the self-assessment.

A Note on Exempt Wells

If you're seeking DOH approval of a new Group A or Group B water system using an exempt well, you must complete the self-assessment, although certain fields will not apply. Talk to your DOH regional planner about using the Water Right Self-Assessment form for a Small Water System Management Program instead of this version.

Local governments must ensure that an adequate potable water supply is available from the exempt well before issuing a building permit. Before developing a permit exempt well, check with your local authorities on their criteria for establishing an adequate potable water supply for your planned public water system.

Water Right Parameters

Below is a brief description of the parameters associated with a typical water right. For the self-assessment, you only need to describe the last two bulleted items if they apply to your water rights.

Source Type – this refers to whether the source is surface water, groundwater or a spring.

Source Location – this refers to the location of points of groundwater withdrawal or surface water diversion for each right.

Purpose of Use – this refers to the type of use, such as municipal water supply, community domestic, industrial or agricultural purposes.

Place of Use – this describes where water can be put to beneficial use under the right. Under the 2003 Municipal Water Law, RCW 90.03.386, the place of use for a water right held for municipal water supply purposes may be the system's service area as identified in an approved water system plan or small water system management program. See Ecology Policy 2030 for information on how Ecology administers the Municipal Water Law.

Washington State Department of Health

If you need this publication in an alternative format, call 800.525.0127 (TDD/TTY call 711). This and other publications are available at www.doh.wa.gov/drinkingwater.

Period of Use – this refers to time-of-year limitations in which the water right may be put to use. If any water right has a time-of-year limitation, please include this information in the INTERRUPTIBLE WATER RIGHTS section.

Provisions or Limiting Conditions – this refers to any provisions or conditions placed on the water right. If a water right has a limiting condition or other provision, such as a collection and reporting requirement, other than a time-of year limitation, include this information in the ADDITIONAL COMMENTS section at the bottom of the self-assessment and in the water system plan narrative.

See Ecology Policy 1040 for more information on water right terminology. If you have questions about your water rights, please contact the Ecology regional office in your area.

Completing the Water Right Self-Assessment Form

The self-assessment is a Word document to allow users to make changes or to expand the document. You may use another format, if preferred, as long as all required information is included. Below is a description of all fields and how to complete them. This form is divided into four different sections. Each section is described in the headings below.

See the column identifiers (A, B, C, etc) at the bottom of each column for guidance in completing the necessary calculations.

Water Right Permit, Certificate, or Claim Number: This number is assigned by Ecology when a permit application is filed. It's listed at the top of the permit or certificate. For water right claims, this is the registration number stamped in the lower left hand corner of the claim form.

WFI Source #: Identify the individual sources (e.g. well #1, well #2) as defined on the DOH Water Facilities Inventory form. If a water right is associated with multiple sources, list all sources in the same row in this column. If a source is associated with multiple water rights, identify each water right on a separate row.

If you have any source(s) that is not currently being used (categorized as standby, back-up, or emergency), and the source has an associated water right that is not listed in column #1, please include the source and water right information in the ADDITIONAL COMMENTS section. This will identify that the source is still intended for a beneficial use under RCW 90.03.015(4). See Ecology Policy 1040.

EXISTING WATER RIGHTS SECTION *(olive green color, top section)*

This section refers to existing water rights. It does not include any water right applications that have been submitted to Ecology.

Primary Qi (Instantaneous Quantity): This is also known as instantaneous flow rate. It's the amount of water allowed to be taken under the right from the source during a period of peak operation. For surface water, this is generally expressed in terms of cubic feet per

second (cfs). For groundwater, this is generally expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm. Please indicate the units of measurement you are using for each source. If there are situations where the flow rate will be limited (e.g. limitations established on the source when other sources are utilized), please note them in the ADDITIONAL COMMENTS section in the form and in the WSP narrative.

Non-Additive Qi: This term was formally known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qi quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qi totals.*

Primary Qa (Annual Quantity): This is the amount of water that can be taken from the source under the right on an annual basis. It's usually expressed in terms of acre-feet. An acre-foot is the amount of water necessary to submerge an acre of land to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water.

Non-Additive Qa: This term was formerly known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qa quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qa totals.*

CURRENT SOURCE PRODUCTION SECTION *(light green color, top section)*

This section refers to how much water is withdrawn from the source under each water right for the most recent full calendar year. You will need to determine any excess or deficiency for each water right after calculating how much water was withdrawn compared to how much water is allowed under each water right. If demand has decreased over past years, you may wish to include historic maximum production information in the ADDITIONAL COMMENTS section. This will provide a more complete picture of the use of your water rights.

Use the water use data and demand projections from your water system plan to define current and projected water needs. You can determine if you'll need additional water rights based on the comparison of existing water rights, current water production, and projected 10- and 20-year needs.

Total Qi (Instantaneous Quantity): This refers to the total maximum instantaneous flow rate withdrawn from the source under each water right during the most recent calendar year. For surface water, this is expressed in terms of cubic feet per second (cfs). For groundwater, this is expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm.

Current Excess or Deficiency (Qi): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

Total Qa (Annual Quantity): This refers to the total volume of water withdrawn from each source under each water right during the most recent calendar year. It's usually expressed in acre-feet.

Current Excess or Deficiency (Qa): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

10-YEAR FORECASTED SOURCE PRODUCTION SECTION *(light blue color, top section)*

This section refers to how much water you project to withdraw from each source in ten years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 10-year forecasted amounts.

20-YEAR FORECASTED SOURCE PRODUCTION SECTION *(darker blue color, top section)*

This section refers to how much water you project to withdraw from each source in twenty years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 20-year forecasted amounts. If you are unable to provide 20-year forecasts for each source, you may choose to include the combined 20-year total at the bottom.

PENDING WATER RIGHTS SECTION *(second section of form)*

Please complete this section for any water right applications that have been submitted to Ecology. Please include the application number, whether it's a new or a change application, the date submitted, and the total quantities requested.

INTERTIES SECTION *(third section of form)*

This section must be completed by purveyors who purchase any amount of wholesale water. If your system sells water to another public water system, include the quantity sold in the CURRENT SOURCE PRODUCTION section.

Purchasers of wholesale water must account for all water obtained through the intertie for non-emergency supply purposes. This is to ensure that all sources of supply are considered when evaluating whether new water rights are needed within 20 years.

Please identify the maximum quantity of water, expressed in the same manner as the above sections, allowed under each intertie contract. If there are limiting conditions or temporary

agreements that effect the long-term use of the intertie, you must account for such limiting conditions when evaluating the current and forecasted water supply needs in your water system plan.

Finally, purchasers of wholesale water are responsible for ensuring that the underlying water right (held by the purveyor selling water) are adequate for such use. You should confirm that the selling system has accounted for the wholesale area in their water system plan to ensure that the water right authorizes the distribution of water through the intertie.

INTERRUPTIBLE WATER RIGHTS SECTION *(bottom section of form)*

This section refers to water rights that have an annual time-of-year interruption. Please complete this section for any water right listed in the above fields that has a time-of-year interruption. Please include the water right number, describe the limitation, and the time period of interruption. Purveyors with interruptible rights should develop a water shortage response plan as part of their water system plan to describe how demand will be met during periods of interruption through aggressive demand-side conservation, fixing leaks or other means.

ADDITIONAL COMMENTS SECTION *(bottom section of form)*

If the system has any source that is not currently being used on a regular basis (such a source may be categorized as stand-by, back-up, emergency), you should identify the source in this section if the source has an associated water right that is not listed in the above sections. The purpose is to identify that such water rights are still intended for a future beneficial use as required under RCW 90.03.015(4). See Page 2, Item 9 (b) in ECY Policy 2030. For these water rights, please briefly describe the future intended use of the source and when you expect to utilize the water right. This does not refer to sources categorized as seasonal sources.

You should also include any other comments in this section that will explain aspects of your water right portfolio that are not identified above.

Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below	WFI Source # If a source has multiple water rights, list each water right on separate line	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM or CFS) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold				Current Source Production – Most Recent Calendar Year Qi = Max Instantaneous Flow Rate Withdrawn (GPM or CFS) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold				10-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold				20-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold			
		Primary Qi Maximum Rate Allowed	Non-Additive Qi Maximum Rate Allowed	Primary Qa Maximum Volume Allowed	Non-Additive Qa Maximum Volume Allowed	Total Qi Maximum Instantaneous Flow Rate Withdrawn	Current Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume Withdrawn	Current Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 10 Years	10-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 10 Years	10-Year Forecasted Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 20 Years	20-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 20 Years	20-Year Forecasted Excess or (Deficiency) Qa
1 876-D	S01*, S05, S09 (Wells 4 & 9)	250	0	157	0	740	510	475	470	750	500	500	445	750	500	500	445
2 3150-A	S05, S09 (Wells 4 & 9)	1,000	0	193	595												
3 877-D	S02 (Well 7)	500	0	315	0	140	1,320	117	926	140	1,320	150	926	140	1,320	150	926
4 G2-00862C	S02 (Well 7)	100	0	65	0												
5 G2-0024C	S08 (Well 7)	720	0	546	0												
6 1322-A	S03 (Well 8)	400	0	123	0	190	210	157	(34)	200	200	100	23	200	200	100	23
7 5374	S07 (Well 6)	500	0	0	800	-	500	-	800	200	300	75	725	200	300	75	725
8 4449-A	S06 (Well 5)	750	0	337	788	-	750	-	1,125	-	750	-	1,125	-	750	-	1,125
9 G2-00863C	S04*	500	0	200	0	-	500	-	200	-	500	-	200	-	500	-	200
	TOTALS =	4,720		1,936		1,070	3,790	750	3,487	1,290	3,570	825	3,444	1,290	3,570	825	3,444
Column Identifiers for Calculations:		A		B		C	=A-C	D	=B-D	E	= A-E	F	=B-F	G	=A-G	H	=B-H

*Inactive sources

PENDING WATER RIGHT APPLICATIONS: Identify any water right applications that have been submitted to Ecology.

Application Number	New or Change Application?	Date Submitted	Quantities Requested			
			Primary Qi	Non-Additive Qi	Primary Qa	Non-Additive Qa

INTERTIES: Systems receiving wholesale water complete this section. Wholesaling systems must include water sold through intertie in the current and forecasted source production columns above.

Name of Wholesaling System Providing Water	Quantities Allowed In Contract		Expiration Date of Contract	Currently Purchased Current quantity purchased through intertie				10-Year Forecasted Purchase Forecasted quantity purchased through intertie				20-Year Forecasted Purchase Forecasted quantity purchased through intertie			
	Maximum Qi Instantaneous Flow Rate	Maximum Qa Annual Volume		Maximum Qi Instantaneous Flow Rate	Current Excess or (Deficiency) Qi	Maximum Qa Annual Volume	Current Excess or (Deficiency) Qa	Maximum Qi 10-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 10-Year Forecast	Future Excess or (Deficiency) Qa	Maximum Qi 20-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 20-Year Forecast	Future Excess or (Deficiency) Qa
1															
2															
3															
TOTALS =															
Column Identifiers for Calculations:	A	B		C	=A-C	D	=B-D	E	=A-E	F	=B-F	G	=A-G	H	=B-H

INTERRUPTIBLE WATER RIGHTS: Identify limitations on any water rights listed above that are interruptible.

Water Right #	Conditions of Interruption	Time Period of Interruption
1		
2		
3		

ADDITIONAL COMMENTS:

WELL 1 IS ABANDONED & WATER RIGHTS ARE IN PROCESS OF BEING SUPERSEDED

Well #1

CERTIFICATE RECORD NO. 2 PAGE NO. 876-D UNDER DECLARATION OF CLAIM NO. 925

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY *That* TOWN OF FIRCREST

of Tacoma, Washington *has filed in the office of the State Supervisor of Hydraulics of Washington Declaration of Claim No.* 925 *to withdraw ground waters of the State from a* Pump Well, *located within* Block A of Regents Park No. 2, Fircrest (NE¼ of SE¼ of Sec. 11, Twp. 20 N., Rge. 2 E.W.M.) *for the purpose of* municipal supply

The right to the use of said ground waters has been sustained and approved by the Supervisor of Hydraulics in accordance with Chapter 263, Laws of Washington for 1945, and is hereby entered of record in Volume 2 *of Ground Water Certificates at page* 876-D*; the right approved has a priority of* April 9, 1940*; the amount of water which the Declarant is entitled to withdraw for the aforesaid purpose is limited to the amount actually beneficially used and shall not exceed* 250 *gallons per minute;* 157 *acre-feet per year; and is appurtenant to the following described lands or place of use:*

Town of Fircrest, Pierce County,
State of Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 28th *day of* January, *19* 49

H. W. POLLOCK
State Supervisor of Hydraulics.

BY: [signature]

WELL 1

16

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Decla. 925
Cert. #876-D

Date Apr. 19, 1940

Record by George S. Masko

Source G. W. Decla. Claim

Location: State of WASHINGTON

County Pierce

Area

Map

NE ¼ SE ¼ sec 11 T. 20 N., R. 2 E. W.

DIAGRAM OF SECTION

Drilling Co.

Address

Method of Drilling drilled Date May 1948

Owner Town of Fircrest

Address Tacoma, Wash.

Land surface, datum ft. above / below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Soil	5	5
	Hardpan (glacial till)	57	62
	Sand	30	92
	Gravel	5	97
	Hardpan (glacial till)	5	102
	Gravel	26	128
Pump	Test:		
	Dim: 128' x 8"		
	SWL: 62'		
	Dd: 2'		
	Yield: 250 g.p.m.		
	Casing: 8" dia. from 0' to 128'.		
	Pump: Turbine		
	Motor: 25 hp, elctric		
	Perfor: ¼ x 2" from 108' to 128';		
	¼ x 2" from 62' to 97'.		

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up

Sheet 1 of sheets

ABANDONED

- **S4 (Well 2):**
  - Permanent Source *
  - Well in wellfield
  - 10"x 169'(WSP) 162' (WFI)
  - Capacity: 725 gpm
  - **Inactive** *

WELL 2
(ABANDONED)

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

☐ *Surface Water* (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ *Ground Water* (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

CERTIFICATE NUMBER	PERMIT NUMBER	APPLICATION NUMBER	PRIORITY DATE
G2-00862C	G2-00862P	11541	January 20, 1971

NAME
TOWN OF FIRCREST

ADDRESS (STREET) (CITY) (STATE) (ZIP CODE)
115 Ramsdell St Tacoma Washington 98466

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	100	65

QUANTITY, TYPE OF USE, PERIOD OF USE
65 acre-feet per year municipal supply continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
1480 feet north and 2[illegible] feet west from the southeast corner of Sec. 11

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
	11	20	2 E	14	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
33	40	Regents Park No. 2 within the Town of Fircrest

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

The Town of Fircrest within T. 20 N., R. 2 E.W.M.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

WELL 2

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

APPLICATION NO.	PRIORITY DATE OF APPLICATION
11541	January 20, 1971

NAME
TOWN OF FIRCREST

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
115 Ramsdell St	Tacoma	Washington	98466

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	100	65

QUANTITY, TYPE OF USE, PERIOD OF USE
65 acre-feet per year municipal supply continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWL
1480 feet north and 240 feet west from the southeast corner of Sec. 11

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
	11	20	2 E	14	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
33	40	Regents Park No. 2 within the Town of Fircrest

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

The Town of Fircrest within T. 20 N., R. 2 E.W.M.

(SEE REVERSE SIDE)

DESCRIPTION OF PROPOSED WORKS

well - 10" x 169'

WELL 2

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started	Completed	January 1, 1975

PROVISIONS AND RECOMMENDATIONS

"The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may, for his own convenience, wish to install an airline and gage in addition to the access port."

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the Assistant Secretary, Health Services Division prior to any new construction or alterations of a public water supply.

This application is filed on existing Well No. 2. The applicants have Ground Water Certificate No. 877-D for 500 gallons perminute, 315 acre-feet per year, on this well. Inasmuch as applicants pump 600 gallons per minute when pumping into lower storage, their projected annual pumping from this well is 380 acre-feet, this application can be approved for 100 gallons per minute, 65 acre-feet per year, as requested.

The existing neighboring wells are all owned by the Town of Fircrest.

The applicants operate 7 wells, numbered 2 through 8. Well No. 1 has been abandoned and the rights associated thereto are being transferred, through legal process, to Well No. 5.

The applicants have prior annual rights as follows:

File No.	Well No.	Acre-feet per year (Primary)	Acre-feet per year (Supplemental)
876-D	5	157	
877-D	2	315	
1322-A	3	123	
3150-A	5	193	595
4449-A	6	337	788
5374-A	7		400 *
200024-C	8	546	
		1671	1783

Additionally, applicants have Ground Water Application No. 11542 for 500 gallons per minute on existing Well No. 4.

The Town of Fircrest is unmetered and the average per capita use is 200 gallons per day. The town's service area is approaching 8000 persons which will place a demand of about 1792 acre-feet per year from the water system. Therefore, the rights associated with this filing will be primary.

* CERT #5374-A SHOWS 800 ACRE FT. -TW.

PROVISIONS

WELL 2

The access port, as required on your permit, shall be maintained at all times.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia, Washington, this 18th *day of* April, *19*75.

JOHN A. BIGGS, *Director*
Department of Ecology

ENGINEERING DATA

OK SP

by R. Jerry Mullen, Assistant Director

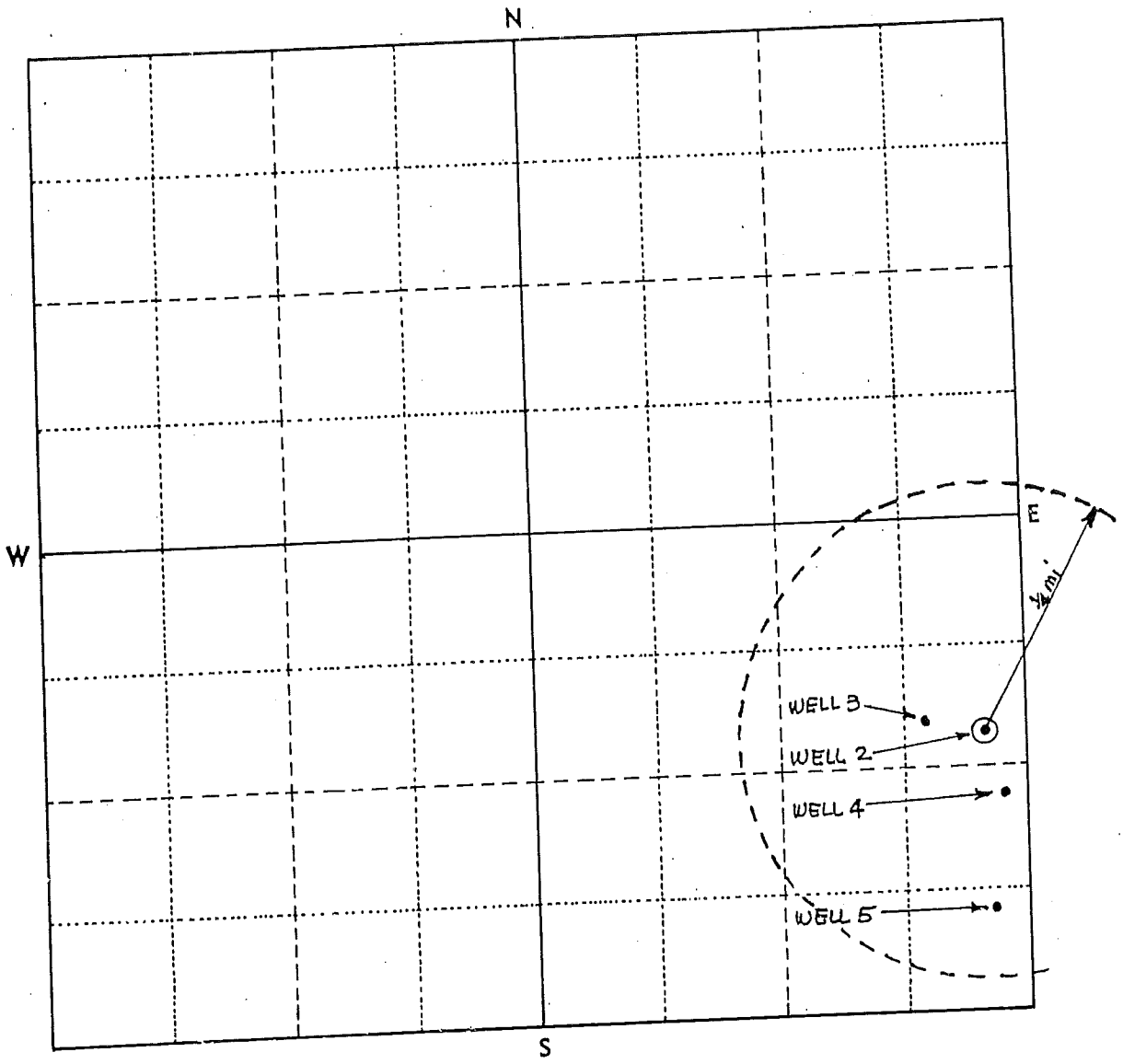
FOR COUNTY USE ONLY

WELL 2

S. F. No. 1854-A—OS

SECTION PLAT

Sec. 11 Twp. 20 N. R. 2EWM



1. Outline property described in application.
2. Show by a cross (X) the location of point of diversion (surface water source) or point of withdrawal (ground water source). For ground water applications, show by a circle (O) the locations of other wells or works within a quarter of a mile.
3. Indicate traveling directions from nearest town.

Scale: 1 inch = 800 feet (each small square = 10 acres)

TOWN OF FIRCREST, PIERCE COUNTY WASH

OFFICE 2

11541

Well #2

WELL 2 WAS ABANDONED UNDER CITY HALL

CERTIFICATE RECORD NO. 2 PAGE NO. 877-D UNDER DECLARATION OF CLAIM NO. 926

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY *That* TOWN OF FIRCREST

of Tacoma, Washington *has filed in the office of the State Supervisor of Hydraulics of Washington Declaration of Claim No.* 926 *to withdraw ground waters of the State from a* Pump Well, *located within* Lots 8 and 9, Block 40 of Regents Park No. 2, Fircrest (NE¼ of SE¼ of Sec. 11, Twp. 20 N., Rge. 2 E.W.M.) *for the purpose of* municipal supply

The right to the use of said ground waters has been sustained and approved by the Supervisor of Hydraulics in accordance with Chapter 263, Laws of Washington for 1945, and is hereby entered of record in Volume 2 *of Ground Water Certificates at page* 877-D*; the right approved has a priority of* June, 1941*; the amount of water which the Declarant is entitled to withdraw for the aforesaid purpose is limited to the amount actually beneficially used and shall not exceed* 500 *gallons per minute;* 315 *acre-feet per year; and is appurtenant to the following described lands or place of use:*

Town of Fircrest, Pierce County,
State of Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 28th *day of* January, 19 49

H. V. POLLOCK
State Supervisor of Hydraulics.

BY: Theo J. Pollock

REPORT OF FINDINGS ON GROUND WATER Decl. 926 WELL 2

NAME Town of Firerest 123 Summit Avenue, Tacoma

TYPE OF WORKS: Pump Well Date Of Examination June 2, 1948

Dimensions: 169' x 10" Progress of Works completed

QUANTITY Claimed ~~or Applied for~~ 500 g.p.m. 200 acre feet per year

LOCATION Lots 8 and 9, Block 40 of Regents Park #2, 11-20-2 E.W.M.

USE: Municipal Supply

Irrigation- acreage: Present _____ Planned _____ Feasible _____

Municipal: Population _____ as of _____

Industrial: _____

Time Pump Will be Operated: _____

Other Water Rights of Applicant: Decl. 925

Proximity to existing works, springs or streams:

None within ¼ mile

Water Bearing Zone: _____

RECOMMENDATIONS

Approved for 500 g.p.m. 315 acre-feet per year, subject to existing water rights. (1 acre-foot = 325,850 gallons)

The town of Firerest has two wells and uses 160,000 gallons a day for 8 months and 960,000 gallons a day for 4 months according to George Masko, General Superintendent of Utilities. This amounts to 472 acre-feet a year which is pro-rated to the two wells on basis of g.p.m. pumped as follows:

	g.p.m.	acre-feet/year
Decl. 925	250	157
Decl. 926	500	315
	Total	472

Signed this 3rd day of July, 1948.

Fred B. Roberts
Ground Water Geologist

WELL 2

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Decla. #926
Cert. #877-D

Date May 20, 1941
Record by George S. Masko
Source G. W. Decla Claim

Location: State of WASHINGTON
County Pierce
Area
Map
NE ¼SE ¼ sec. 11 T. 20 N., R. 2 E. W.

DIAGRAM OF SECTION

Drilling Co.
Address
Method of Drilling drilled Date Mar 1948
Owner Town of Fircrest
Address Tacoma, Wash.
Land surface, datum ft. above / below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Soil	5	5
	Hardpan	30	35
	Sand, water bearing	2	37
	Hardpan	33	70
	Clay and sand	31	101
	Gravel, small; water-bearing	2	103
	Gravel, coarse & fine sand	11	114
	Gravel, small & sand	2	116
	Sand	3	119
	Gravel & sand	11	130
	Gravel, coarse; some sand	10	140
	Gravel, small & sand	8	148
	Gravel, coarse	18	166
	Gravel, small & sand	3	169

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up (Over)

Sheet of sheets

Well #2

CROWN

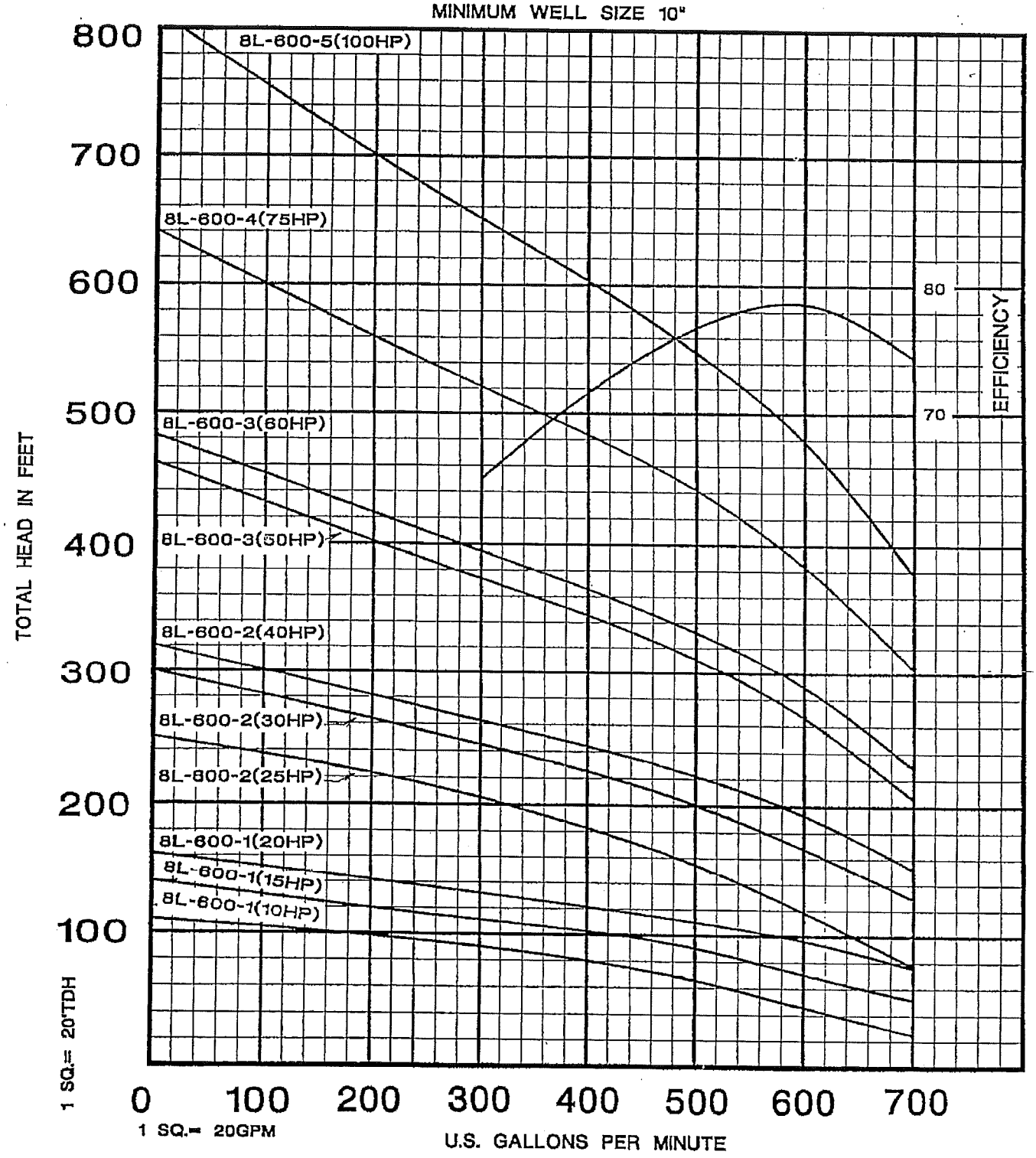
8L-600

FROM RICHARDSON'S RECORDS TO JWMA

MODEL 8L-600

PERFORMANCE CHARACTERISTICS

MINIMUM WELL SIZE 10"



CROWN CROWN PUMP CORPORATION , HIGHWAY 16 & BIVAR , DE LEON , TEXAS

MODEL 8L-600

GENERAL DATA

RPM: 3500 NOMINAL, 60HZ.
MAX. O.D. W/CABLE GUARD 8 1/2"
MINIMUM WELL SIZE 10"
DISCHARGE SIZE: 6" STANDARD

BOWLS : CAST IRON
IMPELLERS : BRONZE
SHAFT : STAINLESS STEEL

IMPELLER DATA

IMPELLER NO.: 812
TYPE : ENCLOSED
EFFECTIVE EYE AREA : 9.6 SQ.IN
TRIM DIAMETER
A - 6.500"
B - 6.050"
C - 5.735"
D -
E -

THRUST CONSTANT K: 4.5
NO. OF VANES : 6
IMPELLER SKIRT CLEARANCE : .015"
EFFICIENCY CORRECTION
1 STAGE - 3%
2 STAGE - 2%
3 STAGE - 0%
4 STAGE -

BOWL DATA

BOWL NO. : 811
DIAMETER : 8."
CONNECTION : FLANGED

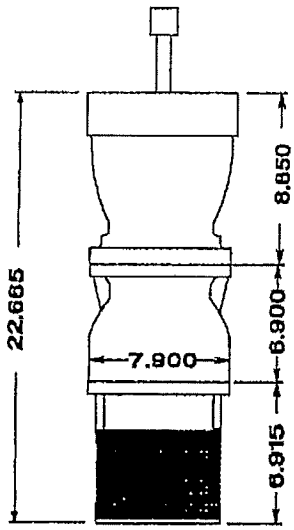
SHAFT BEARING CLEARANCE : .010"
BEARING MATERIAL: CUTLESS RUBBER
PUMP SHAFT DIAMETER : 1"

SPECIAL MATERIALS AVAILABLE - CONTACT FACTORY

NOTE: EFFICIENCY PERFORMANCE BASED ON A-TRIM, CAST IRON BOWLS, POLISHED BRONZE IMPELLERS, AND 6 FEET SUBMERGENCE.

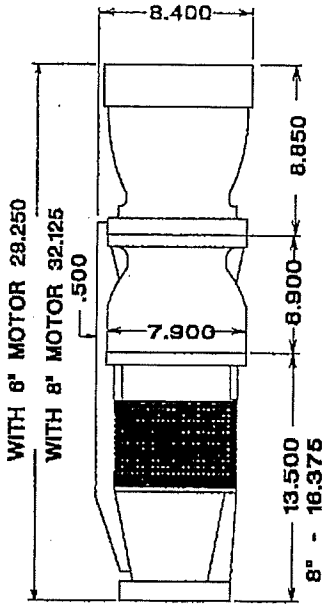
THIS CHARACTERISTIC CURVE IS BASED ON FACTORY TESTS WHEN PUMPING CLEAR, NONAERATED WATER AT A TEMPERATURE NOT EXCEEDING 85 F. AND UNDER SUCTION CONDITIONS AS INDICATED. SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
PUMP PERFORMANCE RATING IS FOR THE DESIGNATED POINT ONLY AND IS SUBJECT TO TEST TOLERANCES AND PROCEDURES AS SPECIFIED IN THE STANDARD OF THE HYDRAULIC INSTITUTE.

DISCHARGES AVAILABLE
5" FEMALE
6" MALE
8" FEMALE



WEIGHT
1 STAGE PUMP : 90#
ADD. STAGE : 37#

VERTICAL TURBINE



DISCHARGES AVAILABLE
5" FEMALE
6" MALE
8" FEMALE

WEIGHT
1 STAGE PUMP : 102#
ADD. STAGE : 37#

SUBMERSIBLE

Well #3

CERTIFICATE RECORD No. 3 PAGE No. 1322-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That TOWN OF FIRCREST

Via Tacoma, Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a* well *located within* the $E\frac{1}{2}$ of $SE\frac{1}{4}$ of $SE\frac{1}{4}$, Sec. 11, Twp. 20 N., Rge. 2 E.W.M.

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 1389 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is herby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 3 *at page* 1322-A; *that the right hereby confirmed dates from* May 8, 1950; *that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 1000 gallons per minute; 123 acre-feet per year. ~~xxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~

A description of the lands to which such ground water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

Town of Fircrest, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 31st *day of* December, 19 52.

[signature]

State Supervisor of Water Resources

WELL 3?

REPORT OF FINDINGS ON GROUND WATER Appli. 1505

NAME Town of Fircrest, c/o D.F. Crammond ADDRESS 123 Summit, via Tacoma

TYPE OF WORKS: well Date of Examination 6-7-50

Dimensions: 12" x 100'/150' Progress of Works started

QUANTITY ~~Maximum~~
Applied for: 1,000 g.p.m. 230 acre-feet per year

LEGAL SUB. SE¼SE¼ Sec. 11 Twp. 20 N Rge. 2E. County Pierce

USE: Municipal

Irrigation - acreage: Present Planned Feasible

Municipal: Population 1400 as of 1950

Industrial:

Time Pump Will be Operated: July, August, September

Other Water Rights of Applicant:

Proximity to existing works, springs or streams:

Area Sub-Area Zone

RECOMMENDATIONS

Approved for 1,000 g.p.m. ~~193~~ acre-feet per year, subject to existing water rights.(1 acre-foot = 325,850 gallons)

According to Mr. Geo. Masko, general superintendant the town needs to pump an additional 250 g.p.m. for 17 hours a day for the four warmer months and 40,000 gallons more a day for the eight colder months. This will produce 94 acre-feet and 29 acre-feet annually respectively. This use in addition to the 472 acre-feet used under Declarations of Claim 925 and 926.
As the water users are not metered the use of water is two to three times greater than in metered districts for the same population. Thus to boost the amount of water for the town the installation of meters would help greatly.
The applicant will furnish information to this office as to the size and type of equipment installed and the gallons per minute furnished. The installation of an access port to well, as described in attached Ground Water Bulletin No. 1, is recommended.

Signed this _____ day of June, 1950.

FBR & PHR

FRED B. ROBERTS
Ground Water Geologist

WELL 3?
WELL NO. 3

2376347

RECEIVED
DEPARTMENT OF ECOLOGY
FEB 1 1971
AM PM
8,9,10,11,12,1,2,3,4,5,6

PARTIAL
RELINQUISHMENT OF
Certificate Record No. 3, Page No. 1322-A
State of Washington, County of Pierce
CERTIFICATE OF (GROUND) (~~SURFACE~~) WATER RIGHT

1. The undersigned Town of Fircrest ~~and~~ --- (is) ~~(are)~~ the holder ~~(s)~~ of a certificate of (ground) ~~(surface)~~ water right No. 1322-A, dated May 8, 1950, issued by the Supervisor of Water Resources ~~(or Hydraulics)~~.

2. Said certificate authorizes withdrawal of public waters of the State of Washington for use for Municipal Supply; Well 3; 1000 GPM, 123 A.F./Yr. Pumping tests indicate the well to be capable of only 400 GPM, at 123 A.F./Yr. therefore 600 GPM of the right is excessive.
(if more space is required, attach separate sheet)

3. The undersigned (has) ~~(have)~~ no further requirement for the rights to withdraw, utilize, and put to beneficial use the waters embodied in said certificate that are excessive.

4. The undersigned (has) ~~(have)~~ not assigned or otherwise transferred the excessive right embodied in said certificate.

5. The undersigned therefore convey ~~(s)~~, quitclaim ~~(s)~~, and relinquish ~~(es)~~ all excessive rights embodied in said certificate of (ground) ~~(surface)~~ water right No. 1322-A to the State of Washington.

6. It is understood this document shall be recorded by the State of Washington in the county or counties wherein the lands affected by said right are located.

Dated this 14th day of January, 19 71.

Donald Asbjornsen
(Wife)
Mayor - TOWN OF FIRCREST

(Husband)

State of Washington)
County of Pierce) ss.

On this day personally appeared before me Donald Asbjornsen to me known to be the individual, or individuals described in and who executed the within and foregoing instrument, and acknowledged that he signed the same as Mayor - Town of Fircrest free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this 14th day of January, 19 71

Notary Public in and for the State of Washington residing in Pierce County - Fircrest, Tacoma

Ord. for Partial Relinquishment
End.

Filed for record January 22 1971 10 30 a m
Request of Wash State of - Dept of Ecology
Richard A. Greco, Pierce County Auditor

WELL 3

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Appli. #1505
Cert. #1322-A

Date Sept. 15, 1950

Record by Pete Sylte

Source Driller's Record

Location: State of WASHINGTON

County Pierce

Area

Map

E½SE¼ SE¼ sec. 11 T. 20 N., R. 2 E. W.

DIAGRAM OF SECTION

Drilling Co. Pete Sylte

Address 7428 So. Sheridan, Tacoma, Wn.

Method of Drilling Drilled Date Sept. 1 1950

Owner Town of Fircrest

Address Fircrest, Wash.

Land surface, datum ft. above / below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Top soil	0	1½
	Hardpan	17½	19
	Dry sand & gravel	10	29
	Dry sand, some clay	33	62
	Sand & gravel (little water - just wet)	5	67
	Coarse sand (little water)	1	68
	Clay & sand	5	73
	Coarse sand (little water)	1	74
	Clay & sand	9	83
	Cemented gravel	5	88
	Gravel & sand (good flow of water)	6	94
	Sand (small flow of water)	10	104
	Cemented sand & gravel	2	106
	Gravel (good flow of water)	1	107

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up (over)

Sheet of sheets

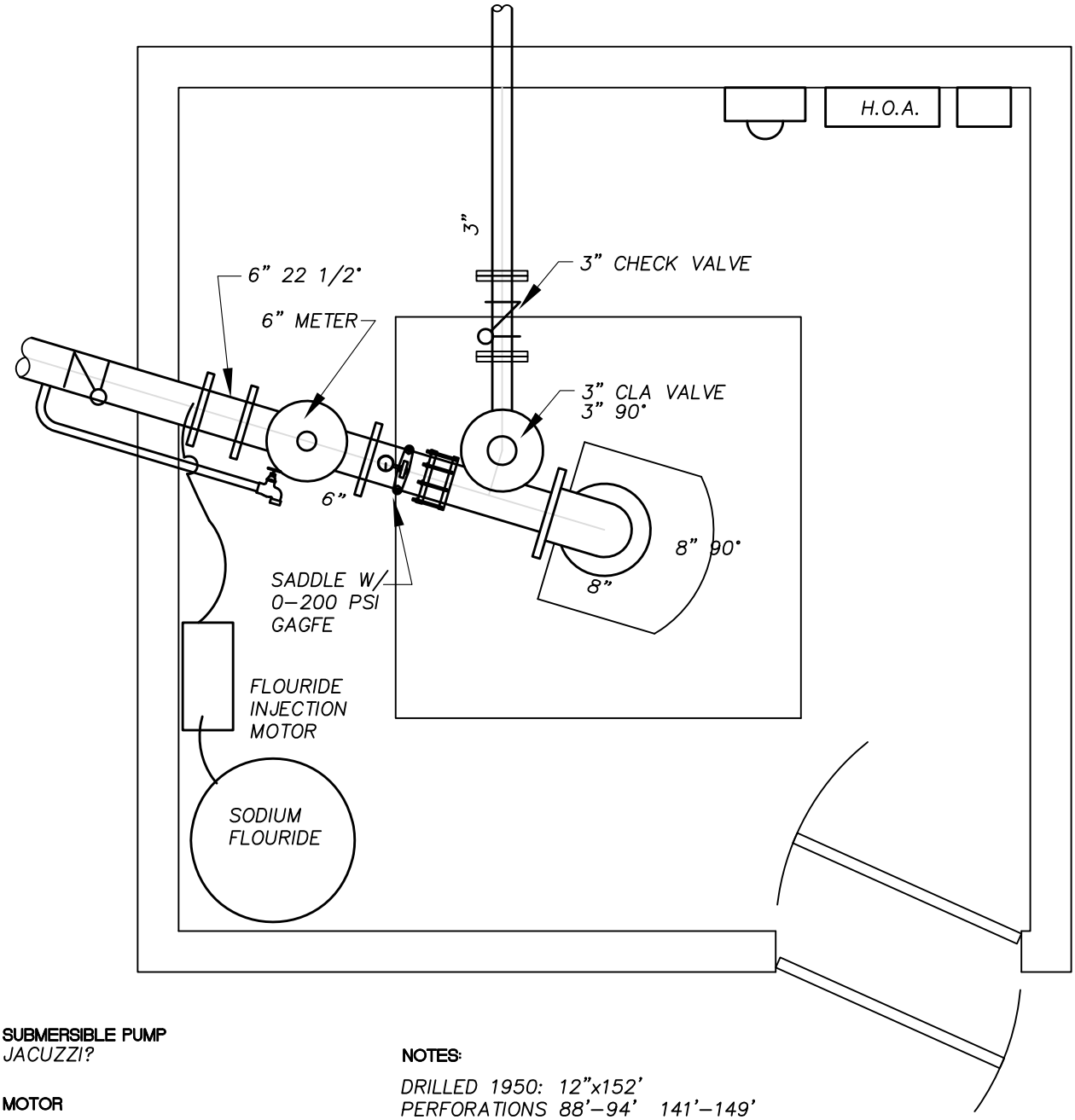
11R

WELL LOG.—Continued

No. Appl. #1505
Cert. #1322-A

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Depth forward	——	
	Cemented gravel	6	113
	Clay, sand & gravel	8	121
	Gravel & sand (good flow of water)	1	122
	Cemented gravel	6	128
	Sand & gravel (good flow of water)	2	130
	Sand	4	134
	Cemented gravel	7	141
	Gravel (good flow of water)	8	149
	Cemented gravel	1	150
	Dry sand & clay	2	152
	Pump Test:		
	Dim.: 152' deep; 12" diam.		
	SWL: 49'		
	DD: 8'		
	Yield: 525 g.p.m.		
	Casing: 12" diam. from 0 to 152'		
	Perfs.:(24 holes per ft. 3/8 x2) from 141' to 149'		

S.F. 7449-46 REMINGTON INC-20 20 745-24



SUBMERSIBLE PUMP
JACUZZI?

MOTOR
MOTOR: TYPE VCTI
FORM: KK
DATE: M 85
HP: 60
HZ: 60
RPM: 3470
AMP: 77
HITACHI INDUCTION NO. 3689
MF # 689276E
SFA 88
S.F. 1.15

METER
NEPTUNE TRIDENT
70005297
6" HPT 695 3027

NOTES:
DRILLED 1950: 12"x152'
PERFORATIONS 88'-94' 141'-149'

PUMPS ON WHEN
RESERVOIR IS AT 79%

CAPACITY 525 GPM

IN WELLFIELD

D.O.E.
UNIQUE WELL # AEF 223
CERTIFICATE NO. G2-00863C
PERMIT NO. G2-00863P
APPLICATION NO. 11542
PRIORITY DATE JAN 20, 1971

DEFICIENCIES
3" IS TIGHTLINED TO STORM MANHOLE

NO VENT

NO SURFACE SEAL ON WELL LOG

JWM&A Civil • Municipal • Geotechnical Engineering and Planning
Jerome W. Morrissette & Associates Inc., P.S.
1700 Cooper Point Road SW, #B-2, Olympia, WA 98502-1110 • (360) 352-9456 • FAX (360) 352-9990

WELL 4
SO 1 - WELLFIELD
SO 5 INDIVIDUAL

CITY OF FIRCREST
DOH # 25150 T

STATE OF WASHINGTON 2599745 MAY 1 1975

DEPARTMENT OF ECOLOGY

WELL 4

CERTIFICATE OF WATER RIGHT

☐ *Surface Water* (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ *Ground Water* (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

CERTIFICATE NUMBER	PERMIT NUMBER	APPLICATION NUMBER	PRIORITY DATE
G2-00863C	G2-00863P	11542	January 20, 1971

NAME

TOWN OF FIRCREST

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
115 Ramsdell St	Tacoma	Washington	98466

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown.

PUBLIC WATER TO BE APPROPRIATED

SOURCE

well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	500	200

QUANTITY, TYPE OF USE, PERIOD OF USE

200 acre-feet per year municipal supply continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL

150 feet west and 1210 feet north from the southeast corner of Sec. 11

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SE¼SE¼	11	20	2 E	14	Pierce

within the Town of Fircrest

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by the Town of Fircrest.

PROVISIONS

WELL 4

The access port, as required on your permit, shall be maintained at all times.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia, Washington, this 28th *day of* March, *19*75.

JOHN A. BIGGS, *Director*
Department of Ecology

by R. Jerry Kellen, Assistant Director

ENGINEERING DATA
OK

FOR COUNTY USE ONLY

DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

WELL 4

☐ SURFACE WATER ☒ GROUND WATER

APPLICATION NO.	PRIORITY DATE OF APPLICATION
11542	January 20, 1971

NAME
TOWN OF FIRCREST

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
115 Rundell St	Tacoma	Washington	98466

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	500	200

QUANTITY, TYPE OF USE, PERIOD OF USE
200 acre-feet per year municipal supply continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
150 feet west and 1210 feet north from the southeast corner of Sec. 11

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE E. OR W. OF W.M.	W.R.I.A.	COUNTY
NE¼SW¼SE¼	11	20	2 E	14	Pierce

within the Town of Fircrest

RECORDED PLATTED PROPERTY

LOT	BLOCK	OR (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by the Town of Fircrest.

(SEE REVERSE SIDE)

DESCRIPTION OF PROPOSED WORKS

WELL 4

Well - 12" x 152'

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started	Completed	January 1, 1975

PROVISIONS AND RECOMMENDATIONS

"The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may, for his own convenience, wish to install an airline and gage in addition to the access port."

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the Assistant Secretary, Health Services Division prior to any new construction or alterations of a public water supply.

This application is filed on Well No. 4 which has been in existance since 1950. When the town made application on Well No. 3 in early 1950, an alternate well site was selected. As Well No. 3 did not produce as well as expected, another well was drilled at the alternate site which became Well No. 4.

Well No. 4 is equipped with a 40 HP turbine and pumps 500 gallons per minute.

The existing neighboring wells are owned by the Town of Fircrest.

The applicants operate 7 wells, numbered 2 through 8. Well No. 1 has been abandoned and the rights associated thereto are being transferred, through legal process, to Well No. 5.

The applicants have prior annual rights as follows:

File No.	Well No.	Acre-feet per year (Primary)	Acre-feet per year Supplemental
876-D	5	157	
877-D	2	315	
1327-A	3	123	
3150-A	5	193	595
4449-A	6	337	788
5374-A	7		400
200074-C	8	546	
CWA-11541 *	1	69	
		1734	1783

5374-A SHOWS 800

The Town of Fircrest is unmetered and the average per capita use is 200 gallons per day. The town's service area is approaching 8000 persons which will place a demand of about 1792 acre-feet per year from the water system. The requested annual quantity of 200 acre-feet will insure coverage of present demands and allow for some future increases. Therefore, this application will be considered primary.

* CERT # G2-00862C

Additionally, the permit when issued shall carry the following provision: "Nothing in this permit shall be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations including those administered by local agencies under the Shoreline Management Act of 1971."

Signed at Olympia, Washington,
this 5 day of Feb, 1974.

DIXY WOOD, Resources Management
Department of Ecology

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT WELL 4

STATE OF WASHINGTON

Application No. 11542

Permit No. G2-00863P

(1) OWNER: Name TOWN of FIRCREST Address 115 Ramsdell Street 98466

(2) LOCATION OF WELL: County Pierce NE¼ SE¼ SE¼ Sec. 11 T. 20 N., R. 2E W.M.

Bearing and distance from section or subdivision corner 150 feet W and 1,210 feet N of SE cor. Sec. 11

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) .... #4
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☒
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 12 inches.
Drilled 152 ft. Depth of completed well 152 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 12" Diam. from 0 ft. to 152 ft.
Threaded ☐ ." Diam. from ft. to ft.
Welded ☒ ." Diam. from ft. to ft.

Perforations: Yes ☒ No ☐
Type of perforator used
SIZE of perforations 3/8 in. by 2 in.
156 perforations from 88 ft. to 94 ft.
192 perforations from 141 ft. to 149 ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☐ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☐ No ☐ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name *
Type: Vertical Turbine H.P. 40

(8) WATER LEVELS: Land-surface elevation above mean sea level.... ft.
Static level 49 ft. below top of well Date 8-29-50
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Fircrest
Yield: 525 gal./min. with 8 ft. drawdown after 9 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test 9-1-50
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Top Soil	0	1½
Hard Pan	1½	19
Dry Sand and Gravel	19	29
Dry Sand some Clay	29	62
Sand and Gravel (just wet)	62	67
Coarse Sand (little water)	67	68
Clay and Sand	68	73
Coarse Sand (little water)	73	74
Clay and Sand	74	83
Cemented Gravel	83	88
Gravel and Sand (good flow)	88	94
Sand (small Flow)	94	104
Cemented Sand and Gravel	104	106
Gravel (good flow)	106	107
Cemented Gravel	107	113
Clay Sand and Gravel	113	121
Gravel and Sand (good flow)	121	122
Cemented Gravel	122	128
Sand and Gravel (good flow)	128	130
Sand	130	134
Cemented Gravel	134	141
Gravel (good flow)	141	149
Cemented Gravel	149	150
Dry Sand and Clay	150	152
Bottom of Well		

RECEIVED
MAR 18 1975
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started ....., 19..... Completed ....., 19.....

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

DRILLER NAME Pete Sylte Well Drilling Co.
(Person, firm, or corporation) (Type or print)

Address Spanaway, Washington

[Signed] (Deceased)
(Well Driller)

License No. Date ....., 19.....

* ALL VERT. TURBINES REPLACED

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

Fircrest, Washington

WELL 4

OFFICE of the CLERK

SMALLW WELL ~~#1 BLOCK 10~~ 3

~~Depth 128' 6"~~
~~Distance to top of water 50 ft.~~
~~Water in well 78' 6"~~
~~After~~ crushed rock was put in well Depth is 121 ft.

40 HP Fairbanks Pump - well #4 MOTOR REMOVED - PUMP?

Pump as is in well
Motor and base
5 ft section bolted to base 5 ft.
7 (10ft) sections screwed R.H. 70 ft.
9 (8" stages) 5 ft.
1 suction and screen 10 ft.
1 top shaft 7'9¼" (### (1-1/8 threads
1 shaft L.H. 5 ft.
7 long shafts (L. H. 70 ft.
8 rubber bearings

90 ft to Bottom of Screen

When pump was put in well #4 two ten ft. sections were left out, leaving 70 ft to bottom of screen.
water in well #4 is 52 ft, from top of well, leaving end of screen 18 ft under water.

5
5
70
10

LOG - Well No. 4

0	-	1½ Ft	-	Top Soil
1½	-	19	-	Hard Pan
19	-	29	-	Dry Sand and Gravel
29	-	62	-	Dry Sand, some clay
62	-	67	-	Sand and Gravel, (Little bit of water - just wet)
67	-	68	-	Coarse Sand - Little Water
68	-	73	-	Clay and Sand
73	-	74	-	Coarse Sand - Little Water
74	-	83	-	Clay and Sand
83	-	88	-	Cemented Gravel
88	-	94	-	Gravel and Sand (Good flow of water)
94	-	104	-	Sand (Small flow of water)
104	-	106	-	Cemented Sand and Gravel
106	-	107	-	Gravel (Good flow of water)
107	-	113	-	Cemented Gravel
113	-	121	-	Clay, Sand & Gravel
121	-	122	-	Gravel and Sand (Good Flow of Water)
122	-	128	-	Cemented Gravel
128	-	130	-	Sand and Gravel (Good Flow of Water)
130	-	134	-	Sand
134	-	141	-	Cemented Gravel
141	-	149	-	Gravel (Good Flow of Water)
149	-	150	-	Cemented Gravel
150	-	152	-	Dry Sand & Clay

BOTTOM OF WELL

192 Holes 3/8 x 2 from 141 Ft to 149 Ft.

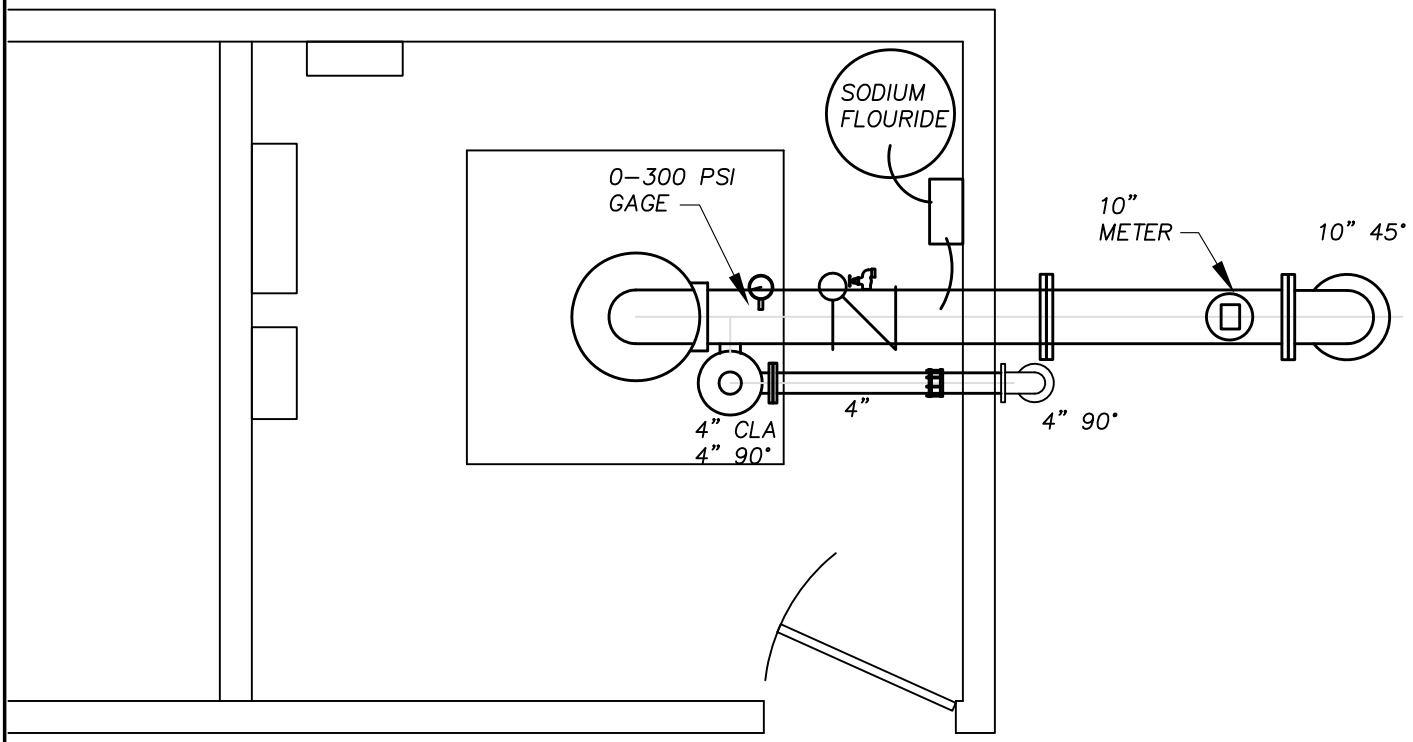
156 Holes 3/8 x 2 from 88 Ft. to 94 Ft.

Water Level is 49 Ft. from surface before pumping.
8 Ft. draw down after 9 hours continued pumping at 525 gal. per min.

6" Hole drilled to 85 Ft. (along side 12") Gravel packed with 17 yards 5/8 gravel.

12" Casing

40 H. P. Fairbanks Morse Pump and Motor



SUBMERSIBLE PUMP
FAIRBANKS MORSE POMONA TURBINE PUMP
A2A2914 FIG #6977

MOTOR
MODEL: SK6324XA16C
HP: 150
SERVICE FACTOR: 1.5@ RATED V 60
TYPE: TYPE:
CODE: CODE:
FRAME: FRAME:
PH: 3
VOLTS:
40/50C RISE
CONT @ 60/50 CY
60 CY FL AMP 177
FL SPEED 1775
50 CY FL AMP 190
FL SPEED 1480
NJJ6949564
TRI CLAD INDUCTION MOTOR

METER
10" 124810 SPARLING

NOTES:
DRILLED 1958 12"x136'
PERFORATIONS 102'–136'

CAPACITY 1100 GPM

IN WELLFIELD

RUNS 1/MO @ APPROX. 6,000 GAL FOR SAMPLE ONLY

D.O.E.
UNIQUE WELL # AAD 995

CERTIFICATE NO. 3150–A
PERMIT NO. 4542

PRIORITY DATE APRIL 17, 1958

THIS WATER RIGHT IS IN PROCESS
OF BEING SUPERSEDED – SEPT. 22, 2000

DEFICIENCIES
2 VENTS ARE NOT SCREENED

JWM&A Civil • Municipal • Geotechnical Engineering and Planning
Jerome W. Morrissette & Associates Inc., P.S.
1700 Cooper Point Road SW, #B-2, Olympia, WA 98502-1110 • (360) 352-9456 • FAX (360) 352-9990

WELL 5
SO 1 WELLFIELD
SO1 6 INDIVIDUAL

CITY OF FIRCREST
DOH # 25150 T

00107-2WELLS | SHT 1 OF 1

City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467
RECORDING # 200010180391

WELLS 5&9

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE OF WASHINGTON
CERTIFICATE OF WATER RIGHT
SUPERSEDING

Document Title: Certificate of Water Right

Agency: Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Applicant: City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467

Reference Number:

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
April 17, 1958	4832	4542	3150

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	TRIBUTARY OF (IF SURFACE WATERS)
Well 5 & Well 9	

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	1000	788

QUANTITY/TYPE OF USE/PERIOD OF USE

788 Acre-feet per year | Municipal supply | Year-round, as needed

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
E½ E½ SW¼	11	20	2E	12	Pierce

PARCEL # 7160200380

ADDITIONAL LEGAL IS ON PAGE 2

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

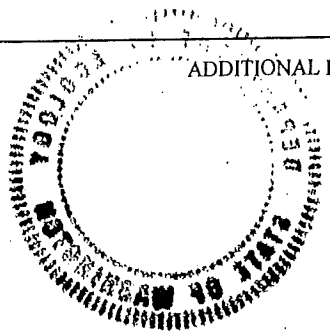
1/4 ¼	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
N/A	N/A	N/A	N/A	12	Pierce

PARCEL # N/A

ADDITIONAL LEGAL IS ON PAGE 2

COPY

1st page



City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467
RECORDING # 200010180392

WELLS 5&9

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE OF WASHINGTON
CERTIFICATE OF WATER RIGHT
SUPERSEDING

Document Title: Certificate of Water Right

Agency: Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Applicant: City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467

Reference Number:

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
April 9, 1940	Declaration of Claim	925	876-D

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	TRIBUTARY OF (IF SURFACE WATERS)
Well 5 & Well 9	

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	250	157

QUANTITY/TYPE OF USE/PERIOD OF USE

157 Acre-feet per year Muncipal supply Year-round, as needed

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

I/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
E½ E½ SE¼	11	20	2E	12	Pierce

PARCEL # 7160200380

ADDITIONAL LEGAL IS ON PAGE 2

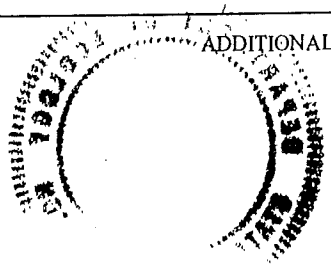
LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

I/4 ¼	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
N/A	N/A	N/A	N/A	12	Pierce

PARCEL # N/A

ADDITIONAL LEGAL IS ON PAGE 2

COPY of 1st page



Well #5

WELL 5 IS CLOSE TO TACOMA LANDFILL PLUME & IS USED FOR EMERGENCY ONLY. SUPERSEDED

CERTIFICATE RECORD NO. 7 PAGE NO. 3150-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY *That* TOWN OF FIRCREST

of Tacoma, Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a* well

located within the SE¼SE¼

of Sec. 11, *Twp.* 20 *N., R.* 2 E. *W. M.,*

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 4542 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 7 *at page* 3150-A;

that the right hereby confirmed dates from April 17, 1958; *that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 1000 gallons per minute; 788 acre-feet per year for municipal supply.

A description of the lands to which such ground water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

Town of Fircrest, Pierce County, Washington.

193 primary
595 secondary

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 22d *day of* August, *19* 58.

M G Walker

State Supervisor of Water Resources.

STATE PRINTING PLANT OLYMPIA, WASH., 1957

WELL 5

Report of Examination on Ground Water

Received date 4-17-58 Date of exam. 6-23-58 Appli. No. 4832

Name Town of Fircrest Address 115 Ramsdell St. Tacoma 66, Wash.

Type of works well Dimensions 12"x200'

Progress of works well completed - not in use at present

Quantity applied for 1000 g.p.m. acre-feet per year

Legal sub SE¼SE¼ Sec. 11 Twp. 20 N. Rge. 2 E. County Pierce

Use municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population Fircrest 3500 as of 1960

Industrial

Time pump will be operated continuously

Other water rights appurtenant to this land Cert. #876-D, 877-D, 1322-A

Proximity to existing works, springs, wells, or streams: Town of Fircrest Well #2, N. 700 ft., #3, NW 800 ft., #4 N. 400 ft., Fred Holly SW 425 ft., University Place wells SW 1250 ft.

Area Sub-area Zone

RECOMMENDATIONS

Approved for 1000 g.p.m. 788 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The water requirements have been based on 200 gpd per person or a total of 788 acre-feet annually for a proposed population of 3500 as of 1960.

The Town of Fircrest holds three other water rights: Cert. 876-D for 250 gpm and 157 acre-feet annually; Cert. 877-D for 500 gpm and 315 acre-feet annually and Cert. 1322-A for 1000 gpm and 123 acre-feet annually or a total of 595 acre-feet annually. This leaves a deficit of 193 acre-feet which will probably be supplied by this new well. However, since the capacity of this well at 1000 gpm is actually great enough to supply all the requirements of the city if in continuous operation, it is thought that the permit should issue as recommended for the entire 788 acre-feet annually less any amount withdrawn from the other city wells such that the combined total withdrawal shall not exceed the recommended 788 acre-feet per year.

The close proximity of neighboring wells has been noted, but it appears that at the present time none of the neighboring wells will be adversely affected. Mr. George Masko, water superintendent, has reported that while pumping this new well at approximately 2200 gpm, the effect on the University Place well was negligible.

The installation of an access port to well as described in attached Ground Water Bulletin No. 1 is recommended.

The applicant will furnish information to this office as to the size and type of equipment installed and the gallons per minute furnished. The size of hole openings and number of sprinklers operated, if such be the case, will give this information.

Signed this 26th day of June, 1958.

Eugene F. Wallace

EUGENE F. WALLACE, Geologist
Division of Water Resources

AUG 9 1974

Well #1

Well #5

2564776

CERTIFICATE OF CHANGE OF PLACE OF WITHDRAWAL OF WATER

In accordance with the provisions of Chapter 263, Laws of Washington, for 1945, and the regulations of the State Director of Ecology.

THIS IS TO CERTIFY That the Town of Fircrest, Washington, has complied with all of the requirements of the Revised Code of Washington 90.44.100 and is hereby granted the right to change the place of withdrawal of 250 gallons per minute, 157 acre-feet per year, of the waters of a well as granted in Ground Water Certificate No. 876-D.

That such water had been used for the purpose of municipal supply and had been withdrawn from a well at a point situated in Block A of Regents Park No. 2, Fircrest ($NE\frac{1}{4}SE\frac{1}{4}$) of Section 11, Township 20 North, Range 2 East W.M.

That such water is being used for the purpose of municipal supply and that they have changed the point of withdrawal to a point situated approximately 740 feet north and 150 feet west from the southeast corner of Section 11, being within the $SE\frac{1}{4}SE\frac{1}{4}$ of Section 11, Township 20 North, Range 2 East W.M. within the Town of Fircrest, Pierce County, Washington.

Given under my hand and seal of this office at Olympia, Washington, this 5th day of July, 1974.

DEPARTMENT OF ECOLOGY STATE OF WASHINGTON

R. JERRY BOLLEN, Assistant Director
Office of Operations

RECORDED:

Volume I-2, pp 47
Certificates of Change

Filed for record JUL 31 1974 11 am
Request of Town of Fircrest
Richard A. Greco, Pierce County Auditor

WELL 5

17

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Appli. #4832
Cert. 3150-A

Date 5-7, 1958

Record by Well driller

Source driller's record

Location: State of WASHINGTON

County Pierce

Area

Map

SE ¼ SE ¼ sec. 11 T. 20 N., R. 2 E. W.

Diagram of Section

Drilling Co. Pete Sylte

Address Spanaway, Wash.

Method of Drilling Date, 19

Owner Town of Fircrest, Washington

Address

Land surface, datum ft. above / below

Correlation	Material	Thickness (feet)	Depth (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Sandy top soil	3	3
	Hardpan	20	23
	Dry Packed sand & gravel	19	42
	Dry sand	22	64
	Hard dry sand & clay	3	67
	Sand small flow water	17	84
	Cemented sand & gravel	6	90
	Gravel & sand good flow water	3	93
	Cemented gravel	7	100
	Gravel & sand good	4	104
	Sand	1	105
	Gravel & sand G.F.W.	5	110
	Cemented gravel	2	112
	Gravel & sand G.F.W.	24	136
	PUMP TEST:		
	Dim. 137'x12"		
	SWL: 55 ft.		

Turn up (over)

Sheet of sheets

Fircrest, Washington

21.20.05

TOTAL of 864 slots 1/4 x 6
Screen 36' 8"

Log of Well # 5

0 to 3' = 3 ft - Top Soil + Sand
3 to 23' = 20 ft - Hard Pan
23 to 42 = 19 ft - Sand + Gravel
42 to 64 = 22 ft - Dry Sand
64 to 67 = 3 ft - Hard Dry Sand + Clay
67 to 84 = 17 ft - Sand + Water
84 to 90 = 6 ft - Cemented Sand + Gravel
90 to 93 = 3 ft - Gravel + Sand (good flow water)
93 to 100 = 7 ft - Cemented Gravel
100 to 104 = 4 ft - Gravel + Sand (good flow water)
104 to 105 - 1 ft - Water + Sand
105 to 110 = 5 ft - Gravel + Sand (good flow water)
110 to 112 2 ft - Hard Cemented Sand + Gravel
112 to 136 = 24 ft Gravel + Sand

136 ft. good flow water

water Level 54 ft from top of Ground on
10" Pipe Screen 24 slots 1/4 x 6 every foot

Water Level 55 ft. 600 G.P.M.

9:30 - 55 ft. to 57.6	700 G.P.M.
9:40 - 57.6 to 58.5	743 G.P.M.
9:45 - 58.5 to 59.00	825 G.P.M.
9:55 - 59.0 to 59.7	900 G.P.M.
10:00 - 59.7 to 60.2	1000 G.P.M.
10:15 - 60.2 to 61.0	1100 G.P.M.
10:30 - 61.0 to 62.00	1200 G.P.M.
10:50 - 62.0 to 62.8	1250 G.P.M.
11:10 - 62.8 to 63.5	
11:50 - 63.6	
1:15 - 63.9	
1:30 - 62.5 at 1200 G.P.M.	
3:15 - 61.5 at 1100 "	
4:30 - 62.5 at 1200 "	
.00 - 62.5 at 1200 "	

Water recovery $\frac{1}{2}$ minute

PUMP #5

When setting 150 hp water pump #5, let shaft down till it can't be turned by turning top nut counter clockwise then turn nut 5 flats of the hex nut clockwise. Then pump will produce 1550 gal. per minute with pressure gauge reading 134 lbs. and each leg of 440 lead reads 190 amps.

If nut is turned clockwise 8 flats from start, then pump will produce 1200 gal per minute with pressure at 116 lbs. and each leg of 440 lead to motor reads 160 amps.

This is where pump was set June 7, 1959.

1958

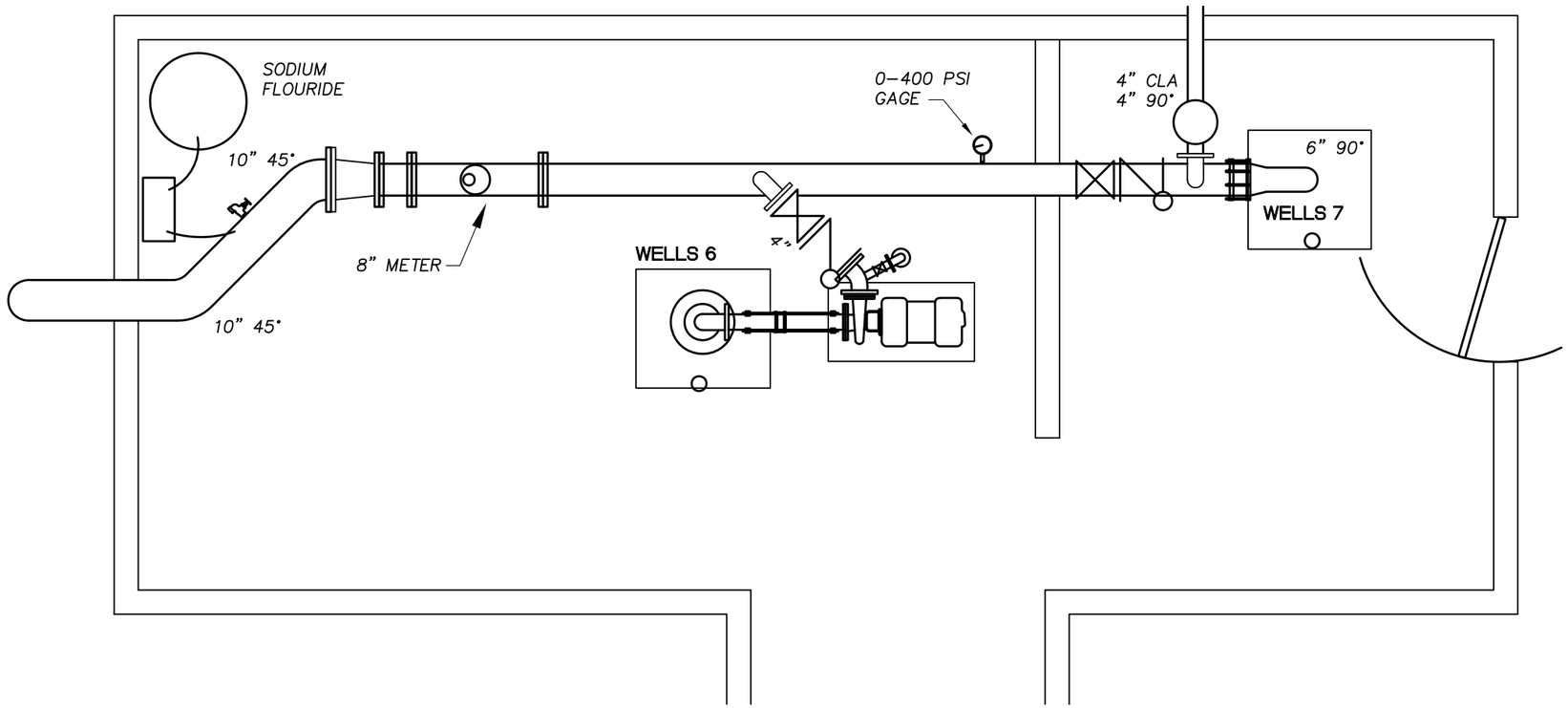
Pump motor Pulled and Reconditioned 2/5/68
Installed 2/6/68 Pumping 1225 GPM 2 Legs
Pulls 140 amps 1 Leg Pulls 160 amps

May 1, 1958

LOG OF WELL NO. 5

0 to 3'	3 ft.	Top soil and sand
3 to 20'	20 ft.	Hard Pan
23 to 42'	19 ft.	Sand & Gravel
42 to 64'	22 ft.	Dry Sand
64 to 67'	3 ft.	Hard dry sand & clay
76 to 84'	17 ft.	Sand & Water
84 to 90'	6 ft.	Cemented sand & gravel
90 to 93'	3 ft.	Gravel & Sand (good flow water)
93 to 100'	7 ft.	Cemented gravel
100 to 104'	4 ft.	Gravel & Sand (good flow water)
104 to 105'	1 ft.	Water & Sand
105 to 110'	5 ft.	Gravel & Sand (Good flow water)
110 to 112'	2 ft.	Hard Cemented sand & gravel
112 to 136'	24 ft.	Gravel & Sand (good flow water)
Total Depth	136 ft.	

12" Casing
This well has a 10" pipe screen
length 36 ft. 8 inches
24 slot per each foot 1/4 X 6
864 slot total
Water in well is 54 ft. from top down



WELLS 6

SUBMERSIBLE PUMP
JACUZZI MODEL NO. 20GM4D WOC 542

BOOSTER PUMP:
MODEL: U.S. MOTORS (SQUIRREL CAGE) NO. 3451602
HP: 20
CYCLES: 50 60
RPM: 3000 3600
TYPE: H1
FRAME: 284 UC
PH: 3
VOLTS: 208-220/440
HI VOLTS AMPS 25 25
LOW VOLTS AMPS 50 50
DESIG: B
DODE: F
RATING 50° 40°
208V AMPS 530
SERIAL 3451002

METER
PRECISION B8963611
0-1000 GALLONS MAGNUM

NOTES:
DRILLED 1963 16"X187'
CAPACITY: 750 GPM
SCREENS 178-172'

DEFICIENCIES
SURFACE SEAL NOT NOTED ON LOG

D.O.E.
UNIQUE WELL # AAO 990
PERMIT NO 5954
CERTIFICATE NO 4449-A
PRIORITY DATE 5/22/62

WELLS 7

PUMP
8L-600-60HP
460V - 3PH

METER
PRECISION B8963611
0-1000 GALLONS MAGNUM

NOTES:
DRILLED 1965 16"x204'
PERFORATIONS 102'-136'
CAPACITY: 800 GPM
SCREENED 160-197'

DEFICIENCIES
SURFACE SEAL NOT NOTED ON LOG

D.O.E.
UNIQUE WELL # AAO 990
CERTIFICATE NO. 5374-A
PERMIT NO. 7096
PRIORITY DATE 3-8-65

WELL 6
SO2 WELLFIELD
SO 7 INDIVIDUAL

WELL 7
SO2 WELLFIELD
SO 8 INDIVIDUAL

JWM&A Civil • Municipal • Geotechnical Engineering and Planning
Jerome W. Morrissette & Associates Inc., P.S.
1700 Cooper Point Road SW, #B-2, Olympia, WA 98502-1110 • (360) 352-9456 • FAX (360) 352-9990

WELLS 6 AND 7

CITY OF FIRCREST
DOH # 25150 T

00107-2WELLS | SHT 1 OF 1

Well #6.

CERTIFICATE RECORD NO. 9 PAGE NO. 4449-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY *That* TOWN OF FIRCREST

of Tacoma, Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a* well

located within Lot 1, Block 1 of Paradise West and Lot 1, Block 1, Mt. Vista Terrace Add.

Sec. 14, *Twp.* 20 *N., R.* 2 E. *W. M.,*

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 5954 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 9 *at page* 4449-A; *that the right hereby confirmed dates from* May 22, 1962; *that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 750 gallons per minute; 1125 acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources: This permit is issued as a supplemental supply to G.W. Certificates Nos. 876-D, 877-D, 1322-A and 3150-A and total withdrawal not to exceed 1125 acre-feet per year less any amount withdrawn under above certificates.

A description of the lands to which such ground water right is appurtenant:

Town of Fircrest, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 27th *day of* February, *19* 63.

M. Walker

State Supervisor of Water Resources.

Town of Fircrest
115 Ramsdell Street
Tacoma 66, Washington
Attn: David J. Gago, Clerk-Treasurer

WELL #6

Report of Examination on Ground Water

Received date May 22, 1962 Date of exam. August 16, 1962 Appl. No. 6313

Name Town of Fircrest Address 115 Ramsdell St., Tacoma 66, Wash.

Type of works Well (#6) Dimensions 16" x 250'

Progress of works Being constructed, test hole completed

Quantity applied for 2000 g.p.m. acre-feet per year

Lot 1, Blk. 1, Paradise West & Lot 1, Blk. 1, Mt. Vista Terrace Addition

Legal sub. Sec. 14 Twp. 20 Rge. 2 E., County Pierce

Use Municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 5000 as of 1965

Industrial

Time pump will be operated Continuously

Other water rights appurtenant to this land 876D, 877D, 1322A, 3150A

Proximity to existing works, springs, wells, or streams None noted

Area Sub-area Zone

RECOMMENDATIONS

Approved for 2000 g.p.m. 1125 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The requirements for this system are based on an estimated need of 200 g.p.d. per person for a projected population of 5000 people. The total quantity allowable is thus 1,000,000 g.p.d., or approximately 1125 acre-feet per year, which is obtainable by continuous pumping of approximately 700 g.p.m. Up to 2000 g.p.m. is authorized to be pumped from this well but total quantities from the 5 wells in this system should not exceed 1125 acre-feet per year. If authorized quantities allowable under the above numbered water rights exceed 1125 acre-feet per year, this water right shall be considered to be a supplemental right to augment the entire system. The report of findings for C. 3150A lists authorized quantities for all previous water rights.

The applicant will furnish this office information of the full pumping capacity of this well in gallons per minute when it is finally put into the system. Up to 2000 g.p.m. will be allowable but final certificate will be reduced to actual quantity produced by the well if yield is less than 2000 g.p.m.

The installation of an access port to well as described in attached Ground Water Bulletin No. 1 is recommended.

Signed at Olympia, Washington
this 20th day of August, 1962

JOHN B. NOBLE, Geologist
Division of Water Resources

WELL 6

Production well #6

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

A 6318 - DOESN'T MATCH

WELL LOG No. P. 5954

Date 1-31, 1963

Record by Well driller

Source driller's record

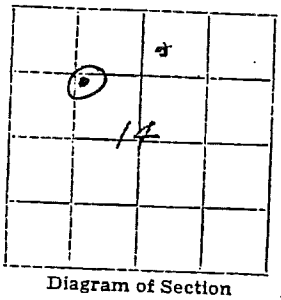


Diagram of Section

Location: State of WASHINGTON

County Pierce

Area

Map

¼ ¼ sec. 14 T. 20 N., R. 2 E. ~~W~~

Drilling Co. Pete Sylte

Address Rt. 1, Box 1402, Spanaway, Wash.

Method of Drilling Date Sept. 7, 1962

Owner Town of Fircrest, Wash.

Address

Land surface, datum ft. above / below

Correlation	Material	Thickness (feet)	Depth (feet)
	Top soil & gravel	2	2
	Cemented gravel	78	80
	Sand & gravel	4	84
	Cemented gravel	21	105
	Sand & Gravel	20	125
	Sand	15	140
	Sand & water	15	155
	Water sand & gravel	37	192
	Sand & gravel	8	200
	Sand	3½	203½
	PUMP TEST:		
	Dim. 16"x203'		
	SWL: 150 ft. (9-7-62)		
	DD: 27 ft.		
	Yield: 754 g.p.m.		
	Type & size of pump: Deep well Jacuzzi 750 g.p.m.		
	Type & size of motor or engine:		

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up (over)

Sheet ... of ... sheets

RICHARDSON WELL DRILLING CO.

219 SOUTH 115TH STREET, TACOMA, WASHINGTON
LENNOX 7-7332

1636

Sold To Town of Fircrest
Tacoma
Address Washington.

Ship To
Address

Terms
Phone

B. O.	QUAN.	CODE NO.	DESCRIPTION	EACH	TOTAL
	1		20 HP Submersible Pump Jacuzzi		1,624 00
	1		20 HP Booster Pump Jacuzzi		771 91
	180	ft	4" Black Pipe		277 00
	180	ft	#10 x 3 Submersible cable	27	48 60
	180	ft	3/4" Plastic Tubing	11	19 80
	1		16" Well Seal		45 00
	1		4" Flanged elbow		16 50
	2		4" Flanges	3 67	7 34
	1		5 x 4" Bushing		5 40
	2		4 x 6" Nipples	1 65	3 30
	2		4 x 8" Nipples	2 75	5 50
	1		4" Dresser coupling		6 97
	1		4" Control valve & handle		53 50
	1		12 x 4" Flange		11 88
	1		4"X Close Nipple		1 27
	1		1/4" Str. Ell		45
	1		1/4" Ell		38
	1		1/4"x 5" Nipple		36
	1		4" Check valve		118 00
	1		3/4" Coupling		34
	2		14 x 4" Spacers	15 00	30 00
	1		3/4"Close Nipple		23
			Bolts for flanges		15 00
			Labor on submersible & booster pump		150 00
			Labor on turbine		595 00
			Parts for turbine (Shafts-Sleeves etc)		1,015 00
	2		#2 Mag. starters with 3rd lg Pro.	94 00	188 00
			Washington Electric Wiring etc		169 99

TOTAL	5,180 72
SALES TAX	207 23
TOTAL INCL. TAX	5.387 95

— 1 874 40
3 513 55

OUR AUDITOR AUTOMATICALLY REFERS TO FEDERAL CREDIT PROCEDURES SHOULD THIS ACCOUNT BECOME 90 DAYS DELINQUENT. INTEREST CHARGED AT MAXIMUM LEGAL RATE.

DEALER

CUSTOMER

Tacoma Office Supply Co., Tacoma, Wash. 402399-1

GENERAL PUMP QUOTATION SHEET

SUBJECT TO OUR PUBLISHED CONDITIONS OF SALE

No. GQ 5448

DATE 6-9-63

QUOT TO: RICHARDSON DRILLING CO. (TOWN OF FIRCREST)

REFERENCE: WELL 6

WE THANK YOU FOR YOUR INQUIRY AND ARE PLEASED TO SUBMIT THE FOLLOWING QUOTATION FOR YOUR CONSIDERATION.

I. D. of Well	In.	Pumping Woter Level	Ft.	TOTAL DYNAMIC HEAD	Ft.	Moter H.P.	
Depth of Well	Ft.	Surfoce Lift	P.S.I. Ft.	CAPACITY ~~300~~ 320 +	G.P.M.	Phose	
Stotic Woter Level	Ft.	Friction (Surface Piping)	Ft.	Pump Speed	R.P.M.	Cycles	
Drawdown	Ft.	Totol Pumping Heod	Ft.	Driver Speed	R.P.M.	Volts	

QUAN.	CATALOG NO. OR SIZE	DESCRIPTION	APPROX. WT. (LBS.)	LIST	TOTAL		NET
		PUMP					
1	20S6X4-7½	20 HP Submersible Pump 440 Volt		1624	00	*	
1	169K	4" Non Slam Check Valve		118	00		
~~500~~ 540 ft	#10	440 Volt Cable .27		54	00		
1	16"x4"	Well Seal		45	00		
~~180~~ 187 ft	4"	Black Pipe Thd & Cpld		~~54~~ 56	20		
~~2~~ 1	14"x4"	Spiders For Oil Lube Turbine		30	00		
		MOTOR					
1	20GM4-7½	20 HP Centrif. Pump 3ø Flanges		640	00	* *	
1	#2	Mag Starter 3ø 3rd Leg		94	00		
		LABOR Except Wiring -		150	00		
		Above Does Not Include Surface Pipe & Fittings					
		Labor on Turbine		550	00		
		Parts (Shafts, Sleeves, etc. on Turbine Repair)		1015			
				4597.00			
				4600.00			
		TAX		184.00			
				4784.00			

SPECIAL FEATURES

* SAME $ AMOUNT AS INVOICE

* * DIFF $ AMOUNT FROM INVOICE

F.O.B.

SHIPMENT WILL BE MADE BY, DATE

SIGNED BY:

COMPANY NAME

ADDRESS

SIGNED BY:

TOTAL—PUMP & EXTRAS				
SALES TAX				
INSTALLATION				
TOTAL PRICE				

ORIGINAL

FORM NO. 823-37

THE HARTFORD STEAM BOILER
INSPECTION and INSURANCE COMPANY
HARTFORD • CONNECTICUT 06102

C. H. MARSH
Manager

W. E. WHITE
Chief Inspector

SEATTLE OFFICE
SUITE 716, WHITE-HENRY-STUART BUILDING
SEATTLE, WASHINGTON 98101

October 6, 1970
REPORT OF INSPECTION

DATE OF INSPECTION September 30, 1970

LOCATION See Below

INSPECTOR L. Shelton and J. Potter

WELL 6 — MOTOR
20 hp U.S. Squirrel Cage Motor No. 3451602 *
Located Corner of 37th Street, S.W. and 63rd Avenue West, Fircrest, Washington
Inspected while in operation.

Since the bearings of this motor have been in service for several years without the benefit of a dismantled inspection, we recommend that the motor be dismantled and the bearings cleaned, checked and re-packed. If the bearings show any abnormal wear at this time, they should be replaced.

WELL 6 — PUMP
20 hp Jacuzzi Centrifugal Pump No. 20GM4DW0C 542
Located Corner of 37th Street, S.W. and 63rd Avenue West, Fircrest, Washington
Inspected while in operation.

JACUZZ SOLD THIS TO GRISWALD PUMPS. PERFORMANCE IS SAME AS R4GM20T

This pump also has been in service several years without the benefit of a dismantled maintenance inspection. We recommend that it be dismantled, the running parts examined for waar and the bearings checked and re-packed.

WELL 7
20 hp Jacuzzi Deep Well Pump Unit No. 1298089
Inspected while in operation
Located Corner of 37th Street, S.W. and 63rd Avenue West, Fircrest, Washington

The contacts of the starter used with this motor were excessively worn and rough. We recommend that they be renewed.

We recommend that performance records be kept on this unit to supplement your maintenance program and to assist you in obtaining

TO
Town of Fircrest
115 Ramsdell Street
Fircrest, Washington

* UNKNOWN DATE MEMO REFERENCES 3451002

greater reliability from your electrical equipment.

It is also recommended that a manufacturer's instruction manual be obtained for this unit and kept on file with other records on the equipment.

National Electric Water Heater No.25466-64W
Located City Hall, 115 Ramsdell Street
Fircrest, Washington
Inspected externally while in service.

The shut-off valve now located between the relief valve and the tank should be removed. If removal is not practicable, the shut-off valve should be locked or sealed in the open position.

The relief valve should be installed in the fitting at the top of the tank, as outlined by the Inspector.

The conditions outlined were discussed with Mr. Nelsen, Utilities Man, at the time of inspection.

Yours very truly,

W. E. White

Chief Inspector

FS/cf

cc: Orig. to:
Town of Fircrest
115 Ramsdell Street
Fircrest, Washington

1c to:
Raleigh, Mann & Powell, Inc.
819 South "K" Street
Tacoma, Washington
Attn: Mr. Ed Baumer

BOOSTER Well No 6 1970 OR LATER

Motor US Motors

HP-20 PH-3 Cycles 50 60

Volts 208-220/440 RPM 3000 3600

Frame 284 UC Hi volts Amps 25 25

Type H1 Low volt Amps 50 50

Design B Code F Rating 50°0 40°0

208V Amps 530 Serial 3451002 *

Pump

Jacuzzi

Pump Model No 20 GM4 D WOC 542 **

* OCT 6 1970 LETTER REFERENCES 3451602

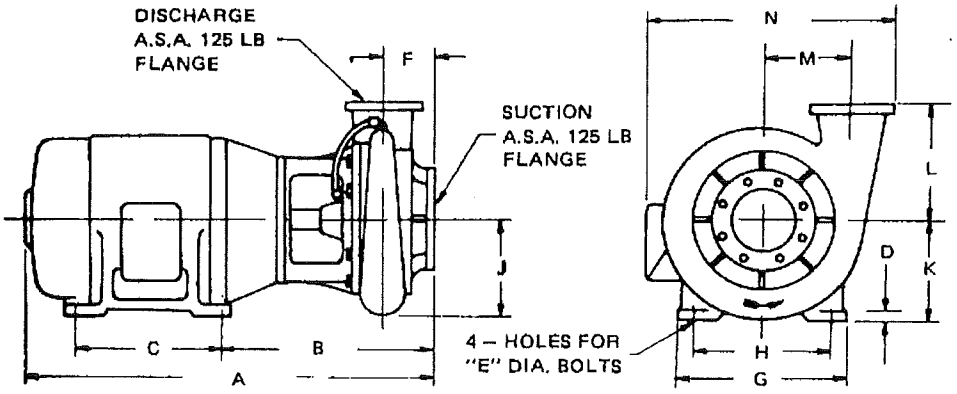
* MATCHES OCT 6 1970 LETTER

Griswold Industrial Pumps

CENTRIFUGALS Dimensions

G Series

Terry - 360/352-9990



NOTES: 1. Dim. 'N' is overall width including pump and motor. 2. Dim. 'A', 'G', and 'N' may vary depending on make of motor.

PUMP MODEL	MOT HP	PHASE	MOTOR FRAME	DISCH	SUCT	DIMENSIONS IN INCHES												
						A	B	C	D	E	F	G	H	J	K	L	M	N
R3GM-10-T	10	3	213JM	3	4	23 5/16	10 1/16	5 1/2	5/8	3/8	3 5/8	10 1/2	8 1/2	7 3/8	5 1/4	8 1/2	5 13/16	17 13/16
R3GM-15-T	15	3	215JM	3	4	24 1/16	10 1/16	7	5/8	3/8	3 5/8	10 1/2	8 1/2	7 3/8	5 1/4	8 1/2	5 13/16	17 13/16
R3GM-20-T	20	3	254JP	3	4	31 1/16	14 9/16	8 1/4	5/8	1/2	3 5/8	12 3/8	10	7 3/8	6 1/4	8 1/2	5 13/16	19 1/2
R3GM-25-T	25	3	256JP	3	4	32 13/16	14 9/16	10	5/8	1/2	3 5/8	12 3/8	10	7 3/8	6 1/4	8 1/2	5 13/16	19 1/2
R3GM-30-T	30	3	284JP	3	4	33 7/16	12 15/16	9 1/2	3/4	1/2	3 5/8	13 7/8	11	7 3/8	7	8 1/2	5 13/16	20 3/8
R3GM-40-T	40	3	286JP	3	4	34 15/16	12 15/16	11	3/4	1/2	3 5/8	13 7/8	11	7 3/8	7	8 1/2	5 13/16	20 3/8
R4GM-15-T	15	3	215JM	4	5	25 1/16	11 9/16	7	5/8	3/8	4 1/8	10 1/2	8 1/2	8 1/8	5 1/4	7 3/4	6 7/16	19 3/16
R4GM-20-T	20	3	254JP	4	5	31 15/16	15 7/16	8 1/4	5/8	1/2	4 1/8	12 3/8	10	8 1/8	6 1/4	7 3/4	6 7/16	20 7/8
R4GM-25-T	25	3	256JP	4	5	33 1/16	15 7/16	10	5/8	1/2	4 1/8	12 3/8	10	8 1/8	6 1/4	7 3/4	6 7/16	20 7/8
R4GM-30-T	30	3	284JP	4	5	34 5/16	13 13/16	9 1/2	3/4	1/2	4 1/8	13 7/8	11	8 1/8	7	7 3/4	6 7/16	21 3/4
R4GM-40-T	40	3	286JP	4	5	35 13/16	13 13/16	11	3/4	1/2	4 1/8	13 7/8	11	8 1/8	7	7 3/4	6 7/16	21 3/4
R4GM-50-T	50	3	324JP	4	5	32 7/8	14 13/16	10 1/2	13/16	5/8	4 1/8	15 7/8	12 1/2	8 1/8	8	7 3/4	6 7/16	24 1/2

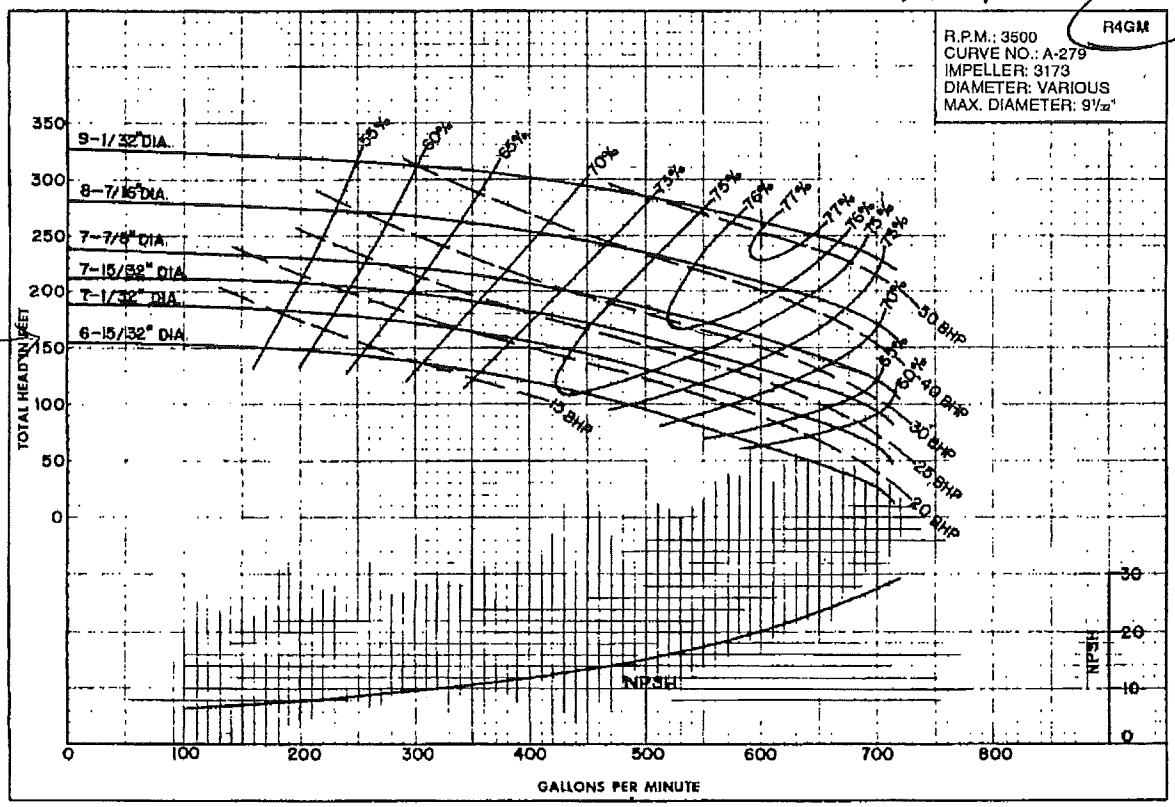
NOTE: I CALLED JACUZZI FOR CURVE - THEY HAVE SOLD THIS PUMP TO GRISWOLD. GRISWOLD SAID THEY WERE NOT FAMILIAR WITH THE DWOC PART OF THE PUMP MODEL NUMBER IS, THEY SENT THIS CURVE & SAID IT WAS THE SAME.

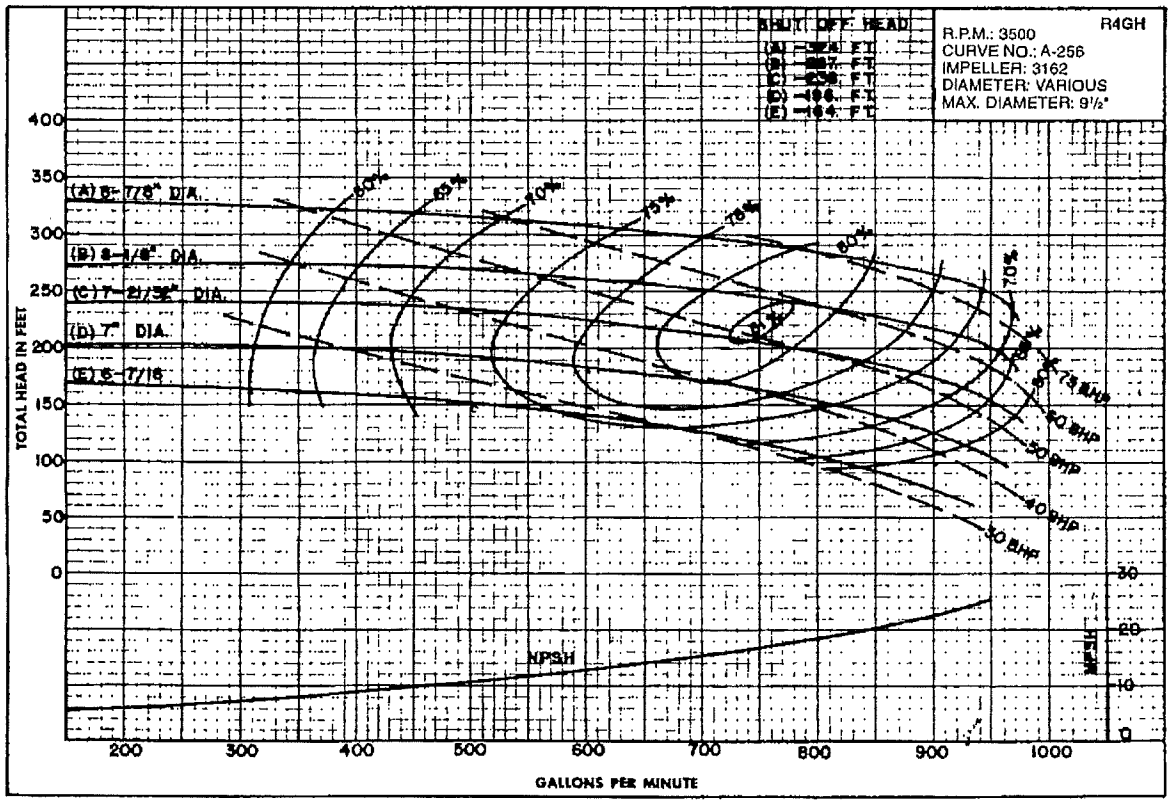
Griswold Industrial Pumps

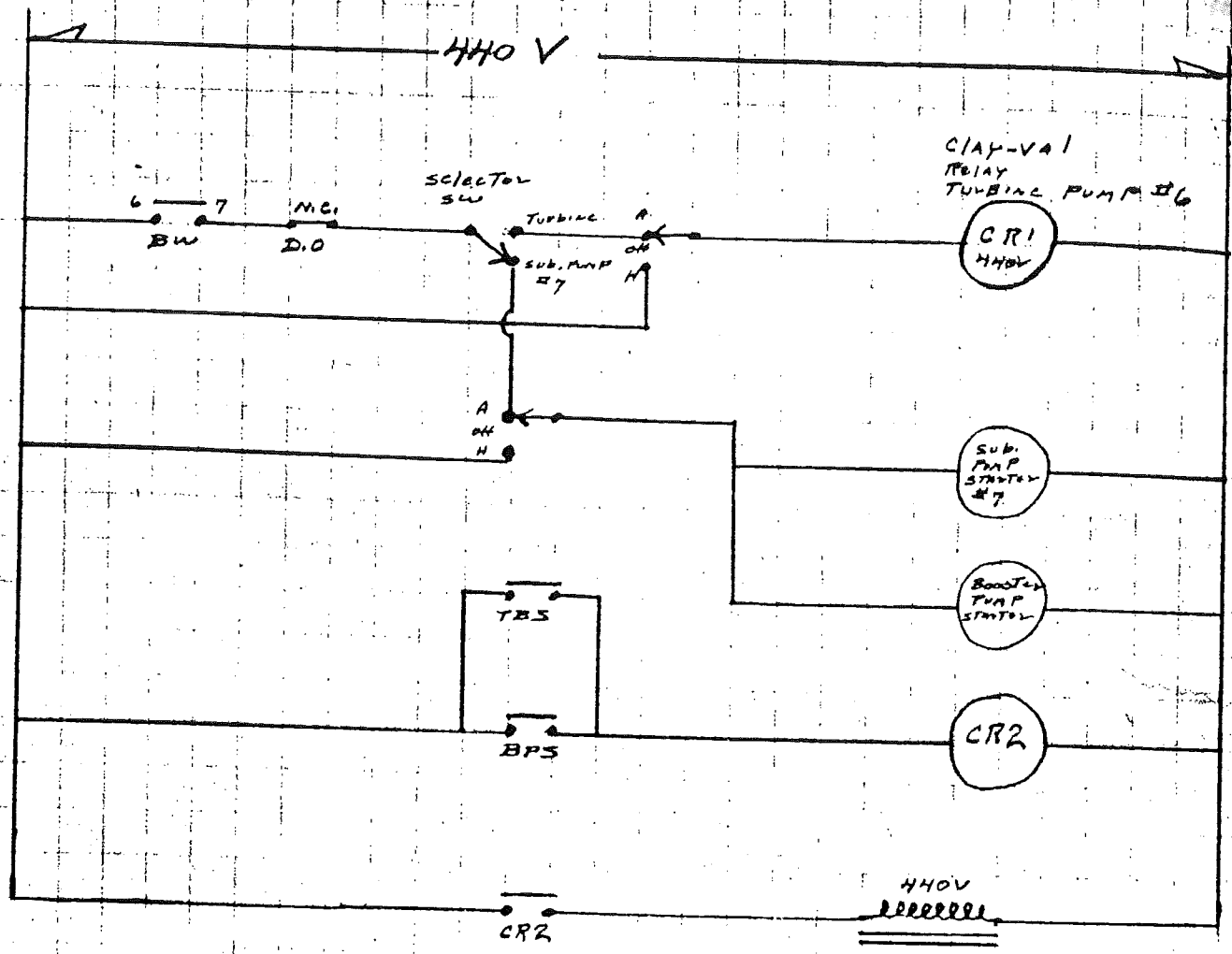
CENTRIFUGALS Performance Curve

20Gm4T SAme As R4Gm20T

R4GM and R4GH







Town of Fircrest

Sub. Pump Circuit
#6 Pump & Booster unit

This print part of well #6
Pump circuit

PARAMOUNT ELECTRIC CO.
311 PUYALLUP AVE.
TACOMA, WASH. 98421

1-27-67

Well Logs + Information

1963?

20 hp Subm 6" 4 stage 3 phase 440

Well #6

Fig 20S 6 X 4 - T4*
Cont WOF 984
Spec - 101

} Pump*

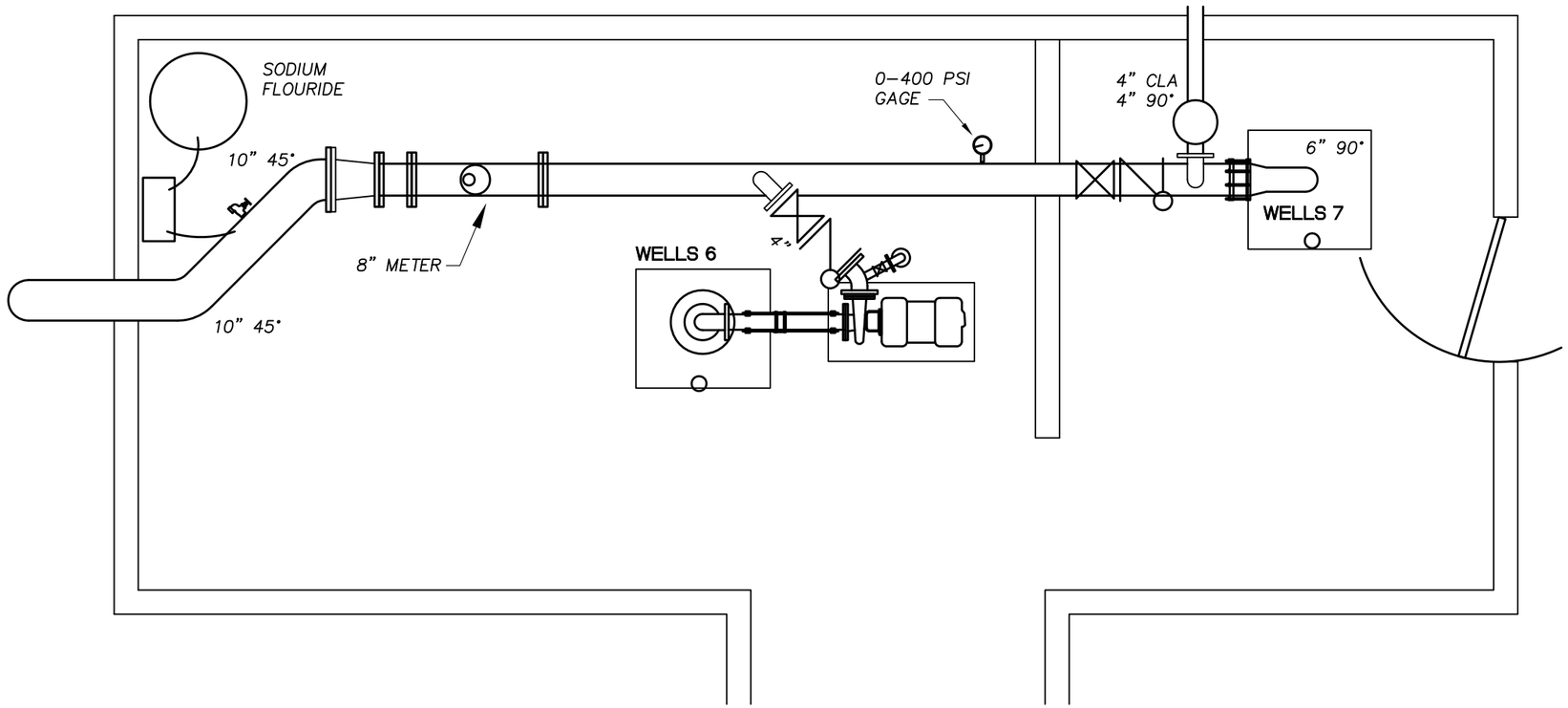
180 Colum

8 ft Pump & motor excluding foot valve on top of Pump

Lower Pump to increase Water

* SAME AS INVOICE ≈ 1963

5A



WELLS 6

SUBMERSIBLE PUMP
JACUZZI MODEL NO. 20GM4D WOC 542

BOOSTER PUMP:
MODEL: U.S. MOTORS (SQUIRREL CAGE) NO. 3451602
HP: 20
CYCLES: 50 60
RPM: 3000 3600
TYPE: H1
FRAME: 284 UC
PH: 3
VOLTS: 208-220/440
HI VOLTS AMPS 25 25
LOW VOLTS AMPS 50 50
DESIG: B
DODE: F
RATING 50° 40°
208V AMPS 530
SERIAL 3451002

METER
PRECISION B8963611
0-1000 GALLONS MAGNUM

NOTES:
DRILLED 1963 16"X187'
CAPACITY: 750 GPM
SCREENS 178-172'

DEFICIENCIES
SURFACE SEAL NOT NOTED ON LOG

D.O.E.
UNIQUE WELL # AAO 990
PERMIT NO 5954
CERTIFICATE NO 4449-A
PRIORITY DATE 5/22/62

WELLS 7

PUMP
8L-600-60HP
460V - 3PH

METER
PRECISION B8963611
0-1000 GALLONS MAGNUM

NOTES:
DRILLED 1965 16"x204'
PERFORATIONS 102'-136'
CAPACITY: 800 GPM
SCREENED 160-197'

DEFICIENCIES
SURFACE SEAL NOT NOTED ON LOG

D.O.E.
UNIQUE WELL # AAO 990
CERTIFICATE NO. 5374-A
PERMIT NO. 7096
PRIORITY DATE 3-8-65

WELL 6
SO2 WELLFIELD
SO 7 INDIVIDUAL

WELL 7
SO2 WELLFIELD
SO 8 INDIVIDUAL

JWM&A Civil • Municipal • Geotechnical Engineering and Planning
Jerome W. Morrissette & Associates Inc., P.S.
1700 Cooper Point Road SW, #B-2, Olympia, WA 98502-1110 • (360) 352-9456 • FAX (360) 352-9990

WELLS 6 AND 7

CITY OF FIRCREST
DOH # 25150 T

00107-2WELLS | SHT 1 OF 1

well # 7

CERTIFICATE RECORD NO. 11 PAGE NO. 5374-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY *That* TOWN OF FIRCREST

of Tacoma, Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a* well

located within NW¼SE¼NW¼ and Lot 1, Block 1 of Plat of Paradise West, within Town of Fircrest,

Sec. 14, *Twp.* 20 *N., R.* 2 E. *W.M.,*

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 7096 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 11 *at page* 5374-A; *that the right hereby confirmed dates from* March 8, 1965; *that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 500 gallons per minute; 800 acre-feet per year, to supply a population of 6,000 as of 1970.

Special provisions required by the Supervisor of Water Resources: The certificate shall issue for 800 acre-feet per year as a totally supplemental right.

A description of the lands to which such ground water right is appurtenant:

Town of Fircrest.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 1st *day of* April, 19 66

State Supervisor of Water Resources.

WELL 7

Report of Examination on Ground Water

Received date March 8, 1965 Date of exam. March 30, 1965 Appl. No. 7518

Name Town of Fircrest Address 115 Ramsdell, Tacoma, Washington

Type of works a well Dimensions 16" x 200'

Progress of works presently being drilled (started)

Quantity applied for 800 g.p.m. acre feet per year

Legal sub. NW¼SE¼NW¼ and Lot 1, Block 1 of Plat of Paradise West, within Town of Fircrest Sec. 14 Twp. 20 N. Rge. 2 E.W.M. County Pierce

Use municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 6,000 as of 1970

Industrial

Time pump will be operated continuously

Other water rights appurtenant to this land G.W.Certs. 876-D, 1322-A, 3150-A and 4449-A

Proximity to existing works, springs, wells, or streams Town of Fircrest, north approximately 30 feet.

Area Sub-area Zone

RECOMMENDATIONS

Approved for 800 g.p.m. 1008 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The installation of an access port to well as described in attached Ground Water Bulletin No. 1 is recommended.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, Fourth Floor, Public Health Building, Olympia, with regard to the need for compliance.

An analysis of water use in Western Washington has shown the average water requirement for municipal supply to be 140 gallons per capita per day. Allowing for an increase in the water requirement, the recommended annual withdrawal for municipal supply is based on an average daily requirement per person of 150 gallons. Therefore, for the estimated population of 6,000 by 1970, the total annual withdrawal under this application shall be limited to 1,008 acre-feet. At the present time, the Town of Fircrest holds title to the withdrawal of 3,500 gallons per minute and 2,508 acre-feet per year. Of this annual amount, 1,125 acre-feet per year is under primary rights, and 1,383 acre-feet per year under supplemental rights as follows:

(over)

WELL 7

	Cert. #	Instantaneous withdrawal	Acre-feet (primary) per year	Acre-feet (supplemental) per year
well #1	876-D	250	157	
#2	877-D	500	315	
3	1322-A	1,000	123	
5	3150-A	1,000	193	595
6	~~3339-A~~ 4449-A	750	337	788
		3,500	1,125	1,383

Inasmuch as the estimated water requirement is 1,008 acre-feet per year and the Town of Fircrest holds title to 1,125 acre-feet per year, "the permit shall issued under this application for 1,008 acre-feet per year as a totally supplemental right."

Applicant is advised that notice of proof of appropriation of water under which the final certificate of water right issues, should not be filed until the permanent withdrawal facilities have been installed together with a distribution system of main line piping capable of furnishing water for domestic supply to all lots which are intended to be supplied under this application.

As provided under R.C.W. 43.21.130, 90.03.360 and 90.44.020, a master meter, individual service meters or other suitable measuring devices shall be installed in this system to measure the total amount of the withdrawal. Records of total monthly withdrawal, shall be maintained by an official, responsible for the management and operation of this water system and this information shall be reported each year to the Supervisor of the Division of Water Resources. A standard form for reporting such information shall be sent annually to the manager of the system.

Signed at Olympia, Washington
on this 16 day of June, 1965.

Dean Wood

DEAN WOOD, Engineer
Division of Water Resources

WATER WELL REPORT
STATE OF WASHINGTON

WELL 7

Application No. 7518

Permit No. ....

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

(1) OWNER:

Town of Fircrest

Address 115 Ramsdell
Tacoma, Washington

(2) LOCATION OF WELL:

County Pierce Owner's number, if any— #7

NW¼SE ¼ NW ¼ Section 14 T. 20 R. 2 E W.M.

Bearing and distance from section or subdivision corner

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) TYPE OF WELL:

Rotary ☐ Driven ☐
Cable ☒ Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED: Threaded ☐ Welded ☒

16 " Diam. from 0 ft. to 204 ft. Gage .....
..... " Diam. from ..... ft. to ..... ft. Gage .....
..... " Diam. from ..... ft. to ..... ft. Gage .....

PERFORATIONS: Perforated? ☐ Yes ☐ No ☒

Type of perforator used
SIZE of perforations in. by in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

(8) SCREENS: Well screen installed ☒ Yes ☐ No

Manufacturer's Name Edward E. Johnson
Type Stainless Steel Model No. 16" Tel.
Diam. List Attached Slot size ..... Set from ..... ft. to ..... ft.
Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

(9) CONSTRUCTION:

Was well gravel packed? ☐ Yes ☒ No Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.
Was a surface seal provided? ☐ Yes ☐ No To what depth? ..... ft.
Material used in seal—
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:

Static level 154 ft. below land surface Date 5/5/65
esian pressure lbs. per square inch Date
Water is controlled by ..... (Cap, valve, etc.)

(11) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: 825 gal./min. with 26 ft. drawdown after 2 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level

Date of test .....
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

(12) WELL LOG: Diameter of well 16 inches.

Depth drilled 204 ft. Depth of completed well 204 ft.

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Fill Dirt	0	4
Hardpan	4	31
Clay, Gravel & Sand - Yellow	32	56
Gravel, Coarse Sand & Gravel	56	78
Sand & Gravel-Water bearing	78	79
Hardpan	79	88
Clay, Sand & Gravel	88	149
Coarse Sand, Clay & Gravel	149	160
Coarse Sand & Gravel-Water Bear	160	167
Coarse Sand & Gravel-Water	167	183
Sand & Gravel - Water	183	195
Fine Sand & Gravel	195	197
Fine Dirty Sand & Some Gravel	197	204

Work started March 16 1965 Completed May 14 1965

(13) PUMP:

Manufacturer's Name Jacuzzi Bros. Inc.
Type: Turbine H.P. 75

Well Driller's Statement:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Richardson Well Drilling Co.
(Person, firm, or corporation) (Type or print)

Address 219 So. 115th St., Tacoma, Wash.

[Signed] .....
(Well Driller)

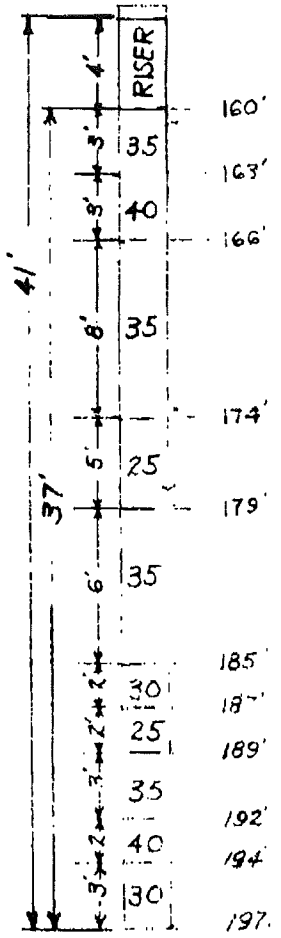
License No. ..... Date June 9, 1965

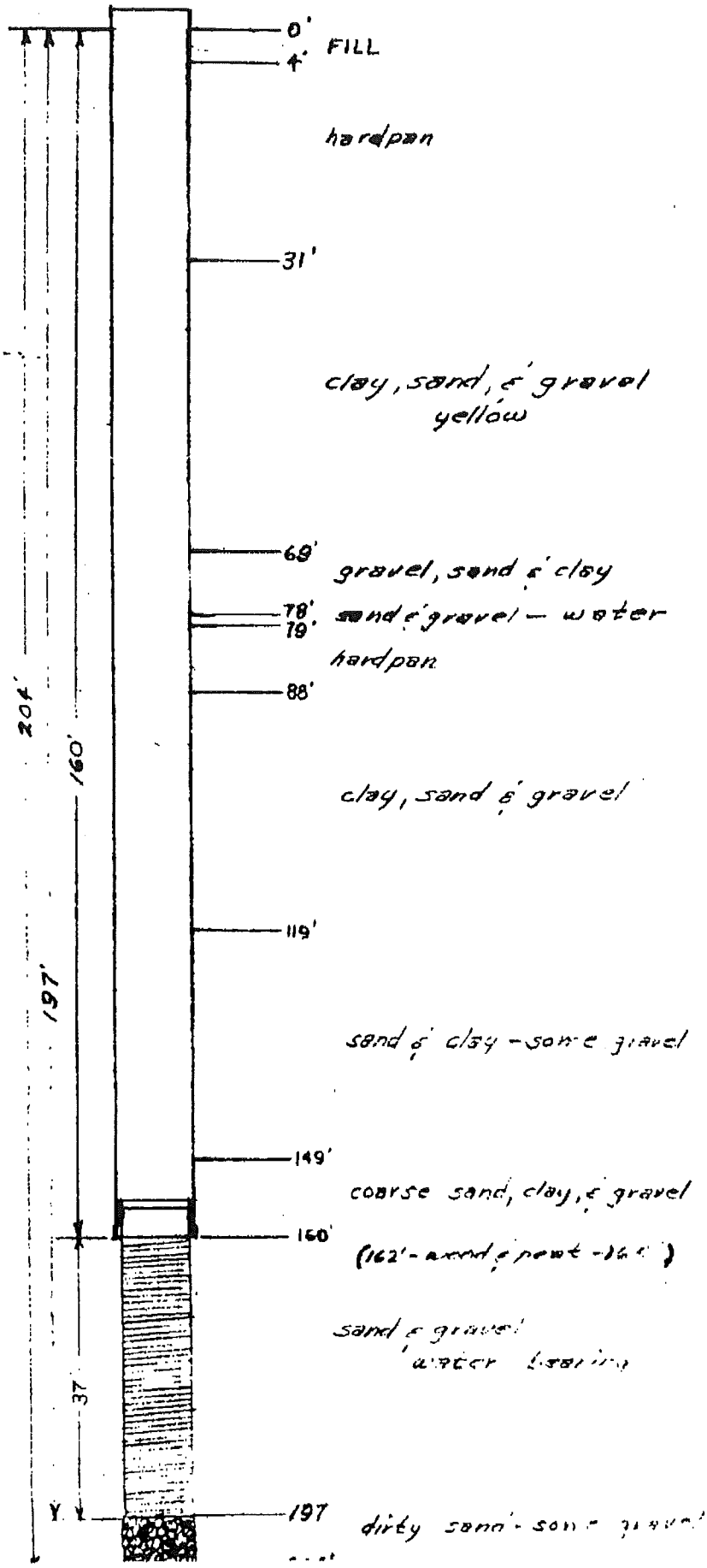
(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—(Rev. 9-62)—8-62—5M. 75168.

Fircrest Well #7

4/7/65





WELL 7

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT Appli. #7518

Well No.7

WELL LOG

No. /

Date June 9, 19 65

Record by Driller

Source Driller's Record

Location: State of WASHINGTON

County Pierce

Area 1320' W & 1250' N of

Map center Sec.14

NW¼SE¼ NW ¼ sec. 14 T 20 N., R. 2 E. E. W.

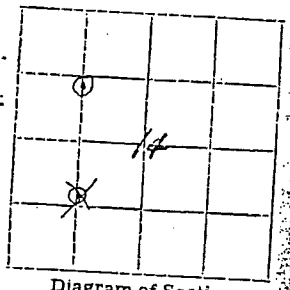


Diagram of Section

Drilling Co. Richardson Well Drilling Company

Address 219 So. 115th St., Tacoma, Washington

Method of Drilling Cable Date May 14, 19 65

Owner Town of Fircrest

Address 115 Ransdell, Tacoma, Washington

Land surface, datum ..... ft. above / below

Correlation	Material	Thickness (feet)	Depth (feet)
	Municipal Supply well - 16" x	204'	
	Fill dirt	0	4
	Hardpan	4	31
	Clay,gravel & sand,yellow	31	56
	Gravel,coarse sand & gravel	56	78
	Sand & gravel,w/bearing	78	79
	Hardpan	79	88
	Clay,sand and gravel	88	149
	Coarse sand,gravel & clay	149	160
	Coarse sand & gr. w/bearing	160	167
	Coarse sand & gr. water	167	183
	Sand and gravel, water	183	195
	Fine sand and gravel	195	197
	Fine dirty sand & s/gravel	197	204
	Casing: 16" from 0 to 204'		
	Screened from160 to 197'		

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up

Sheet ..... of ..... sheets

RICHARDSON WELL DRILLING CO.

219 SOUTH 115TH STREET • P.O. BOX 44427
TACOMA, WASHINGTON 98444
537-7332 • 1-800-562-6542

INVOICE NO. 18789

REMOVED FROM 2
INSTALLED IN 7

ADDRESS •CITY OF Fircrest
ADDRESS 115 Ramsdell, Street
CITY Fircrest, Wa 98466-6999
PHONE 564-8901 (PER JEFF)

HOURS	
TIME IN	
TIME OUT	
TIME IN	
TIME OUT	
TOTAL HOURS	

DATE	DATE PROMISED	CUSTOMER P.O.		SERVICED BY	DATE COMPLETED
7-20-94	Same		☑ BILL ☐ COLL	Jim	

QUANTITY	DESCRIPTION	UNIT COST	AMOUNT
1	PUMP 8L-600-60hP 460V-3Ø		6150 00
	TANK		
	WELL SEAL/PITLESS		
	NO. X 4 CABLE		
	NO. X UF		
	DROP PIPE		
	PIPE		
1	6" check valve		400 00

MATERIAL	6550 00
LABOR	600 00
MISC.	
SUB TOTAL	7150 00
TAX	564.85
Pay this Amount ▶	7714 85

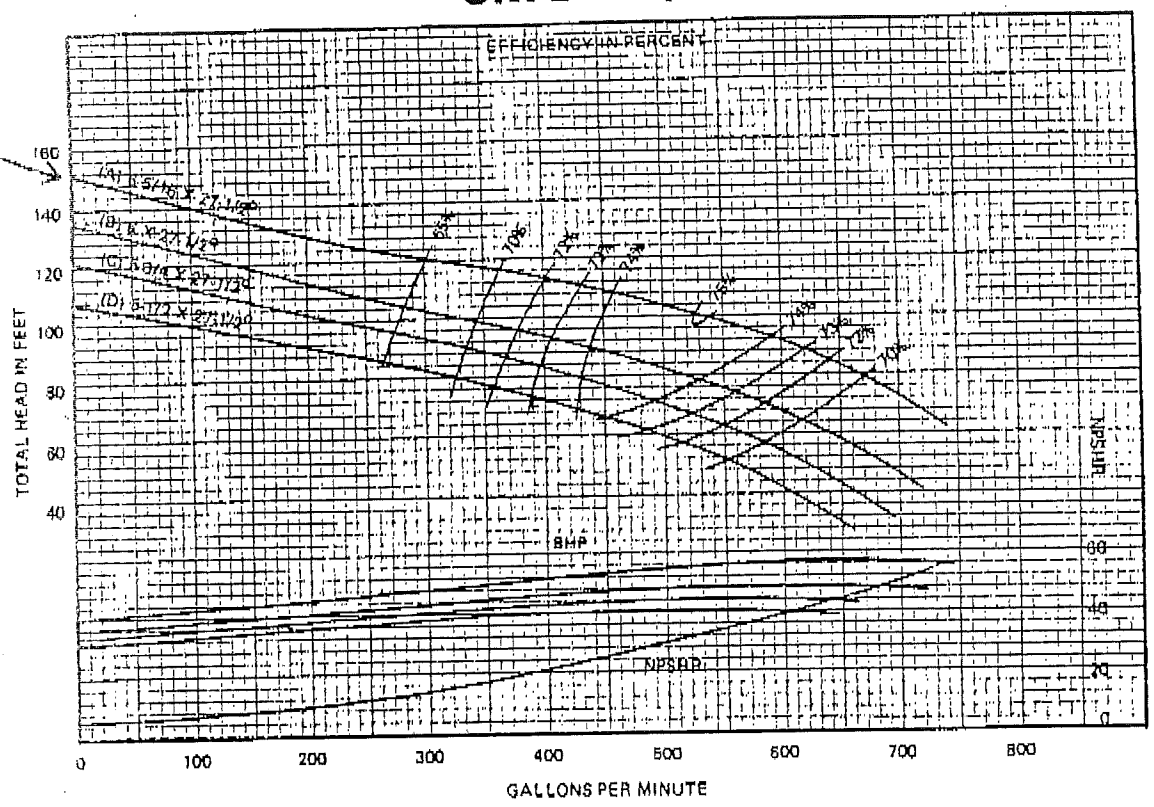
SECTION 2105
REVE PAGE 10
May 26, 1982

Performance

JACUZZI

WELL 7

8MC 3450 RPM



NUMBER OF BOWLS	CHANGE EFFICIENCY AS FOLLOWS
1	−4
2	−2
3	−1

Change in efficiency may affect both head and horsepower

Bowl Dia.	7-7/8 In.
Bowl No.	3591, C.I., ENAM.
Impeller No.	3589, BRONZE
Eye Area	6.5 Sq. In.
Imp. Type	CLOSED K = 3.93

STAGE PERFORMANCE

Curve No.	8M-200
R. P. M.	3450
Bowl	8MC

Performance based on pumping clear, fresh water at a temperature not over 85°F., and free of gas, air or abrasives, and with bowls properly adjusted and submerged.

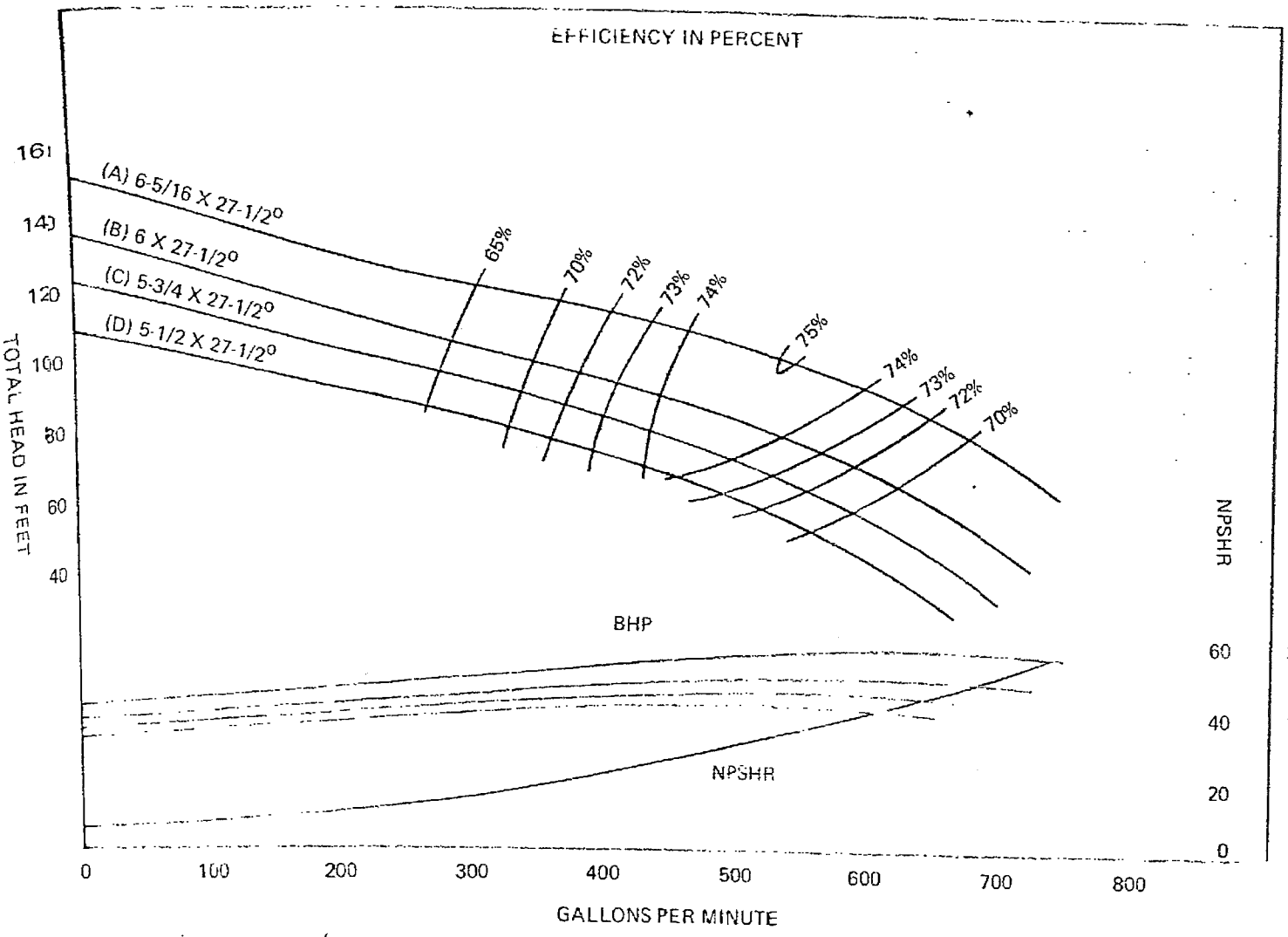
8MC-A 4 - 75 HP ← ORIGINAL WELL 2 PUMP #

THIS WAS THE ORIGINAL PUMP FROM WELL 2. PUMP WAS BURIED INTO BOTTOM OF WELL, OR IT WAS INSTALLED IN WELL 7?

THIS IS THE CURVE FOR WELL 7 - JEFF

JACUZZI BROS. INC.

TURBINE PUMP CURVE



NUMBER OF BOWLS	CHANGE EFFICIENCY AS FOLLOWS
1	−4
2	−2
3	−1

Change in efficiency may affect both head and horsepower

Bowl Dia.	7-1/2 In.
Bowl No.	3591, C.I., ENAM.
Impeller No.	3589, BRONZE
Eye Area	6.5 Sq. In.
Imp. Type	CLOSED K = 3.93

STAGE PERFORMANCE

Curve No.	8M-200
R. P. M.	3450
Bowl	8MC

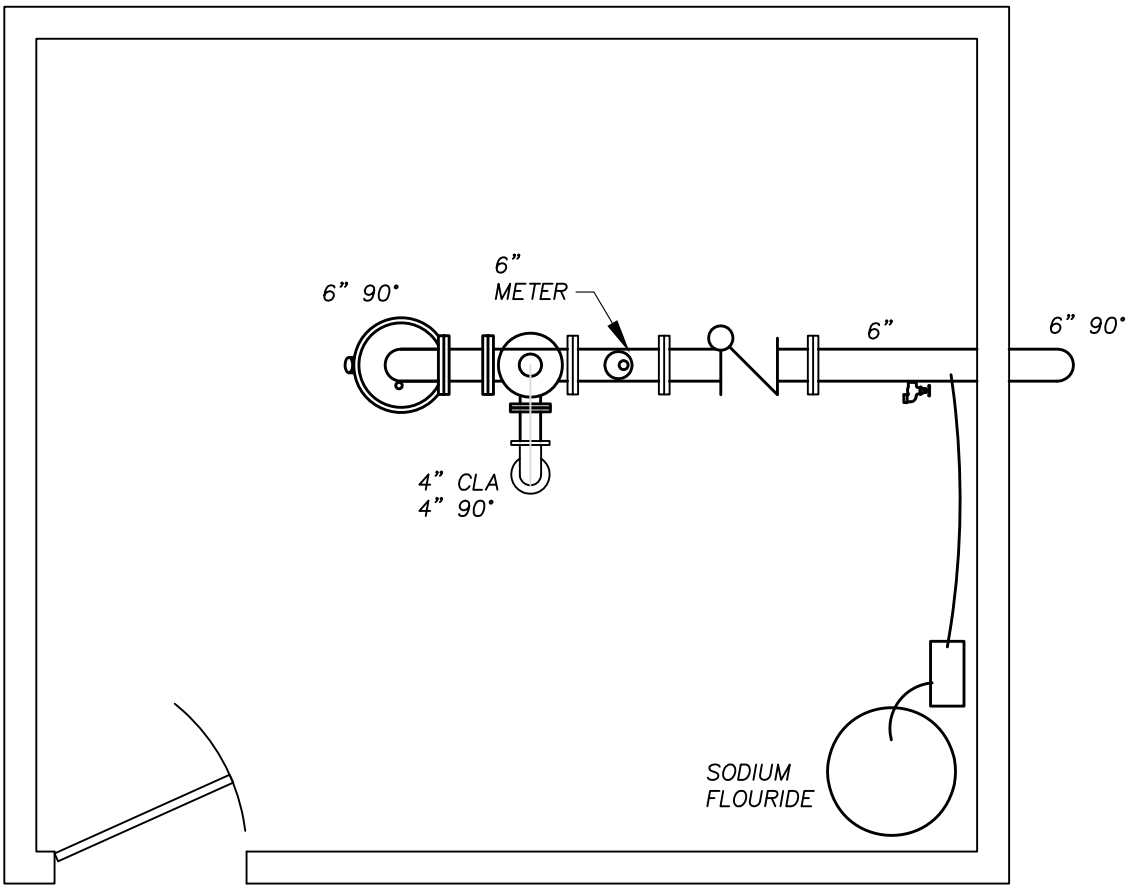
Performance based on pumping clear, fresh water at a temperature not over 85°F., and free of gas, air or abrasives, and with bowls properly adjusted and submerged.

8MC
SECTION 2105
JAN. 15, 1970

Well #7

FROM RICHARDSON'S RECORDS TO JUDMA

4 Feet



SUBMERSIBLE PUMP AND MOTOR:
SEE HOLT DRILLING DIAGRAM

METER
6" MAGNUM
PRECISION B6973638

NOTES:
DRILLED 1969 8"x155'
SCREENS 112'–129'
SCREENS 129'–145'

CAPACITY 720 GPM

DEFICIENCIES
NO AIR GAP ON SURGE VALVE LINE

D.O.E.
UNIQUE WELL # ACN 701

CERTIFICATE NO. G2–00024C
PERMIT NO. 10087

PRIORITY DATE JANUARY 6, 1969

JWM&A Civil • Municipal • Geotechnical Engineering and Planning
Jerome W. Morrissette & Associates Inc., P.S.
1700 Cooper Point Road SW, #B-2, Olympia, WA 98502-1110 • (360) 352-9456 • FAX (360) 352-9990

WELL 8
SO 3

CITY OF FIRCREST
DOH # 25150 T

00107-2WELLS | SHT 1 OF 1

S. F. No. 1361—(Rev. 6-70)

CERTIFICATE RECORD NO. - , PAGE NO. G 2-00024 C

STATE OF WASHINGTON, COUNTY OF Pierce

WELL 8

CERTIFICATE OF GROUND WATER RIGHT

(Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1[illegible], and amendments thereto, and the rules and regulations of the Department of Ecology thereunder.)

THIS IS TO CERTIFY That TOWN OF FIRCREST

of Tacoma, Washington, has made proof to the satisfaction of the Department of Ecology of a right to the use of the public ground waters of the State of Washington from a well

located within NE¼SE¼NE¼SW¼

Sec. 14, Twp. 20 N., R. 2 E. W.M., within the Town of Fircrest

for the purpose(x) of municipal supply

under and specifically subject to provisions contained in Ground Water Permit No. 10087

issued by the Department of Ecology and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Ecology and entered of record in Volume - at page 1 ; that the priority of the right hereby confirmed dates from January 6, 1969 ; that the quantity of ground water under the right hereby confirmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes, and shall not exceed 720 gallons per minute; 546 acre-feet per year, during entire year for municipal supply.

G 2-00024C

A description of the lands to which such ground water right is appurtenant is as follows:

Area served by Town of Fircrest.

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and seal of this office at Olympia, Washington, this 12th *day of* May, 19 72

JOHN A. BIGGS, *Director*
Department of Ecology

by R. Jerry Bollens

Engineering Data

OK

WELL 8

Report of Examination on Ground Water

Received date January 6, 1969 Date of exam. February 10, 1969 Appli. No. 9967

Name Town of Fircrest Address 115 Ramsdell Street, Tacoma, Wash.

Type of works a well Dimensions 20" x 145'

Progress of works Well under construction (project started)

Quantity applied for 720 g.p.m. 546 acre-feet per year

Legal sub. NE¼SW¼, within the Town of Fircrest NE¼SE¼ Sec. 14 Twp. 20 N. Rge. 2 E. County Pierce

Use Municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 5175 as of 1968
8000 as of 1974

Industrial

Time pump will be operated Continuously

Other water rights appurtenant to this land Ground Water Certs. 9876-D, 877-D, 1922-A, 3158-A, 4469-A and 5374-A.

Proximity to existing works, springs, wells, or streams 6" observation well (formrly domestic well) 30' north; There are no ground water rights of record with this office within ½ mile of this well.

Area Sub-area Zone

RECOMMENDATIONS

Approved for 720 g.p.m. 546 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may, for his own convenience, wish to install an air-line and gage in addition to the access port.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, 304 Public Health Building, Olympia, with regard to the need for compliance.

In 1968 the applicant withdrew 382,569,703 gallons. The population served by the applicants on January 1, 1968, was 5006 and grew to 5175 persons by April 1st. Using the same growth rate would be a mean average of 5344 persons served during 1968. This amounts to 196 gallons per capita per day. This is considerably higher than the average residential usage in Western Washington; however, it is noted that the individual services are not

metered. The applicant's future needs are based on 200 gallons per capita per day which would be a demand of 1792 acre-feet per year for the projected population of 8000 by 1974.

This application is approved for 720 gallons per minute, 546 acre-feet per year, as requested.

Following is a tabulation of rights held by applicant:

Well No.	Cert. No.	GPM (As authorized)	GPM (Actual)	Acre-foot/year (Primary)	Acre-feet/year (Supplemental)
1	876-D	~~200~~ 250	0	157	0
2	877-D	500	600	315	0
3	1322-A	1000	0	123	0
4	None	0	500	0	0
5	3150-A	1000	1200	193	595
6	4449-A	750	400	337	788
7	5374-A	500	500		800
		~~3950~~ 4000	3200	1125	2183

Well No. 1 has been abandoned.

Well No. 3 is capped and not in use because of pumping sand. This well has been pumped at 400 gallons per minute. Applicants are uncertain at this time if they will abandon or rehabilitate this well.

Well No. 4 was never filed upon.

Well No. 5 is reported capable of 1800 gallons per minute.

Wells No. 6 and 7 are reported capable of 750 gallons per minute each.

Inasmuch as the projected need for 1974 is 1792 acre-feet and the applicant's existing primary rights total 1125 acre-feet, the permit will issue as an entirely primary right.

Signed at Olympia, Washington
this 18 day of Dec, 1969

[signature]
DEAN WOOD, Water Resources Inspector
Division of Water Management

Telephone check, w/ Don [illegible], Fircrest Engr Office, Lo 4-8961
1/2/71 - "Fircrest Park Add'n" (as shown on plat of Sec. 14, in plat file) has been incorporated within town limits! This includes POW
(DW)

Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No. .....

(1) OWNER: Name [illegible] Address [illegible]

(2) LOCATION OF WELL: County [illegible] ¼ ¼ Sec. T. N., R. WM.

Bearing and distance from section or subdivision corner [illegible]

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 8
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 20 inches.
Drilled [illegible] ft. Depth of completed well 155 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 24 " Diam. from 0 ft. to 70 ft.
Threaded ☐ 20 " Diam. from 70 ft. to 112 ft.
Welded ☒ 16" Diam. from 112 ft. to 145 ft.
16" OD Sump 145 155

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type 304 Stainless Model No.
Diam. 16 Slot size 50/20 from 112 ft. to 129 ft.
Diam. 16 Slot size 40/40 from 129 ft. to 145 ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: [illegible]
Gravel placed from 110 ft. to 155 ft.

Surface seal: Yes ☒ No ☐ To what depth? 70 ft.
Material used in seal [illegible]
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Byron Jackson
Type: [illegible] H.P. 100

(8) WATER LEVELS: Land-surface elevation above mean sea level [illegible] ft.
Static level 80.68 ft. below top of well Date 2/16/69
Artesian pressure 0 lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Johnson
Yield: 402 gal./min. with 94.8 ft. drawdown after 2 hrs.
" 524 " 100 " 2 "
" 855 " 113.2 " 16 "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
0	112.0	2	81.2	15-0	81.05
0-30	96.8	5	81.15	25-0	81.05
1-30	80.12	10-0	81.1	120-0	80.9

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water [illegible] Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Sand & gravel	0	20
Sand, clay & gravel	20	88
Blue sand, fine gravel, water	88	105
Sand, gravel & water	105	117
Sand, water bearing	117	125
Sand, gravel & water	131	138
Cemented sand & gravel	138	141
Sand & gravel, water bearing	141	149
Blue clay & sand	149	155

Work started Jan. 22, 19 69 Completed March 7, 19 69

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Richardson Well Drilling Co., Inc.
(Person, firm, or corporation) (Type or print)
Address P. O. Box 2266, Kennewick, Wash. 99336

[Signed] (Well Driller)

License No. 223-02-5600 Date Feb. 17, 19 71

(USE ADDITIONAL SHEETS IF NECESSARY)

Well # 8

WELL 8

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES A-9967
P-10087

WELL LOG

Record by: Driller

Source: Driller's Record

Location: State of WASHINGTON

County: Pierce

Area: 789' S and 120' W

Map: from center of Sec. 14

SE¼NE¼ SW¼ sec. 14 T. 20 N., R. 2 E.

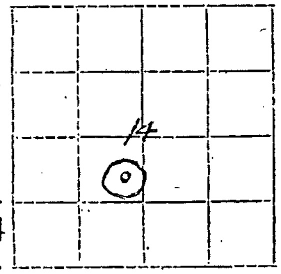


Diagram of Section

File number

Drilling Co.: Richardson Well Drilling Co.

Address: P.O. Box 2266, Tacoma

Method of Drilling: Cable Date: March 1, 1969

Owner: Town of Fircrest

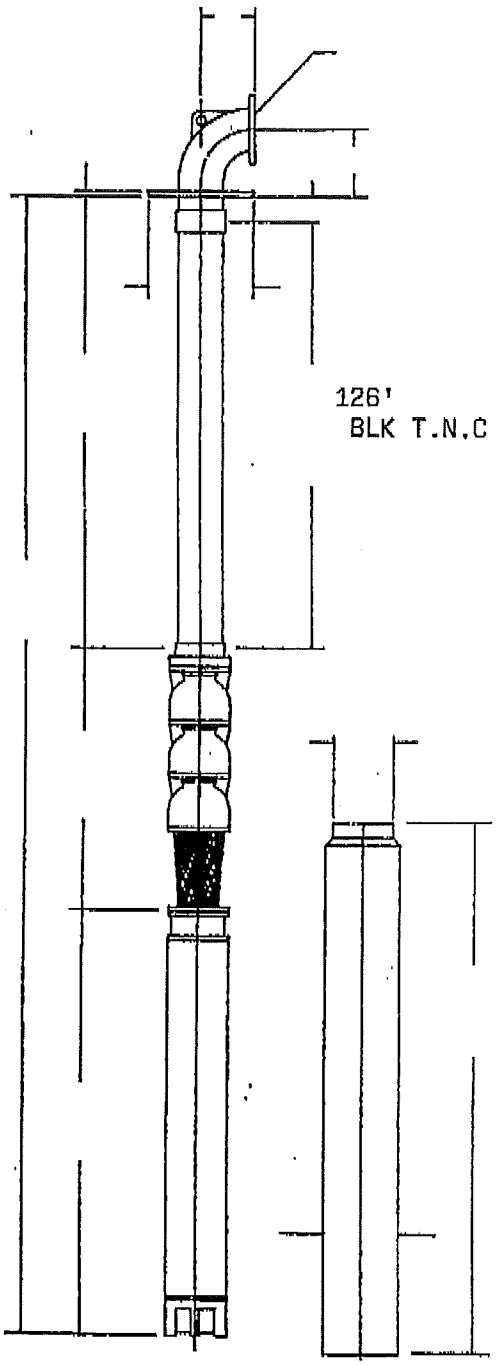
Address: 115 Ramsdell St., Tacoma

Land surface, datum: 300 ft. above mean sea level

SWL: 80'6" Date: Feb. 4, 1969 Dims.: 20"x155'

CORRELATION	MATERIAL	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Municipal use		
	Sand and gravel	0	70
	Sand, clay and gravel	70	88
	Sand, dirty; gravel, few water	88	105
	Sand, gravel and water	105	117
	Sand, gray; no gravel	117	125
	Sand, gravel to 2" water-bearing	125	138
	Sand, cemented, and gravel	138	141
	Sand and some gravel water-bearing	141	149
	Clay, blue and sand	149	155
	Casing: 24" from 0 to 70'		
	20" from 70 to 113'		
	16" from 112 to 145'		
	16" OD sump 145 to 155'		

Turn up Sheet of sheets



DATE 4-20-00
CUSTOMER CITY OF FIRCREST
JOB NAME WELL #8 PUMP REPLACMENT

MOTOR

H.P. 75 MFGR. FRANKLIN
R.P.M. 3450 SIZE 8"
PHASE/CYCLE/VOLTS 460V- 3PH- 60HZ

DISCHARGE ELBOW

SIZE 6"
MATERIAL STEELE

COLUMN ASSEMBLY

PIPE SIZE/LENGTH 6" T.N.C.
PIPE WALL SCH 40

CABLE

SIZE #2 FLAT JACKET
MATERIAL COPPER
LENGTH 135'

BOWL ASSEMBLY

MODEL 8RJHC GOULDS
NO. OF STAGES 4
G.P.M. 600 T.D.H. 352'
MATERIAL:
BOWL CAST IMPELLER BRONZE
SHAFT S.S BEARING BRASS
COLLET S.S BOLTS S.S
BOWL W.R. MATERIAL S.S
IMPELLER W.R. MATERIAL BRONZE

MOTOR ADAPTER

TYPE
SIZE

SHROUD

MATERIAL PVC
SIZE 12"

COMMENTS:

HOLT DRILLING INC.
P.O. BOX 1890
MILTON WA. 98354
PH 253-845-7448
FAX 253-770-1420

City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467
RECORDING # 200010180391

WELLS 5&9

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE OF WASHINGTON
CERTIFICATE OF WATER RIGHT
SUPERSEDING

Document Title: Certificate of Water Right

Agency: Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Applicant: City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467

Reference Number:

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
April 17, 1958	4832	4542	3150

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	TRIBUTARY OF (IF SURFACE WATERS)
Well 5 & Well 9	

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	1000	788

QUANTITY/TYPE OF USE/PERIOD OF USE

788 Acre-feet per year | Municipal supply | Year-round, as needed

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
E½ E½ SW¼	11	20	2E	12	Pierce

PARCEL # 7160200380

ADDITIONAL LEGAL IS ON PAGE 2

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 ¼	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
N/A	N/A	N/A	N/A	12	Pierce

PARCEL # N/A

ADDITIONAL LEGAL IS ON PAGE 2

COPY

1st page

City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467
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Applicant: City of Fircrest
115 Ramsdell Street
Fircrest, Washington 98467

Reference Number:

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
April 9, 1940	Declaration of Claim	925	876-D

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	TRIBUTARY OF (IF SURFACE WATERS)
Well 5 & Well 9	

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	250	157

QUANTITY/TYPE OF USE/PERIOD OF USE

157 Acre-feet per year Muncipal supply Year-round, as needed

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
E½ E½ SE¼	11	20	2E	12	Pierce

PARCEL # 7160200380

ADDITIONAL LEGAL IS ON PAGE 2

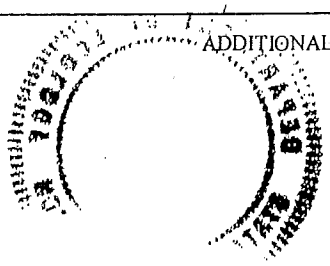
LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 ¼	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
N/A	N/A	N/A	N/A	12	Pierce

PARCEL # N/A

ADDITIONAL LEGAL IS ON PAGE 2

COPY of 1st page



WELL 7

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. W-16376
UNIQUE WELL I.D. # AAY306
Water Right Permit No. Cert #3150

OWNER: Name City of Fircrest Address 115 Ramsdell Street

LOCATION OF WELL: County Pierce NE 1/4 SE 1/4 Sec 11 T. 20 N., R. 2E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) same as above - well located in Masko Park

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) FW-9
Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☒ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches. Drilled 165 feet. Depth of completed well 163.2 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 16 " Diam. from 0 ft. to 130 ft. Welded ☐ Liner installed ☐ Threaded ☐ " Diam. from ft. to ft. " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Steel Continuous Slot Model No.
Diam. 14 Slot size 0.060 from 124 ft. to 133.7 ft.
Diam. Slot size 0.120 from 133.7 ft. to 153.2 ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal cement grout
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing streta off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ~284 ft.
Static level 65.5 ft. below top of well Date 1-8-97
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? PGG/Holt
Yield: 2050 gal./min. with 10 ft. drawdown after 72 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test 1-8-97 to 1-11-97
Baller test gal./min. with ft. drawdown after hrs.
Airtest gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water ~50°F Was a chemical analysis made? Yes ☒ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Brown, silty, gravelly SAND (TILL)	0	26
Gray, clean to silty, gravelly SAND	26	32
Brown to gray, fine to medium SAND w/ abundant carbonized wood from 60 to 64	32	92
Brown and gray, sandy GRAVEL	92	118.5
Brown, gravelly SAND grading to brown, fine to medium SAND	118.5	124
Brown and gray, very sandy GRAVEL	124	133
Brown and gray, coarse sandy GRAVEL (silt pebbles @ 155')	133	156
Brown, silty SAND and brown, silty, sandy GRAVEL	156	165
Log prepared by Russ Prior of Pacific Groundwater Group		

Work Started 12-6-96 19. Completed 12-16-96 19

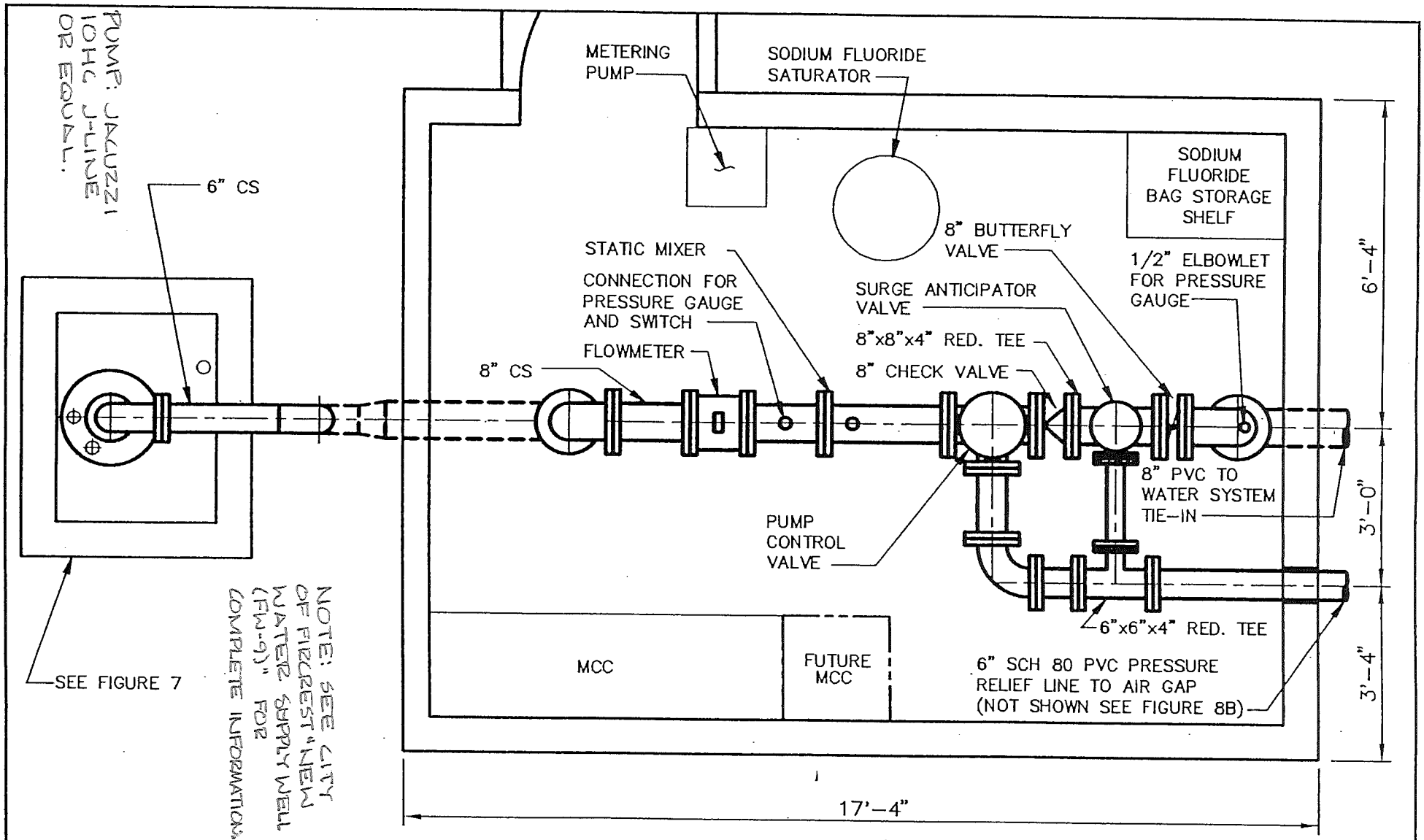
WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Holt Drilling Inc (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 10621 Todd Rd E
(Signed) Rudy Holt (WELL DRILLER) License No. 1099
Contractor's Registration No HOLTDJ-136OG Date 1-17 19 97

(USE ADDITIONAL SHEETS IF NECESSARY)

ECL 050-1-20 (2/93)



BLACK & VEATCH
SPECIAL PROJECTS CORP.

12" 6" 0 1' 2' 3'
SCALE: 3/8"=1'-0"

CITY OF FIRCREST
FW-9

PUMP HOUSE PIPING PLAN

FIGURE 9

murraysmith

APPENDIX J

CITY OF FIRCREST WATER SYSTEM

Coliform Monitoring Plan

A. System Information

1) Water System name: City of Fircrest
2) System ID number: 25150T
3) County: Pierce
4) Sources: See Attached
5) Reservoirs: 0.6 MG Golf Course Storage Tank
   0.2 MG High Storage Tank
   1.0 MG Low Storage Tank
6) Pressure Stations and Zones:
   Low Pressure Zone
   High Pressure Zone
   Golf Course Pressure Zone
   Booster Pressure Zone
7) Treatment: Sodium Flouride
8) Population and Connections:

Population Served	Equivalent Residential Units
6080	3790

B. Sampling Information

1) Minimum Number of Routine Monthly Samples:
   i) 7 when NO samples with a coliform presence were collected during the previous month
   ii) See repeat sample sets when ANY samples with a coliform presence were collected during the previous month
2) Total Number of Routine Sampling Sites: 7
3) Location of all Routine Sampling Sites:
   527 Ramsdell St.
   120 Ramsdell St.
   216 Contra Costa Ave.
   550 Harvard Ave.
   440 Buena Vista Ave.
   920 Daniels Dr.
   1300 Alameda Ave.
   Weathervane Booster Station Site
4) Number of (daily, weekly, bi-weekly) samples: N/A
5) Monthly Rotation Cycles: See Sheet 3
6) Repeat Sampling Site Availability:
   Repeat sample sites are available upstream and downstream of all set Sample locations.
   Low/High Reservoir Site
   Golf Course Reservoir Site

C. Plan Preparation information

1) Name of Plan Preparer: Trent Lougheed
2) Title or Position with System: City/Water System Engineer
3) Preparer's daytime phone: (360) 352-9456
4) Date(s) of Plan Preparation and/or Modification: 02/14/2014
5) Name and Office of Reviewer: (if Applicable) Northwest Drinking Water
6) Date of Last Review:

SAMPLING REQUIREMENTS

L sample set is in Low Pressure Zone, H sample set is in High Pressure Zone, G sample set is in Golf course, W sample set is in Weathervane, see address list below for sample locations.

ROUTINE SAMPLE LOCATION AND ROTATION

LOW PRESSURE ZONE

JAN	L1, L4	MAY	L4, L7	SEPT	L7, L1
FEB	L4, L7	JUNE	L7, L1	OCT	L1, L4
MAR	L7, L1	JULY	L1, L4	NOV	L4, L7
APRIL	L1, L4	AUG	L4, L7	DEC	L7, L1

HIGH PRESSURE ZONE

JAN	H1, H4	MAY	H1, H4	SEPT	H1, H4
FEB	H1, H4	JUNE	H1, H4	OCT	H1, H4
MAR	H1, H4	JULY	H1, H4	NOV	H1, H4
APRIL	H1, H4	AUG	H1, H4	DEC	H1, H4

GOLF COURSE PRESSURE ZONE

JAN	G1, G4	MAY	G1, G4	SEPT	G1, G4
FEB	G1, G4	JUNE	G1, G4	OCT	G1, G4
MAR	G1, G4	JULY	G1, G4	NOV	G1, G4
APRIL	G1, G4	AUG	G1, G4	DEC	G1, G4

WEATHERVANE PRESSURE ZONE

JAN	W1,	MAY	W1	SEPT	W1
FEB	W1	JUNE	W1	OCT	W1
MAR	W1	JULY	W1	NOV	W1
APRIL	W1	AUG	W1	DEC	W1

REPEAT SAMPLE SET LOCATIONS

Four repeat samples are to be taken within 24 hours for each routine sample showing coliform presence in that routine sample. Sample locations include a repeat of the failed sample location, one sample from 5 service connections upstream, one sample from 5 service connection downstream and one random sample location. Random sites may be any site shown on attached map with the exception of those specifically listed in the repeat set.

FAILED SITE	REPEAT SET
L1	L1, L2, L3 and random
L4	L4, L5, L6 and random
L7	L7, L8, L9 and random
H1	H1, H2, H3 and random
H4	H4, H5, HL6 and random
G1	G1, G2, G3 and random
G4	G4, G5, G6 and random
W1	W1, W2, W3, and random

MONTH AFTER FOLLOW UP LOCATIONS

Five samples must be taken one month after coliform presence, and may be counted as routine. Samples may be taken from any of the sampling locations indicated on the address list below.

SAMPLE LOCATIONS

Low Pressure Zone

L1	527 Ramsdell St.
L2	513 Ramsdell St.
L3	611 Ramsdell St.
L4	120 Ramsdell Street
L5	717 San Juan Ave.
L6	909 Altadena Ave.
L7	550 Harvard Ave.
L8	523 Harvard Ave.
L9	209 Regents Blvd.
L10	Low Tank

High Pressure Zone

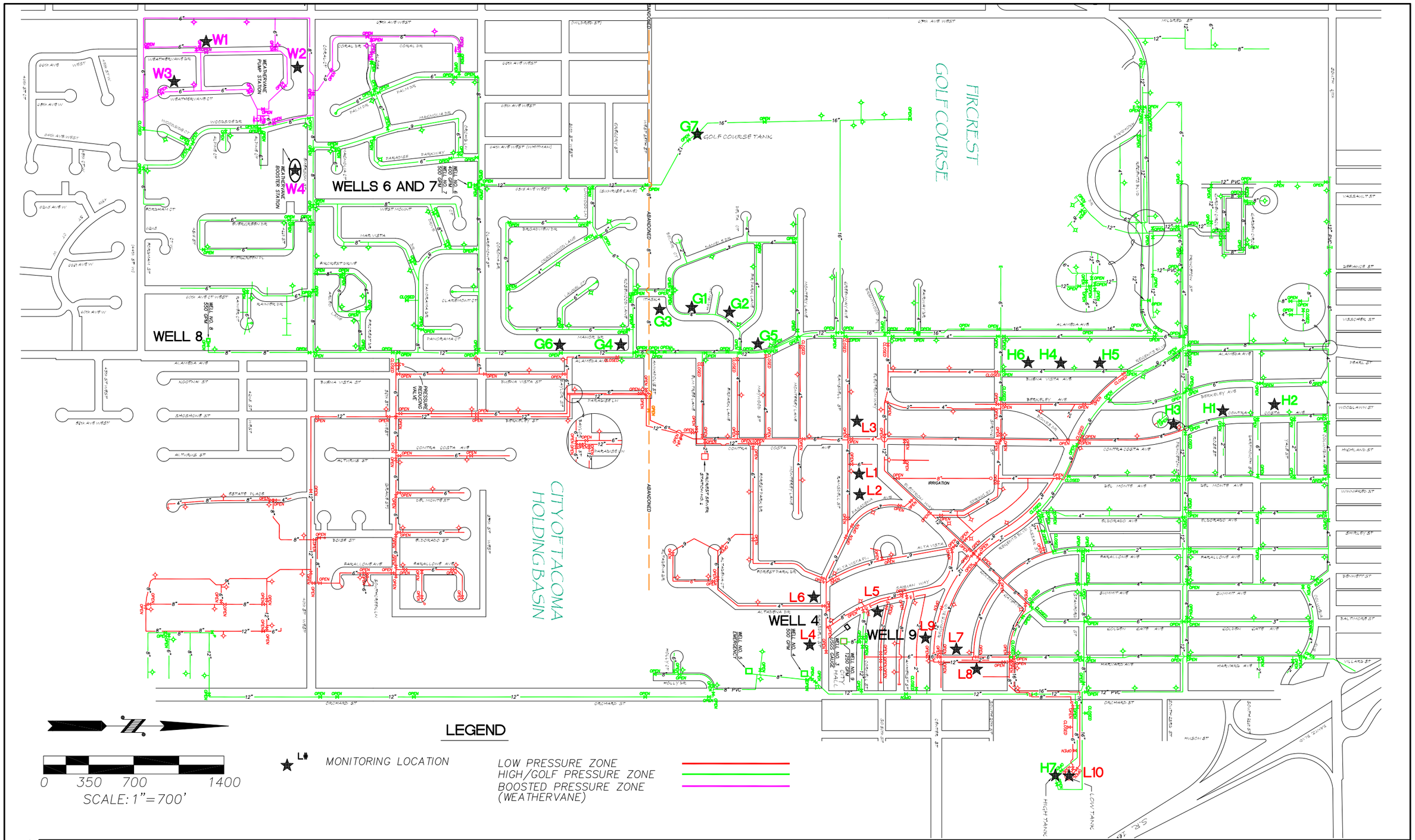
H1:	216 Contra Costa Ave.
H2	136 Contra Costa Ave.
H3	302 Contra Costa Ave.
H4	440 Buena Vista Ave.
H5	426 Buena Vista Ave.
H6	458 Buena Vista Ave.
H7	High Tank

Golf Course Pressure Zone

G1	920 Daniels Dr.
G2	908 Daniels Dr.
G3	940 Daniels Dr.
G4	1300 Alameda Ave.
G5	1222 Alameda Ave.
G6	1328 Alameda Ave.
G7	Golf Course Tank

Boosted Pressure zone (Weathervane)

W1	1506 Weathervane Dr,
W2	1633 Weathervane Ct.
W3	1410 Weathervane Dr.
W4	Weathervane Booster Station



NO	DATE	BY	APPR	REVISIONS

JWM&A Civil • Municipal • Geotechnical Engineering and Planning
Jerome W. Morrissette & Associates Inc., P.S.
1700 Cooper Point Road SW, #B-2, Olympia, WA 98502-1110 • (360) 352-9456 • FAX (360) 352-9990

T.J.L. DESIGNED BY	10/27/09 DATE
T.W., C.D.M. C.A.D.D. BY	10/27/09 DATE
CHECKED BY	DATE
10/27/09 DATE PLOTTED	

CITY OF FIRCREST

COLIFORM MONITORING PLAN

00445 COLIFORM MONITORING PLAN | SHT 1 OF 1

Please Print Plainly
USE HEAVY PEN
DO NOT WRITE IN SHADED AREAS

WATER MANAGEMENT LABORATORIES INC.
1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

*24

INORGANIC CHEMICALS (IOCS) REPORT

System ID No: 25150T	System Name: City of Fircrest	
Lab/Sample No: 0849339	Date Collected: 08-29-13	DOH Source No: 505
Multiple Source Nos: NA	Sample Type: A	Sample Purpose: C
Date Received: 08-29-13	Date Reported: 09 11 13	Supervisor: [illegible]
County: Pierce	Date Digested: NA	Group: (A) B Other
Sample Location: Well #4		
Send Results & Bill To: City of Fircrest 115 Ramsdell street Fircrest, WA 98466	Remarks:	

DOH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger?	EXCEEDS MCL?	Method/Analyst	
	EPA REGULATED									
4	Arsenic	0.001	mg/L	0.001	0.01	0.01	NO	NO	200.8	DMS
5	Barium	<0.01	mg/L	0.01	2	2			200.8	DMS
6	Cadmium	<0.0001	mg/L	0.0001	0.005	0.005			200.8	DMS
7	Chromium	<0.007	mg/L	0.007	0.1	0.1			200.8	DMS
11	Mercury	<0.0002	mg/L	0.0002	0.002	0.002			200.8	DMS
12	Selenium	<0.002	mg/L	0.002	0.05	0.05			200.8	DMS
110	Beryllium	<0.0003	mg/L	0.0003	0.004	0.004			200.8	DMS
111	Nickel	<0.005	mg/L	0.005	0.1	0.1			200.8	DMS
112	Antimony	<0.003	mg/L	0.003	0.006	0.006			200.8	DMS
113	Thallium	<0.001	mg/L	0.001	0.002	0.002			200.8	DMS
116	Cyanide	<0.01	mg/L	0.01	0.2	0.2			4500-CNF	LAL
19	Fluoride	0.8	mg/L	0.5	2	4			300.0	LAL
114	Nitrite - N	0.1	mg/L	0.1	0.5	1			300.0	LAL
20	Nitrate - N	2.0	mg/L	0.2	5	10			300.0	LAL
161	Total Nitrate/Nitrite	2.1	mg/L	0.5	5	10	↓	↓	300.0	LAL
	EPA REGULATED (Secondary)									
8	Iron	<0.1	mg/L	0.1	0.3	0.3	NO	NO	3111B	DMS
10	Manganese	<0.01	mg/L	0.01		0.05			200.8	DMS
13	Silver	<0.01	mg/L	0.1		0.1			200.8	DMS
21	Chloride	7	mg/L	20		250			300.0	LAL
22	Sulfate	14	mg/L	50		250			300.0	LAL
24	Zinc	<0.2	mg/L	0.2	5	5	NO	↓	200.8	DMS
	STATE REGULATED									
14	Sodium	10	mg/L	5					200.8	DMS
15	Hardness	137	mg/L	10					2340C	DH
16	Conductivity	280	umhos/cm	70		700		NO	2510B	LAL
17	Turbidity	<0.1	NTU	0.1					2130B	LAL
18	Color	<5.0	color units	15		15		NO	2120B	LAL
26	Total Dissolved Solids	NA	mg/L	100		500		—	2540C	—
	STATE UNREGULATED									
9	Lead	<0.001	mg/L	0.001					200.8	DMS
23	Copper	<0.02	mg/L	0.02					200.8	DMS

COMMENTS: Full Chem 28

Health

Cross-Connection Control Activities (Blue)
Annual Summary Report (ASR) for 2019

PWS ID: **25150T** PWS Name: **FIRCREST, CITY OF** County: **PIERCE**

Part 1: Designated Cross-Connection Control Specialist (CCS) Information

CCS Name	Jeff P Davis	CCS Phone	253-564-8900 ext- 4137	CCS Cert. #	003443	BAT Cert. #	
CCS is: PWS owner or employee							

Part 2: Status of Cross-Connection Control (CCC) Program at End of 2019

Provide information about the status of your CCC Program at the end of the reporting year.

PWS has:		Program Plan Last Updated[3] 07/24/2007
	A written CCC Program Plan[1] • Yes ○ No	
	CCC implementation activities[2] • Yes ○ No	

[1] Enter "Yes" if PWS has **any** type of written CCC Program Plan, policies, or procedures. Written CCC Program Plan must be part of a Water System Plan (WSP) or Small Water System Management Program (SWSMP).

[2] Enter "Yes" if PWS implemented **any** CCC Program activities during the reporting year, such as establishing legal authority, conducting hazard evaluations, requiring installation of backflow assemblies to protect the PWS, requiring assembly testing, maintaining CCC records, or enforcing the PWS's or CCC Program requirements.

[3] PWS can update the CCC Program Plan at any time (independent of WSP or SWSMP update).

Provide information regarding PWS's specific CCC Program Elements.

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is:	
		Included in Written Program Plan	Being Implemented or Is Completed
1	Legal Authority Established	• Yes ○ No	• Yes ○ No
2	Hazard Evaluation Procedures and Schedules	• Yes ○ No	• Yes ○ No
3	Procedures/Schedules for Ensuring Installation of Backflow Preventers	• Yes ○ No	• Yes ○ No
4	Certified CCS Provided	• Yes ○ No	• Yes ○ No
5	Backflow Preventer Inspection and Testing	• Yes ○ No	• Yes ○ No
6	Assembly Testing Quality Assurance/Quality Control (QA/QC) Program	• Yes ○ No	• Yes ○ No
7	Backflow Incident Response Procedures	• Yes ○ No	• Yes ○ No
8	Public Education Program	• Yes ○ No	• Yes ○ No
9	CCC Records	• Yes ○ No	• Yes ○ No
10	Reclaimed Water Permit	○ Yes ○ No • N/A	○ Yes ○ No • N/A

Part 3A: PWS Characteristics at End of 2019

Enter the number of connections (new and existing) served by the PWS by type.

Type of Service Connection	Number
Residential (As defined by PWS)	2717
All Other (include dedicated fire lines, dedicated irrigation lines, and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers, and docks)	136
Total Number of Connections	2853

(Question I)

Part 3B: Cross-Connection Control for Severe and High-Hazard Premises and High-Hazard Dedicated Lines Served by the PWS

Answer the following questions carefully. These answers control your access to pages 2 and 3 for data entry.

1. **Does your PWS serve any severe or high-hazard premises or any high-hazard dedicated fire or irrigation lines?** ○ Yes • No

2. **Does PWS serve any high-hazard medical premises?** ○ Yes • No

- If you answer Yes to both questions, you must enter data in at least one row on page 2 and one row on page 3.
- If you answer Yes to Question 1 and No to Question 2, you must enter data on page 2 only.
- If you answer No to both questions, pages 2 and 3 will be grayed out to prevent data entry.

- Count only premises PWS serves water to.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information.**

Type of Severe or High-Hazard Premises or Dedicated Lines [WAC 246-290-490(4)(b)]	Number of Connections at end of 2019			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Agricultural (farms and dairies)				
Beverage bottling plants (including breweries)				
Car washes				
Chemical plants				
Commercial laundries and dry cleaners				
Both reclaimed water and potable water provided				
Film processing facilities				
Dedicated fire lines with chemical addition or using unapproved auxiliary supplies				
Food processing plants (including canneries, slaughter houses, rendering plants)				
Hospitals, medical centers, medical, dental and veterinary clinics, mortuaries, nursing homes, etc., reported on Part 3C page 3 (totals imported from page 3)	0	0	0	0
Dedicated irrigation systems using purveyor's water supply and chemical addition[4]				
Laboratories				
Metal plating industries				
Petroleum processing or storage plants				
Piers and docks				
Radioactive material processing plants or nuclear reactors				
Survey access denied or restricted				
Wastewater lift/pump stations (non-residential only)				
Wastewater treatment plants				
Unapproved auxiliary water supply interconnected with potable water supply				
Totals	0	0	0	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections whose premises isolation preventers were inspected (AGs) or tested (RPs) during the reporting year.

[4] For example, dedicated irrigation lines to parks, playgrounds, golf courses, cemeteries, estates, etc.

[5] Premises with hazardous materials or processes (requiring isolation by AG or RP), such as aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, for example "Other manufacturing" or "Other commercial".

Part 3C: Cross-Connection Control for High-Hazard Medical Premises Served by the PWS

- Count only medical premises PWS serves water to
- Don't count the same premises more than once. If you serve different medical category premises through a single connection, count the connection under the medical category you consider to pose the highest hazard to PWS.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information**

Type of High-Hazard Medical Premises [WAC 246-290-490(4)(b)]	Number of Connections at end of 2019			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)				
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers				
Out-patient clinics and offices				
Alternative health out-patient clinics and offices				
Psychiatric out-patient clinics and offices				
Chiropractors with water-connected X-ray equipment				
Hospice care centers				
Childbirth centers				
Kidney dialysis centers				
Blood centers				
Dental clinics and offices				
Facilities for Housing Patients				
Nursing homes				
Assisted Living Facilities (formerly Boarding Homes)				
Residential treatment centers				
Other Medical-Related Facilities				
Mortuaries with embalming equipment				
Morgues and autopsy facilities (not in hospitals)				
Veterinarian offices, clinics and hospitals				
Totals	0	0	0	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises backflow preventers only or connections with premises isolation DCVAs or DCDAs isolation.

Part 4A: Backflow Preventer Inventory and Testing Information for 2019

- Complete all fields. Enter **zero (0)**, if no backflow preventers in a specific category.
- Count only backflow preventers relied on to protect the PWS.
- Count AVBs on *irrigation systems only*. Select No to AVB question above Table 2 if PWS doesn't track AVBs.
- Count multiple tests (or failures) for the same backflow preventer as one test (or failure) for that backflow preventer.
- For multiple service connections or parallel installations, count each assembly separately.
- Count RPDAs and DCDAs as ***single*** assemblies. Count the tests of the mainline assembly and bypass assembly as ***one test***. Count the failure of either the mainline or bypass assembly (or the failure of both) as ***one failure***. Count an entire detector assembly taken out of service as ***one assembly removed from service***.
- Count assemblies installed on dedicated fire or irrigation lines as **Premises Isolation Assemblies** in Table 1.

	Backflow Preventer Category and Inspection/Testing Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
	Table 1: Premises Isolation Preventers (include preventers isolating PWS-owned facilities)								
	Existing Premises Isolation Backflow Preventers								
1	In service at beginning of 2019	0	0	0	365	0			
2	Inspected and/or tested in 2019[1]	0	0	0	0	0			
3	Failed inspection or test in 2019	0	0	0	0	0			
	New Premises Isolation Backflow Preventers								
4	Installed in 2019[2]	0	0	0	0	0			
5	Inspected and/or tested in 2019[1]	0	0	0	0	0			
6	Failed inspection or test in 2019	0	0	0	0	0			
	Premises Isolation Backflow Preventers (existing or new)								
7	Removed from service in 2019[3]	0	0	0	0	0			
	Total Premises Isolation Preventers at End of 2019	0	0	0	365	0	0	0	0
	Does PWS track AVBs on irrigation systems? ☐ Yes ◉ No								
	Table 2: In-Premises Preventers (include preventers within PWS-owned facilities)								
	Existing In-Premises Backflow Preventers								
8	In service at beginning of 2019	0	2	0	4	0	0	0	unk
9	Inspected and/or tested in 2019[1]	0	0	0	0	0	0	0	unk
10	Failed inspection or test in 2019	0	0	0	0	0	0	0	unk
	New In-Premises Backflow Preventers								
11	Installed in 2019[2]	0	0	0	0	0	0	0	unk
12	Inspected and/or tested in 2019[1]	0	0	0	0	0	0	0	unk
13	Failed inspection or test in 2019	0	0	0	0	0	0	0	unk
	In-Premises Backflow Preventers (existing or new)								
14	Removed from service in 2019[3]	0	0	0	0	0	0	0	unk
	Total In-Premises Preventers at End of 2019[4]	0	2	0	4	0	0	0	0
	Grand Totals at End of 2019	0	2	0	369	0	0	0	0

[1] Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only, using DOH-approved USC field test procedures).

[2] Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at the beginning of the reporting year. Replacement preventers may be of a different type than the originals.

[3] Existing or new preventers taken out of service, whether or not they were replaced by the same or a different type of preventer.

Part 4B: Other Implementation Activities in 2019

Complete all cells. Enter zero if not applicable.

Water Use Questionnaires	
Did your PWS send any water use questionnaires to customers during 2019?	○ Yes ● No

On-site Hazard Surveys			
Did your CCS conduct any on-site hazard surveys during 2019?			○ Yes ● No
	Service Connection Type		
	New	**Existing**	**Total**
1. Number of connections surveyed for cross-connection hazards to PWS.			0
2. Number of connections requiring backflow prevention to protect PWS.[1,2]			0

New Exceptions to Premises Isolation	
Did your CCS grant any new premises isolation exceptions in 2019 to high-hazard premises?[3]	○ Yes ● No

CCC Enforcement Actions	
Did your PWS take any enforcement actions during 2019?[4]	○ Yes ● No

[1] Include services where either premises isolation or in-premises preventers were required to protect the PWS.
[2] Include existing services that need new, additional or higher level backflow prevention.
[3] Submit a completed DOH Exception Form (green) for each new exception granted in the reporting year.
[4] "Enforcement actions" means actions taken by the PWS (such as water shut-off, PWS installation or testing of backflow preventer, assessment of fines, etc.) when the customer fails to comply with the PWS's CCC requirements.

Part 5: Backflow Incidents and "Off-Normal" Events in 2019

	Backflow Incidents, Risk Factors, and Indicators during 2019	Number
Backflow Incidents during 2019		
1	Backflow incidents that contaminated the PWS[5]	0
2	Backflow incidents that contaminated the customer's drinking water system ***only***[5]	0
Risk Factors for Backflow during 2019		
3	Distribution main breaks per 100 miles of pipe.	3.00
4	Low pressure events (<20 psi in PWS distribution system).	0
5	Water outage events.	0
Indicators of Possible Backflow during 2019		
6	Total health-related complaints received by PWS.[6]	8
7	Received during BWA or PN events.[7]	0
8	Received during low pressure or water outage events.	8
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	7
10	Received during BWA or PN events.[7]	0
11	Number of these complaints received during low pressure or water outage events.	0

[5] Purveyors must submit a Backflow Incident Report form for each backflow incident known to have contaminated the public water system. DOH is also interested in receiving incident report forms for backflow incidents that contaminated the customer's drinking water system only.
[6] Such as stomach ache, headache, vomiting, diarrhea, skin rashes, etc.
[7] "**BWA**" means **Boil Water Advisory** and "**PN**" means **Public Notification** for water quality reasons.

Part 6: Comments and Clarifications

- Enter comments to:
  - Explain or clarify information in this report
  - Describe challenges faced or accomplishments made in this reporting year
  - Share your goals and objectives for the coming reporting year
- Delete comments that are no longer valid

No Comments

Part 7: Report Certification and Contact Information

I [Certified by] certify that the information in this form is true, complete and accurate to the best of my knowledge.

Last Saved	05/15/2020	**All ASR Forms Certified/Submitted**	

Designated CCS/CCC Program Manager[1]					
Name	Jeff P Davis	**Title**	Utility Foreman	**CCS Cert #**	003443
Email Address	jeffd@cityoffircrest.net	**Phone**	253-564-8900	**Phone Ext**	4137

PWS Manager[2]					
Name	Jerry Wakefield	**Title**	Public Works Director	**Operator Cert #**	
Email Address	jwakefield@cityoffircrest.net	**Phone**	253-564-8900	**Phone Ext**	4134

[1] The CCS responsible for developing and implementing the PWS's CCC program (CCC Program Manager)

[2] The person the designated CCS/CCC Program Manager reports to or other manager having direct oversight of the CCC Program

Health

Cross-Connection Control Program Summary (Cream)
Annual Summary Report (ASR) for 2019

PWS ID: **25150T** PWS Name: **FIRCREST, CITY OF** County: **PIERCE**

Describe the characteristics of the PWS's Cross-Connection Control (CCC) Program at the end of 2019.

Part 1: CCC Program Characteristics

A. Type of Program Implemented

Type of Program	Check One
Premises isolation only.	○
Combination program: reliance on both premises isolation and in-premises prevention.	●
In transition from a combination program to a premises isolation only program.	○

B. Coordination with Authority Having Jurisdiction (AHJ) on CCC Issues

Indicate the status of coordination with AHJs in your service area. The AHJ is the entity that enforces the Uniform Plumbing Code at the local level. The AHJ is usually your county or city building department. Don't list DOH as an AHJ.

AHJ #	Name of AHJ (City or County Building Department)[1]	PWS		AHJ Declined to Coordinate
		Coordinates with AHJ	Has Written Agreement with AHJ	
1	City of Fircrest Building Department	Yes ○ No ●	Yes ○ No ●	Yes ○ No ●

[1] Do not enter an individual's name.

C. Corrective/Enforcement Actions Available to the Purveyor

Type of Corrective Action/Enforcement Action	Indicate Whether Available	Most Often Used (Check One)
Purveyor denies or discontinues water service.	Yes ○ No ●	○
Purveyor installs backflow assembly and bills customer.	Yes ○ No ●	○
Purveyor assesses fines (in addition to eliminating or controlling cross connection).	Yes ○ No ●	○
Purveyor tests backflow assembly and bills customer.	Yes ○ No ●	○

[1] Enter detailed description of other enforcement actions available to PWS. Don't enter "None", "Not Applicable", or "Not Available."

(Question I)

D. CCC Program Responsibilities

Do not include enforcement action related procedures or circumstances.

CCC Program Activity	Responsible Party (Check one per row)	
	Customer	Purveyor
Hazard Evaluation by DOH-certified CCS	○	●
Backflow preventer (BP) ownership	●	○
BP installation	●	○
BP *initial* inspection (for proper installation - all BPs)	○	●
BP *initial* test (for testable assemblies)	●	○
BP *annual* inspection (Air Gaps and AVBs)	●	○
BP *annual* test (for testable assemblies)	●	○
BP maintenance and repair	●	○

E. Backflow Prevention for Fire Protection Systems

Please remember to enter number of days allowed if you require retrofitting.

PWS coordinates with *AHJ* on CCC issues for fire sprinkler systems (FSSs)	Yes ○ No ○ N/A ●
PWS coordinates with *local Fire Marshal* on CCC issues for FSSs.	Yes ● No ○ N/A ○
PWS ensures backflow prevention is installed before serving *new* connections with FSSs.	Yes ● No ○
PWS requires retrofits to *high*-hazard FSSs.	Yes ○ No of days allowed No ● N/A ○
PWS requires retrofits to *low*-hazard FSSs.	Yes ○ No of days allowed No ● N/A ○

F. Backflow Prevention for Irrigation Systems

Minimum level of backflow prevention required on irrigation systems *without* chemical addition.	Not Addressed ○ AVB ○ PV/SVBA ○ DCVA ● RPBA ○
PWS currently inspects AVBs upon *initial* installation.	Yes ● No ○ N/A ○
PWS currently inspects AVBs upon repair, reinstallation or relocation.	Yes ● No ○ N/A ○

G. Used Water

Does PWS prohibit, by ordinance, rules, policy, by-laws or agreement, the intentional return of used water (e.g. for heating or cooling) into the distribution system?	Yes ● No ○
If not prohibited at present, date plan to prohibit use.	N/A
Current number of service connections returning used water to distribution system.	0

H. Backflow Prevention for Unapproved Auxiliary Water Supplies[1] NOT Interconnected with PWS

Show the **minimum** backflow preventer and type of protection required for service connections having unapproved auxiliary water supplies *when they are NOT interconnected to the PWS*

Existing service connections.	None ● DCVA ○ RPBA ○ AG ○
Type of protection required.	N/A ● In-premises prevention ○ Premises isolation ○
New service connections.	None ● DCVA ○ RPBA ○ AG ○
Type of protection required.	N/A ● In-premises prevention ○ Premises isolation ○

[1] An auxiliary water supply is any water supply on or available to customer's premises in addition to the purveyor's potable water supply

I. Backflow Prevention for Tanker Trucks and Temporary Water Connections

Minimum **level of backflow prevention (installed on or associated with the truck) required for tanker trucks taking water from PWS.**	AG • DCVA ○ RPBA ○ Not Specified ○ Tanker trucks not allowed ○
PWS requires tanker trucks to obtain water at designated fill sites each equipped with permanently installed backflow preventer(s).	Yes ○ (Minimum preventer: DCVA ○ RPBA ○) No • N/A ○ No sites provided ○
PWS currently accepts tanker trucks approved by other PWSs without further inspection or testing.	Yes ○ No • N/A ○
Minimum **level of backflow prevention required for temporary water connections (e.g., for construction sites).**	AG ○ DCVA • RPBA ○ Not specified ○ Temp. connections not allowed ○
PWS provides approved backflow preventer for temporary connections.	Yes • No ○ N/A ○ (Temp. connections not allowed)
PWS requires testing each time the temporary connection backflow preventer is relocated.	Yes • No ○ N/A ○ (Temp. connections not allowed)

J. Backflow Prevention for Non-Residential Connections

For each category shown, indicate whether PWS has non-residential connections of that type and the **minimum** level of ***premises isolation*** backflow prevention required (whether or not PWS currently has that type of customer).

Type of Connection	PWS has Customers of this Type	Minimum Premises Isolation Backflow Prevention Required
Commercial	Yes • No ○	Not Required ○ DCVA • RPBA ○
Industrial	Yes • No ○	Not Required ○ DCVA ○ RPBA •
Institutional	Yes • No ○	Not Required ○ DCVA • RPBA ○

K. Backflow Prevention for Wholesale Customers

Indicate whether the PWS requires backflow prevention at interties with wholesale customers (other PWSs).

Type of Intertie	PWS has Customers of this Type	Minimum Backflow Prevention Required (if prevention is required, indicate minimum level).	
Existing	Yes ○ No •	Not specified / Not required ○ Always required ○ Required only if purchaser's CCC program is inadequate •	Minimum required (if applicable): DCVA • RPBA ○
New	Yes ○ No •	Not specified / Not required ○ Always required ○ Required only if purchaser's CCC program is inadequate •	Minimum required (if applicable): DCVA • RPBA ○

L. Exceptions to Mandatory Premises Isolation

PWS's written CCC Program Plan *allows* system to grant exceptions to mandatory premises isolation per WAC 246-290-490(4)(b)(iii)	Yes ○ No • Doesn't Address ○
PWS currently grants new Exceptions.	Yes ○ No •
PWS granted Exceptions in past reporting years.	Yes ○ No •

Part 2: CCC Program Record-Keeping Software

Indicate the type or name of computer software the PWS uses to track CCC records

BPMS ○	Cross-Track (BMI) ○	Tokay ○	XC2 ○	Custom developed for or by PWS[1] ○
Other non-CCC software (e.g. Excel) ●	Other commercial CCC software (specify) ○	None Used ○		

[1] Do not include commercial CCC software customized for PWS. If PWS uses customized commercial software, check the box for the appropriate commercial software name.

Part 3: Comments and Clarifications

- Enter comments to:
  - Explain or clarify information in this report.
  - Describe accomplishments made in this reporting year.
  - Identify challenges faced in this reporting year.
  - Share your goals and objectives for the coming reporting year.
- Delete comments that are no longer valid.

No Comments

Part 4: Report Certification and Contact Information

I,[Certified by], certify that the information in this form is true, complete and accurate to the best of my knowledge.

Last Saved	05/15/2020	**All ASR Forms Certified/Submitted**	

Designated CCS/CCC Program Manager[1]

Name	Jeff P Davis	**Title**	Utility Foreman	**CCS Cert #**	003443
Email Address	jeffd@cityoffircrest.net	**Phone**	253-564-8900	**Phone Ext**	4137

PWS Manager[2]

Name	Jerry Wakefield	**Title**	Public Works Director	**Operator Cert #**	
Email Address	jwakefield@cityoffircrest.net	**Phone**	253-564-8900	**Phone Ext**	4134

[1] The CCS responsible for developing and implementing the PWS's CCC program (CCC Program Manager)

[2] The person the designated CCS/CCC Program Manager reports to or other manager having direct oversight of the CCC Program.

Water Quality Monitoring Schedule

System: FIRCREST CITY OF
Contact: Jeffrey P Davis

PWS ID: 25150 T
Group: A - Comm

Region: NORTHWEST
County: PIERCE

NOTE: To receive credit for compliance samples, you must fill out laboratory and sample paperwork completely, send your samples to a laboratory accredited by Washington State to conduct the analyses, AND ensure the results are submitted to DOH Office of Drinking Water. There is often a lag time between when you collect your sample, when we credit your system with meeting the monitoring requirement, and when we generate the new monitoring requirement.

Coliform Monitoring Requirements

	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021
Coliform Monitoring Population	6578	6579	6578	6578	6580	6578	6579	6614	6358	6357	6613	6615
Number of Routine Samples Required	7	7	7	7	7	7	7	7	7	7	7	7

- Collect samples from representative points throughout the distribution system.
- Collect required repeat samples following an unsatisfactory sample. In addition, collect a sample from each operating groundwater source.
- For systems that chlorinate, record chlorine residual (measured when the coliform sample is collected) on the coliform lab slip.

Chemical Monitoring Requirements

Distribution Monitoring

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Lead and Copper	20	Jan 2020 - Dec 2022	standard - 3 year	09/13/2019	Aug 2022
Asbestos	1	Jan 2020 - Dec 2028	standard - 9 year	10/27/1998	Sep 2021
Total Trihalomethane (THM)	1	Jan 2020 - Dec 2020	reduced - 1 year	09/19/2019	***Oct 2020***
Halo-Acetic Acids (HAA5)	1	Jan 2020 - Dec 2020	reduced - 1 year	09/19/2019	***Oct 2020***

(Questions K & L)

Water Quality Monitoring Schedule

Notes on Distribution System Chemical Monitoring

For *Lead and Copper*:
- Collect samples from the COLD WATER side of a KITCHEN or BATHROOM faucet that is used daily.
- Before sampling, make sure the water has sat unused in the pipes for at least 6 hours, but no more than 12 hours (e.g. overnight).
- If you are sampling from a faucet that has hot water, make sure cold water is the last water to run through the faucet before it sits overnight.
- If your sampling frequency is annual or every 3 years, collect samples between June 1 and September 30.

For *Asbestos*: Collect the sample from one of your routine coliform sampling sites in an area of your distribution system that has asbestos concrete pipe.

For *Disinfection Byproducts (HAA5 and TTHM)*: Collect the samples at the locations identified in your Disinfection Byproducts (DBP) monitoring plan.

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S02 *WELLS #6 & 7 WF* *Well Field* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*	
Nitrate	1	Jan 2020 - Dec 2020	standard - 1 year	10/17/2019	***Oct 2020***	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	07/10/2018	Jul 2027	
Manganese	1	Jan 2020 - Dec 2022	standard - 3 year	07/10/2018	Jul 2022	
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	05/12/2014	***May 2020***	***Past Due***
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	08/14/2012	Aug 2021	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/22/2016		
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year			
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	05/10/2016	May 2022	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	05/10/2016	May 2022	

Source S03 *WELL #8 ACN701* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2020 - Dec 2020	standard - 1 year	10/17/2019	***Oct 2020***
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	10/16/2018	Oct 2027

Water Quality Monitoring Schedule

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S03 *WELL #8 ACN701* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*	
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	05/12/2014	***May 2020***	***Past Due***
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/13/2016		
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/22/2016		
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year			
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	10/15/2015	Oct 2021	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	06/15/2017	Oct 2021	

Source S05 *WELL #4 AEF223* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2020 - Dec 2020	standard - 1 year	10/17/2019	***Oct 2020***
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	08/29/2013	Aug 2022
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	08/31/2016	Aug 2022
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	08/28/2019	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	08/28/2019	
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year	02/15/1996	
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	08/25/2015	Aug 2021
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	08/25/2015	Aug 2021

Source S09 *WELL #9 AAY306* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2020 - Dec 2020	standard - 1 year	10/17/2019	***Oct 2020***

Water Quality Monitoring Schedule

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S09 *WELL #9 AAY306* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	08/28/2019	Aug 2028
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	03/23/2015	Mar 2021
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	03/23/2015	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	03/23/2015	
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	08/25/2015	Aug 2021
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	08/25/2015	Aug 2021

Water Quality Monitoring Schedule

Other Information

Other Reporting Schedules	***Due Date***
Measure chlorine residuals and submit monthly reports if your system uses continuous chlorination:	monthly
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2020
Submit CCR certification form to ODW (Community systems only):	10/01/2020
Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2020
Send notices of lead and copper sample results to the customers sampled:	30 days after you receive the laboratory results
Submit Certification of customer notification of lead and copper results to ODW:	90 days after you notify customers

Special Notes

None

Northwest Regional Water Quality Monitoring Contacts

For questions regarding chemical monitoring:	Steve Hulsman: (253) 395-6777 or Steve.Hulsman@doh.wa.gov
For questions regarding DBPs:	Steve Hulsman: (253) 395-6777 or Steve.Hulsman@doh.wa.gov
For questions regarding coliform bacteria and microbial issues:	Ingrid Salmon: (253) 395-6775 or ingrid.salmon@doh.wa.gov

Additional Notes

The information on this monitoring schedule is valid as of the date in the upper left corner on the first page. However, the information may change with subsequent updates in our water quality monitoring database as we receive new data or revise monitoring schedules. There is often a lag time between when you collect your sample and when we credit your system with meeting the monitoring requirement.

We have not designed this monitoring schedule to display all compliance requirements. The purpose of this schedule is to assist water systems with planning for most water quality monitoring, and to allow systems to compare their records with DOH ODW records. Please be aware that this monitoring schedule does not include constituents that require a special monitoring frequency, such as monitoring affiliated with treatment.

Any inaccuracies on this schedule will not relieve the water system owner and operator of the requirement to comply with applicable regulations.

If you have any questions about your monitoring requirements, please contact the regional office staff listed above.

murraysmith

APPENDIX L

2020 Annual Water Quality

Providing our customers with safe and reliable drinking water as well as educating and informing you on the importance of using water efficiently for future generations and the environment is a primary mission of the City of Fircrest Water Utility.

These annual reports are intended to provide current, factual and educational information about your drinking water and the importance of conserving. This report also includes details about where your water comes from, what it contains and how it compares to the stringent standards set by regulatory agencies and information on why we should conserve and how the city promotes conservation and our efforts to minimize water loss.

All public water systems are required by the Environmental Protection Agency (EPA), the State of Washington and the Department of Health to provide all of their water customers with annual reports on the quality of the drinking water provided and the City's efforts on promoting and educating our water conservation efforts.

Where does the water come from?

The City owns and operates the water system which consists of five ground wells and three reservoir tanks with a capacity of 1.8 million gallons. The water comes from two underground aquifers called the Vashon Advance Outwash and the Colvos Sand.

Wellhead Protection Plan

Preventing pollution is the first priority in protecting our groundwater supply. The objective is to reduce the risks of water supply contaminations by chemicals or other materials that might make the water supply unusable. Fircrest is completely dependent on groundwater. To protect the City's many wellheads, the focus is on human activity on the land above the water-bearing zones called aquifers. The City has developed a Wellhead Protection Plan that has been approved by the State Department of Health.

Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Question M

Why are there contaminants in my water?

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and can pick up substances resulting from the presence of animals or human activity.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at (1-800-426-4791) or from the EPA's Office of Ground Water website at: www.epa.gov/OGWDW.

In order to assure the water system remains free of coliform bacteria, the City has implemented a disinfection system to the water system. This will provide an extra layer of protection to the miles of pipes that we have in our system and also our storage facilities.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses, parasites and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, and farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can, also, come from gas stations, urban storm water runoff, and septic systems.

Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

2019 MONITORING RESULTS

Substance	Highest Level Allowed (MCL)	Highest Level Detected	Ideal Goals (MCLG)	Range of Level Detected Exceed AL	Meets Standards	Potential Source
Inorganic Chemicals (IOC's)						
Fluoride	2 ppm	0.89 ppm	4 ppm	0.20 – 0.89	Yes	Treatment Additive
Nitrites	10 ppm	4.49 ppm	10 ppm	1.76 – 4.49	Yes	Erosion of Natural Deposits
Lead	15 ppb	0.0065 ppm	0	<0.0010 - 0.065	Yes	Household Plumbing
Copper	1.3 ppm	0.713 ppm	1.3ppm	<0.020 – 0.713	Yes	Household Plumbing

Microbiologic Contaminants						
Coliform	5%	None	0.5 ppm	None	Yes	Naturally Present in the Environment
Chlorine	4 ppm	1.27 ppm	4 ppm	0.10 – 1.27	Yes	Additive to control microbes
Inorganic Chemicals (IOC's)						
Tests were performed in 2019 on 27 inorganic chemicals for which none exceeded the MCL.						
Volatile Organic Chemicals (VOC's)						
Tests were performed in 2016 on 47 volatile organic chemicals for which none were detected.						
Synthetic Organic Chemicals (SOC's)						
Tests were performed in 2015 on 44 synthetic organic chemicals for which none were detected.						

Definitions:

Maximum Contaminant Level of MCL: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal or MCLG: The level of a contaminant in drinking water below which there is no known or expected risk of health. MCLGs allow for a margin of safety.

Action Level: The concentration of a contaminant which, if exceeded, triggers treatment of other requirements that a water system must follow.

Treatment Technique or TT A required process intended to reduce the level of a contaminant in drinking water.

Maximum Residual Disinfectant Level or MRDL: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal or MRDLG: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

ppm – parts per million **ppb** – parts per billion

murraysmith

APPENDIX M

Wellhead Protection Program

A complete Wellhead Protection Plan was prepared by Dames & Moore and submitted to the Washington State Department of Health – Northwest Drinking Water Division (DOH) in June of 1998. The existing Wellhead Protection Plan (prepared by Dames and Moore; 06/17/1998 – on file with WSDOH) will be sufficient for this Comprehensive Water System Plan, and no other work will be required for this portion of the plan. This plan identifies potential impact areas to all of the City of Fircrest water system wellheads, inventories potential contamination sources within the various impact areas (6 month, 1 year, 5 year and 10 year), provides a contingency plan for alternative water supplies for each system, provides an emergency spill response plan, and describes the implementation of the wellhead protection education program.

murraysmith

APPENDIX N

City of Fircrest

Hydraulic Analysis

Prepared on:

February, 2014

Prepared by:

Jerome W. Morrissette and Associates Inc., P.S.
1700 B2 Cooper Point Road SW
Olympia, WA 98502
(360) 352-9456

Source of Supply Analysis

Currently, the water system for the Fircrest community has 2,795 connections. The water system for the City of Fircrest does not have a limit on the number of approved service connections per the Operating Permit for Public Water System issued by the State of Washington.

The "Source of Supply Analysis" provided (see Attachment A) indicates that the system is currently capable of serving the existing 3,790 residential type connections (ERU's). The available storage for the analysis was adjusted so that only the storage in the existing reservoirs that provides a residual pressure of 30 psi during Peak Hourly Demand (PHD) was utilized (based on the results of the calibrated hydraulic model). The six year (end of year 2019) ERU count is estimated to be 3,820 ERU's based on data provided in Chapter Two (basic planning data).

Hydraulic Analysis

Another objective of this planning effort was to establish a distribution system hydraulic model for the Fircrest water system. A hydraulic model is a valuable tool necessary for the evaluation of a water system. The primary purpose and benefit of the hydraulic analysis is in the understanding of the distribution system capabilities to meet domestic demands and fire flow demands. Once the hydraulic model has been established, "what if" scenarios can be readily evaluated so that the most cost effective solutions can be made in order to provide for domestic demands and fire flow demands for both the existing service area and the future projected service area.

The hydraulic model for the water system was developed using Bently WaterCAD Version 8. The results of the hydraulic analyses are located in Attachment B. The model was calibrated to results from fire flow tests. The calibrated models best represent the conditions that exist for the current system.

The following is the description of the system operations for the Fircrest Water System:

> The system currently contains six wells, a 1,000,000 gallon reservoir, a 600,000 gallon reservoir, and a 200,000 gallon reservoir. All wells are currently controlled by a telemetering system. A signal is sent to a well pump to turn on when the water level in the reservoirs drop to set elevations. The wells run on an alternate basis unless the first well that is called on cannot fill the reservoirs while maintaining the domestic demand of the system. At that time, the controls will call for a second pump to turn on. If the two well pumps cannot fill the reservoirs while maintaining the domestic demand of the system, a third pump will be signaled to turn on, and so on. Once the water level in the reservoirs approach the overflow elevations, a signal is sent to the well pumps to turn off.

As shown on the hydraulic model base map, the system is comprised of four pressure zones. The following is a detailed breakdown of the pressure zone characteristics and their capacities:

High Tank Pressure Zone:

Proceeding down the water system from north to south, the high reservoir subsystem (indicated by the blue colored facilities on the map) is served from the high reservoir and three of the wells. Wells 4, 5, and 9 feed this subsystem and the high reservoir. These wells are isolated from the low reservoir subsystem with "normally closed" gate valves. The gravity feed from this reservoir provides static pressures within the subsystem of approximately 51 psi at Summit Avenue and Princeton Place (the highest connection within the subsystem) and 83 psi at Alameda Avenue and Monterey Lane (the lowest connection). Pressures within the subsystem may increase slightly when the wells are on since the wells feed the high reservoir through the distribution system (no dedicated fill line). This subsystem is isolated from the other subsystems by a series of "normally closed" gate valves.

The hydraulic analysis was run for the peak hourly demand (PHD) at maximum build-out for this zone with an assumed reservoir water level elevation. The analysis was also run multiple times for maximum day demand (MDD) with fire flows at various extremity points throughout the zone. The distribution map used for the hydraulic model is also located in Attachment B.

During PHD the lowest pressure within this zone was 51.46 psi at Node J-21, which is well above the minimum requirement of 30 psi. In the analyses with MDD and fire flow, the run with the lowest pressures was with 2500 gpm fire flow at Node J-45. This run yielded a low pressure of 34.72 psi at Nodes J-51, J-199, J-201, and J-202, which is still well above the minimum requirement of 20 psi during fire flow demands. Because this pressure zone had no deficiencies during all analyses run, no further discussion will be presented for results after the proposed system improvements are completed.

Low Tank Pressure Zone:

The next subsystem proceeding southerly from the high reservoir subsystem along the east portion of the service area, the low reservoir subsystem, (indicated by the red colored facilities on the map) is served from the low reservoir. No wells directly feed this subsystem. However, wells 4, 5, and 9 can supply this subsystem if necessary by opening the "normally closed" gate valves, which normally directs the source flow to the high reservoir subsystem. The low reservoir receives water from the high reservoir through an altitude valve that utilizes pressure transducers (one pressure transducer provides an "open" signal when the level in the tank lowers, and one provides a close signal prior to low reservoir overflow) that control the flow from the high reservoir to the low reservoir. The gravity feed from the low reservoir provides static pressures within the subsystem of approximately 39 psi at the Summit Avenue and Harvard Avenue (highest connection within the subsystem) and 93 psi at Boise Street and Emerson Street (the lowest connection). This subsystem is isolated from the other subsystems by a series of "normally closed" gate valves and two pressure reducing valves.

The hydraulic analysis was run for the peak hourly demand (PHD) at maximum build-out for this zone with an assumed reservoir water level elevation. The analysis was also run multiple times for maximum day demand (MDD) with fire flows at various extremity points throughout the zone. All analyses were then re-run with the proposed system improvements #1 through #6 identified in Chapter 8. The distribution map used for the hydraulic model is also located in Attachment B.

During PHD the lowest pressure within this zone was 37.26 psi at Node J-67, which is above the minimum requirement of 30 psi. In the analyses with MDD and fire flow, the run with the lowest pressures was with 1,500 gpm fire flow at Node J-148. This run yielded a low pressure of 18.95 psi at Nodes J-67, which is still below the minimum requirement of 20 psi during fire flow demands. However, the pressure relief valves that serve this portion of the system will be adjusted to provide the additional pressure to meet the 20 psi requirement.

Golf Course Pressure Zone:

The next subsystem proceeding southerly from the high reservoir subsystem along the west portion of the service area, the golf course reservoir subsystem, (indicated by the green colored facilities on the map) is served from the golf course reservoir and three wells. Wells 6, 7, and 8 feed this subsystem and the golf course reservoir. The gravity feed from the golf course reservoir provides static pressures within the subsystem of approximately 39 psi at Aloha Drive and Palm Drive (the highest connection within the subsystem) and 88 psi at Dainiels Drive and Alameda Avenue (the lowest connection). Pressures within the subsystem may increase slightly when the wells are on since the wells feed the golf course reservoir through the distribution system (no dedicated fill line). This subsystem is isolated from the other subsystems by a series of "normally closed" gate valves and two pressure reducing valves.

The hydraulic analysis was run for the peak hourly demand (PHD) at maximum build-out for this zone with an assumed reservoir water level elevation. The analysis was also run multiple times for maximum day demand (MDD) with fire flows at various extremity points throughout the zone. All analyses were then re-run with the proposed system improvements #1 through #6 identified in Chapter 8. The distribution map used for the hydraulic model is also located in Attachment D.

During PHD the lowest pressure within this zone was 36.27 psi at Node J-120, which is above the minimum requirement of 30 psi. In the analyses with MDD and fire flow, the run with the lowest pressures was with 1,500 gpm fire flow at Node J-132. This run yielded a low pressure of 28.97 psi at Node J-120, which is still well above the minimum requirement of 20 psi during fire flow demands. Because this pressure zone had no deficiencies during all analyses run, no further discussion will be presented for results after the proposed system improvements are completed.

Weathervane Booster Pressure Zone:

The next pressure zone in the southwest corner of the service area boundary is part of the golf course subsystem. This pressure zone supplies water to the pressure zone by the Weathervane Booster Station. The pressurized distribution system fed by the Weathervane Booster Station provides static pressures within the subsystem of approximately 48 psi at the far end of Weathervane Court (the highest connection within the subsystem) and 71 psi along 67th Avenue West between Emerson Street and Fordham Street (the lowest connection).

The hydraulic analysis was run for the peak hourly demand (PHD) at maximum build-out for this zone with an assumed reservoir water level elevation. The analysis was then run multiple times for maximum day demand (MDD) with fire flows at various extremity points throughout the zone. The distribution map used for the hydraulic model is also located in Attachment B.

During PHD the lowest pressure within this zone was 55.12 psi at Node J-130, which is still well above the minimum requirement of 30 psi. In the analyses with MDD and fire flow, the run with the lowest pressures was with 1,500 gpm fire flow at Node J-158. This run yielded a low pressure of 10.12 psi at Nodes J-130, which is below the minimum requirement of 20 psi during fire flow demands. It is understood that the desired fire flow in this small area will not be able to be achieved without further watermain improvement projects, which the City of Fircrest will install when the funding is available.

Attachment A

Source of Supply Analysis

Fircrest Water System (ID # 25150T)

Existing Source and Storage Analysis Without Nesting Fire Flow Storage

Existing Facilities Inventory:	High Reservoir: 200,000 gallons	
	Low Reservoir: 1,000,000 gallons	
	Golf Course Reservoir: 600,000 gallons	
	Well #4 Pumping Rate: 550 gpm	
Emergency Source:	Well #5 Pumping Rate: 1,050 gpm	
	Well #6 Pumping Rate: 300 gpm	
	Well #7 Pumping Rate: 500 gpm	
	Well #8 Pumping Rate: 600 gpm	
	Well #9 Pumping Rate: 1,250 gpm	

largest source	1250	gpm	(If single source, enter 0 on this line)
total source capacity	4250	gpm	
remaining source capacity	3000	gpm	
Equivalent Residential Units	3790		
Peak Hourly Demand (PHD)	1520	gpm	
Average Demand Day	172	gpd	
Equalizing Storage, ES	0	gal.	Minimum Required Source Capacity
			3,032,000 GPD
			2,105.6 GPM
Standby Storage	-3,016,240	gal.	Min. Standby Storage 758,000 gal.
			at 200 gallons/ERU
			Based on 22 Years of Operator Experience
Use Standby Storage, SB	758,000		
ES + SB	758,000		
Fire Flow Storage			
2500 gpm for	300000	gal	
120 min.			
Total Live Storage			
with nesting	758,000	gal	
without nesting	1,058,000	gal	Existing Reservoir Capacity = 1,800,000 gal

---

If	MDD =	344	Gal/Conn/Day
and if	N =	3790	Connections
then	C =	1.6	
	F =	225	
and	PHD =	1520	gpm

Where

Range of N	C	F
15 to 50	3	0
51 to 100	2.5	25
101 to 250	2	75
251 to 500	1.8	125
> 500	1.6	225

Fircrest Water System (ID # 25150T)

Max Buildout Source and Storage Analysis Without Nesting Fire Flow Storage

Existing Facilities Inventory:	High Reservoir: 200,000 gallons	
	Low Reservoir: 1,000,000 gallons	
	Golf Course Reservoir: 600,000 gallons	
	Well #4 Pumping Rate: 550 gpm	
Emergency Source:	Well #5 Pumping Rate: 1,050 gpm	
	Well #6 Pumping Rate: 300 gpm	
	Well #7 Pumping Rate: 500 gpm	
	Well #8 Pumping Rate: 600 gpm	
	Well #9 Pumping Rate: 1,250 gpm	

largest source	1250	gpm	(If single source, enter 0 on this line)
total source capacity	4250	gpm	
remaining source capacity	3000	gpm	
Equivalent Residential Units	3990		
Peak Hourly Demand (PHD)	1597	gpm	
Average Demand Day	172	gpd	
Equalizing Storage, ES	0	gal.	Minimum Required Source Capacity 3,192,000 GPD 2,216.7 GPM
Standby Storage	-2,947,440	gal.	Min. Standby Storage 798,000 gal. at 200 gallons/ERU Based on 22 Years of Operator Experience
Use Standby Storage, SB	798,000		
ES + SB	798,000		
Fire Flow Storage 2500 gpm for 120 min.	300000	gal	
Total Live Storage with nesting	798,000	gal	
Total Live Storage without nesting	1,098,000	gal	Existing Reservoir Capacity = 1,800,000 gal

---

If	MDD =	344	Gal/Conn/Day
and if	N =	3990	Connections
then	C =	1.6	
	F =	225	
and	PHD =	1597	gpm

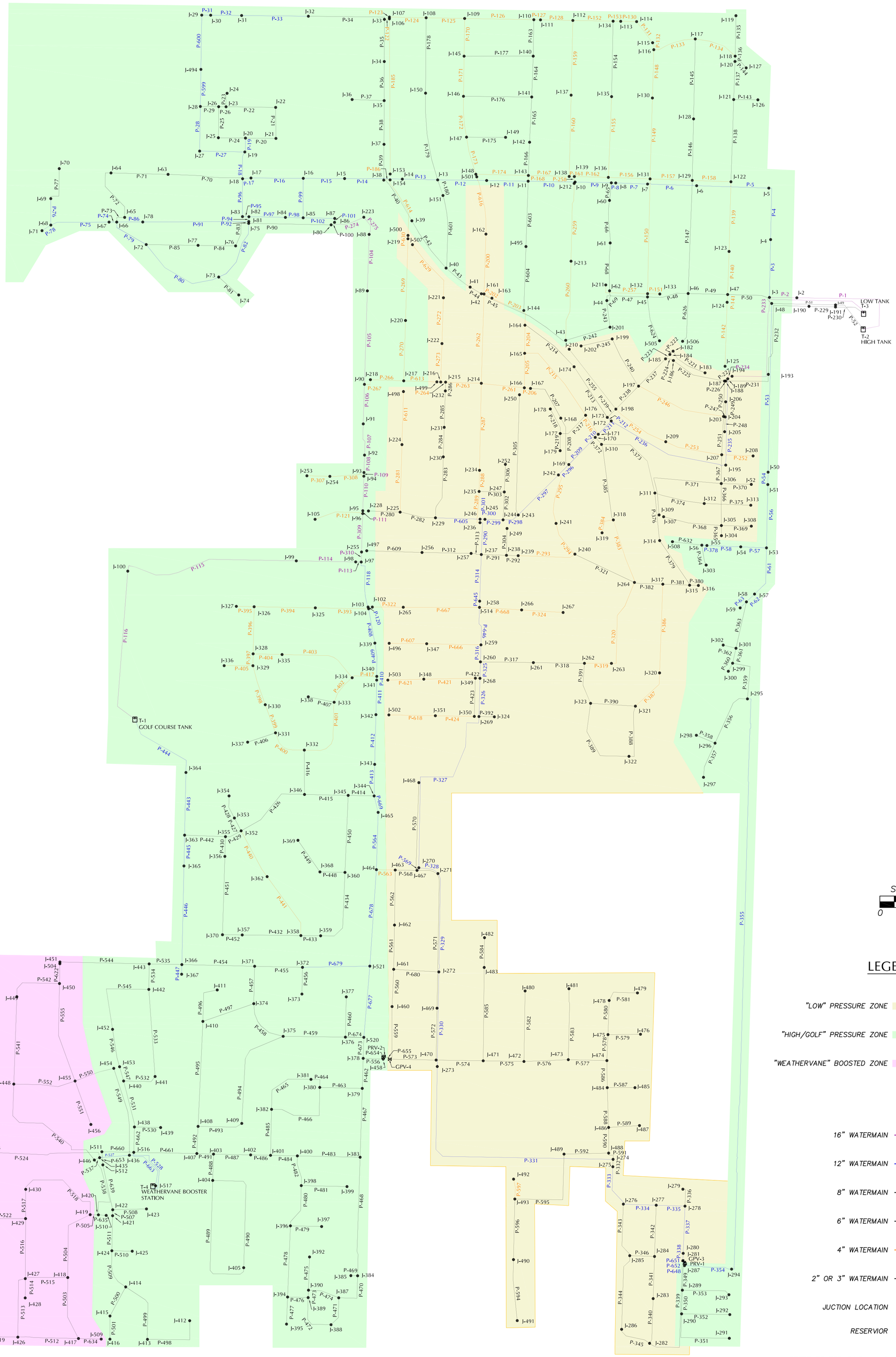
Where

Range of N	C	F
15 to 50	3	0
51 to 100	2.5	25
101 to 250	2	75
251 to 500	1.8	125
> 500	1.6	225

Attachment B

Hydraulic Analysis

THE CITY OF FIRCREST



JWM&A Civil • Municipal • Geotechnical Engineering and Planning

Jerome W. Morrissette & Associates Inc., P.S.

1700 Cooper Pt. Road S.W. #B-2, Olympia, Wa. 98502-1110 Ph 360.352.9456 Fx 360.352.9990

T.J.L.	02/26/14
DESIGNED BY	DATE
S.S., C.M.	02/26/14
C.A.D.D. BY	DATE
CHECKED BY	DATE
DATE PLOTTED	

Existing Water Distribution System and Pressure Zones

CITY OF FIRCREST

Hydraulic Model Node Map

00425\HYDRAULIC MODEL | SHT 1 OF 1

Z:\Personnel\Charlie\01] Projects\00445 - Fircrest Water Comprehensive Plan Update\[11] 00445 Fircrest - Old Water System Plan Support\HYDRAULIC MODEL\01-21-2010 hydraulic model\00425 Hyd Model.dwg, 2/26/2014 12:47:20 PM, POnstott

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 12/04/2012
Printed: 2/14/2014
WFI Printed For: On-Demand
Submission Reason: No Change

RETURN TO: Northwest Regional Office, 20425 72nd Ave S STE 310, Kent, WA, 98032

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
25150 T	FIRCREST, CITY OF	PIERCE	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 001924
JEFF DAVIS [UTILITY FOREMAN] 115 RAMSDELL FIRCREST, WA 98466	FIRCREST, CITY OF JEFFREY P. DAVIS 115 RAMSDELL FIRCREST, WA 98466	TITLE: UTILITY FOREMAN
STREET ADDRESS IF DIFFERENT FROM ABOVE	**STREET ADDRESS IF DIFFERENT FROM**	
ATTN ADDRESS CITY STATE ZIP	ATTN ADDRESS CITY STATE ZIP	

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (253) 564-8900	Owner Daytime Phone: (000)000-0000
Primary Contact Mobile/Cell Phone: (253) 905-0871	Owner Mobile/Cell Phone:
Primary Contact Evening Phone:	Owner Evening Phone: (xxx) xxx-xxxx
Fax:(253) 564-3640 | E-mail: XXXXXX	Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed — SMA NAME: _____ SMA Number:
- [ ] Managed Only
- [ ] Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

[ ] Agricultural	[ ] Hospital/Clinic	[x] Residential
[x] Commercial / Business	[ ] Industrial	[ ] School
[ ] Day Care	[ ] Licensed Residential Facility	[ ] Temporary Farm Worker
[x] Food Service/Food Permit	[ ] Lodging	[x] Other (church, fire station, etc.):
[ ] 1,000 or more person event for 2 or more days per year	[x] Recreational / RV Park	

13. WATER SYSTEM OWNERSHIP (mark only one)				14. STORAGE CAPACITY (gallons)
[ ] Association	[ ] County	[ ] Investor	[ ] Special District	
[x] City / Town	[ ] Federal	[ ] Private	[ ] State	1,800,000

- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES -

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
25150 T	FIRCREST, CITY OF	PIERCE	A	Comm

15	16	17	18										19			20	21						22	23	24			
	SOURCE NAME	INTERTIE	SOURCE CATEGORY										USE				TREATMENT						DEPTH		SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL	SPRING	SPRING IN SPRING FIELD	SPRING FIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANEANT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	InAct 06/16/2005 WELLS #4,5&9 WF			X									X			Y	X						88	2350	SE SE	11	20N	02E
S02	WELLS #6 & 7 WF			X									X			Y				X			152	800	SW NW	14	20N	02E
S03	WELL #8 ACN701		X										X			Y				X			112	720	NE SW	14	20N	02E
S04	InAct 12/03/1999 WELL #2				X								X			Y	X						162	725	NE SE	11	20N	02E
S05	WELL #4 AEF223		X										X			Y				X			88	525	SE SE	11	20N	02E
S06	WELL #5		X												X	Y	X						102	1100	SE SE	11	20N	02E
S07	WELL #6 AAD990				X								X			Y				X			151	750	SW NW	14	20N	02E
S08	WELL #7 AEF249				X								X			Y				X				800	SW NW	14	20N	02E
S09	WELL #9 AAY306		X										X			Y				X			130	1250	NE SE	11	20N	02E
S10	86800/TACOMA	86800 N													X	Y	X							0			00N	00E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
25150 T	FIRCREST, CITY OF	PIERCE	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	2739	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	2257		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	45		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	482		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	56	56	
28. TOTAL SERVICE CONNECTIONS		2795	

29. FULL-TIME RESIDENTIAL POPULATION	
A. How many residents are served by this system 180 or more days per	6080

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?					36	36	36	36	36			
B. How many days per month are they present?					31	30	31	31	30			

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?	540	540	540	540	540	478	478	478	540	540	540	540
B. How many days per month is water accessible to the public?	31	28	31	30	31	30	31	30	30	31	30	31

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	481	481	481	481	481	226	226	481	481	481	481	481
B. How many days per month are they present?	31	28	31	30	31	30	31	31	30	31	30	31

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	7	7	7	7	7	7	7	7	7	7	7	7

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____
DATE: _____

PRINT NAME: _____
TITLE: _____

Existing System with Existing Connections

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-2	319.0	0	457.9	60.1	
J-3	319.0	2	457.9	60.1	
J-4	327.0	2	457.8	56.6	
J-5	319.0	2	457.7	60.0	
J-6	307.0	2	457.6	65.1	
J-7	334.0	2	457.5	53.4	
J-8	322.0	0	457.4	58.6	
J-9	321.0	2	457.4	59.0	
J-10	318.0	2	457.4	60.3	
J-11	282.0	2	457.3	75.8	
J-12	262.0	2	457.3	84.5	
J-13	277.0	2	457.2	78.0	
J-14	278.0	2	457.2	77.5	
J-15	275.0	2	457.2	78.8	
J-16	278.0	4	457.2	77.5	
J-17	285.0	3	457.2	74.5	
J-18	288.0	2	457.2	73.2	
J-19	289.0	2	457.2	72.8	
J-20	287.0	2	457.2	73.6	
J-21	282.0	2	457.2	75.8	
J-22	284.0	2	457.1	74.9	
J-23	289.0	2	457.1	72.8	
J-24	291.0	2	457.1	71.9	
J-25	293.0	2	457.2	71.0	
J-26	290.0	2	457.1	72.3	
J-27	305.0	2	457.2	65.8	
J-28	303.0	2	457.1	66.7	
J-29	302.0	2	457.1	67.1	
J-30	302.0	2	457.1	67.1	
J-31	304.0	13	457.1	66.3	
J-32	303.0	2	457.1	66.7	
J-33	298.0	2	457.2	68.9	
J-34	279.0	8	457.2	77.1	
J-35	277.0	2	457.2	77.9	
J-36	272.0	7	457.2	80.1	
J-37	272.0	5	457.2	80.1	
J-38	279.0	5	457.2	77.1	
J-39	271.0	4	457.2	80.6	
J-40	259.0	3	457.2	85.8	
J-41	251.0	2	457.2	89.2	
J-42	248.0	2	457.2	90.5	
J-43	272.0	2	457.3	80.2	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-44	297.0	2	457.3	69.4	
J-45	324.0	2	457.3	57.7	
J-46	331.0	2	457.3	54.7	
J-47	310.0	2	457.4	63.8	
J-48	319.0	2	457.5	59.9	
J-49	319.0	0	457.8	60.1	
J-50	286.0	2	457.5	74.2	
J-51	286.0	2	457.5	74.2	
J-52	286.0	2	425.1	60.2	
J-53	283.0	2	457.5	75.5	
J-54	293.0	7	457.5	71.2	
J-55	285.0	0	457.5	74.6	
J-56	284.0	2	457.5	75.1	
J-57	279.0	2	457.5	77.2	
J-58	279.0	4	457.5	77.2	
J-59	279.0	0	457.5	77.2	
J-60	312.0	2	457.4	62.9	
J-61	308.0	2	457.4	64.6	
J-62	298.0	2	457.3	68.9	
J-63	307.0	17	457.1	65.0	
J-64	312.0	17	457.1	62.8	
J-65	315.0	17	457.1	61.5	
J-66	319.0	2	457.1	59.8	
J-67	319.0	4	457.1	59.8	
J-68	333.0	2	457.1	53.7	
J-69	334.0	10	457.1	53.3	
J-70	334.0	4	457.1	53.3	
J-71	330.0	3	457.1	55.0	
J-72	304.0	2	457.1	66.3	
J-73	303.0	2	457.1	66.7	
J-74	300.0	6	457.1	68.0	
J-75	290.0	3	457.2	72.3	
J-76	294.0	2	457.1	70.6	
J-77	309.0	2	457.1	64.1	
J-78	313.0	2	457.1	62.4	
J-80	274.0	2	457.2	79.2	
J-81	290.0	2	457.2	72.3	
J-82	290.0	3	457.2	72.3	
J-83	292.0	5	457.2	71.5	
J-84	284.0	2	457.2	74.9	
J-85	281.0	2	457.2	76.2	
J-86	275.0	2	457.2	78.8	
J-87	275.0	2	457.2	78.8	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-88	273.0	2	457.2	79.7	
J-89	271.0	2	457.2	80.5	
J-90	269.0	2	457.2	81.4	
J-91	270.0	2	457.2	81.0	
J-92	268.0	2	457.2	81.8	
J-93	268.0	0	457.2	81.8	
J-94	269.0	2	457.2	81.4	
J-95	269.0	2	457.2	81.4	
J-96	269.0	2	457.2	81.4	
J-97	267.0	0	457.2	82.3	
J-98	267.0	2	457.2	82.3	
J-99	270.0	2	457.3	81.0	
J-100	328.0	24	457.7	56.1	
J-102	261.0	2	426.6	71.7	
J-103	261.0	0	456.8	84.7	
J-104	261.0	2	456.7	84.7	
J-105	275.0	2	457.2	78.8	
J-106	298.0	1	457.2	68.9	
J-107	298.0	1	457.2	68.9	
J-108	294.0	4	457.2	70.6	
J-109	292.0	2	457.2	71.5	
J-110	299.0	2	457.2	68.4	
J-111	299.0	2	457.2	68.4	
J-112	296.0	2	457.1	69.7	
J-113	293.0	2	457.0	71.0	
J-114	294.0	2	457.0	70.5	
J-115	304.0	2	457.0	66.2	
J-116	305.0	2	457.0	65.8	
J-117	301.0	2	457.0	67.5	
J-118	296.0	2	457.0	69.6	
J-119	321.0	2	456.9	58.8	
J-120	295.0	34	457.0	70.1	
J-121	285.0	2	457.0	74.4	
J-122	290.0	2	457.0	72.3	
J-123	297.0	2	457.2	69.3	
J-124	312.0	2	457.4	62.9	
J-125	321.0	2	457.4	59.0	
J-126	292.0	2	456.9	71.4	
J-127	295.0	2	456.9	70.1	
J-128	291.0	2	457.0	71.8	
J-129	308.0	2	457.1	64.5	
J-130	311.0	2	457.0	63.2	
J-131	335.0	2	457.1	52.8	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-132	325.0	2	457.0	57.1	
J-133	324.0	2	457.0	57.6	
J-134	293.0	2	457.1	71.0	
J-135	308.0	2	457.1	64.5	
J-136	321.0	2	457.1	58.9	
J-137	307.0	2	457.1	64.9	
J-138	318.0	2	457.1	60.2	
J-139	318.0	2	457.1	60.2	
J-140	296.0	2	457.2	69.7	
J-141	291.0	2	457.2	71.9	
J-142	287.0	2	457.2	73.6	
J-143	283.0	2	457.2	75.4	
J-144	255.0	2	457.3	87.5	
J-145	281.0	2	457.2	76.2	
J-146	275.0	2	457.2	78.8	
J-147	269.0	2	457.2	81.4	
J-148	263.0	2	457.2	84.0	
J-149	276.0	2	457.1	78.4	
J-150	280.0	2	457.2	76.7	
J-151	275.0	2	457.2	78.8	
J-153	279.0	3	457.1	77.1	
J-154	278.0	2	457.2	77.5	
J-161	248.0	4	425.7	76.9	
J-162	253.0	2	425.7	74.7	
J-163	248.0	0	425.7	76.9	
J-164	255.0	2	425.6	73.8	
J-165	245.0	2	425.7	78.2	
J-166	233.0	2	425.8	83.4	
J-167	234.0	2	425.8	83.0	
J-168	238.0	2	425.8	81.2	
J-169	238.0	2	425.8	81.2	
J-170	255.0	0	425.7	73.8	
J-171	256.0	2	425.7	73.4	
J-172	262.0	4	425.6	70.8	
J-173	262.0	2	425.6	70.8	
J-174	270.0	2	425.6	67.3	
J-176	262.0	2	425.7	70.8	
J-177	239.0	2	425.2	80.6	
J-178	240.0	2	425.1	80.1	
J-179	238.0	2	425.2	81.0	
J-182	318.0	0	425.3	46.4	
J-183	319.0	2	425.2	45.9	
J-184	319.0	2	425.3	46.0	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-185	319.0	0	425.3	46.0	
J-186	319.0	2	425.2	46.0	
J-187	320.0	0	425.1	45.5	
J-188	320.0	2	425.1	45.5	
J-189	320.0	2	425.1	45.5	
J-190	319.0	0	425.0	45.9	
J-191	319.0	0	425.0	45.9	
J-193	304.0	2	425.1	52.4	
J-194	318.0	2	425.1	46.4	
J-195	296.0	2	425.3	56.0	
J-197	294.0	2	425.3	56.8	
J-198	264.0	5	425.5	69.9	
J-199	292.0	2	425.1	57.6	
J-201	292.0	2	457.3	71.5	
J-202	275.0	2	425.0	64.9	
J-203	306.0	0	425.1	51.5	
J-204	305.0	2	425.1	52.0	
J-205	302.0	2	425.1	53.3	
J-206	313.0	2	425.1	48.5	
J-207	297.0	2	425.1	55.4	
J-208	286.0	5	425.1	60.2	
J-209	284.0	2	425.3	61.1	
J-210	271.0	2	425.4	66.8	
J-211	298.0	2	457.0	68.8	
J-212	318.0	2	457.1	60.2	
J-213	305.0	2	457.2	65.8	
J-214	235.0	2	425.9	82.6	
J-215	245.0	2	426.1	78.3	
J-216	245.0	2	426.0	78.3	
J-217	269.0	2	457.1	81.4	
J-218	268.0	2	457.2	81.8	
J-219	269.0	2	457.2	81.4	
J-220	274.0	2	457.1	79.2	
J-221	254.0	4	425.8	74.3	
J-222	246.0	3	425.9	77.8	
J-223	275.0	2	457.2	78.8	
J-224	256.0	2	426.1	73.6	
J-225	256.0	2	426.1	73.6	
J-228	268.0	2	426.1	68.4	
J-229	243.0	2	426.1	79.2	
J-230	242.0	2	426.1	79.7	
J-231	242.0	2	426.1	79.6	
J-232	244.0	2	426.1	78.8	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-234	231.0	2	426.0	84.4	
J-235	230.0	2	426.0	84.8	
J-236	229.0	2	426.2	85.3	
J-237	224.0	2	426.3	87.5	
J-238	220.0	5	426.3	89.3	
J-239	220.0	2	426.3	89.3	
J-240	236.0	2	425.9	82.2	
J-241	232.0	2	425.9	83.9	
J-242	233.0	2	425.8	83.4	
J-243	225.0	2	426.0	87.0	
J-244	225.0	2	426.1	87.0	
J-245	227.0	2	426.1	86.2	
J-246	229.0	0	426.1	85.3	
J-247	226.0	3	426.0	86.5	
J-249	223.0	5	426.3	88.0	
J-250	222.0	24	426.0	88.3	
J-252	226.0	9	425.9	86.5	
J-253	281.0	2	457.1	76.2	
J-254	281.0	2	457.1	76.2	
J-255	267.0	2	457.2	82.3	
J-256	255.0	2	426.3	74.1	
J-257	224.0	2	426.3	87.5	
J-258	218.0	0	426.6	90.3	
J-259	217.0	2	426.9	90.8	
J-260	212.0	2	427.0	93.0	
J-261	209.0	2	426.8	94.2	
J-262	246.0	2	426.6	78.1	
J-263	256.0	2	426.4	73.7	
J-264	274.0	2	425.8	65.7	
J-265	256.0	2	426.6	73.8	
J-266	211.0	2	426.6	93.3	
J-267	214.0	2	426.6	92.0	
J-268	212.0	2	427.1	93.1	
J-269	211.0	26	427.4	93.6	
J-270	232.0	2	429.2	85.3	
J-271	228.0	2	429.2	87.1	
J-272	262.0	2	429.5	72.5	
J-273	271.0	2	429.5	68.6	
J-274	204.0	4	429.6	97.6	
J-275	201.0	4	429.6	98.9	
J-276	196.0	4	429.6	101.0	
J-277	202.0	4	429.6	98.5	
J-278	224.0	4	429.6	88.9	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-279	216.0	4	429.6	92.4	
J-280	217.0	4	429.6	92.0	
J-281	218.0	4	429.6	91.5	
J-282	210.0	4	429.6	95.0	
J-283	222.0	4	429.6	89.8	
J-284	214.0	4	429.6	93.3	
J-285	195.0	4	429.6	101.5	
J-286	191.0	4	429.6	103.2	
J-287	218.0	4	457.4	103.6	
J-289	222.0	4	457.4	101.8	
J-290	223.0	4	457.4	101.4	
J-291	274.0	4	457.4	79.3	
J-292	274.0	4	457.4	79.3	
J-293	270.0	4	457.4	81.1	
J-294	274.0	4	457.4	79.4	
J-295	304.0	2	457.4	66.4	
J-296	272.0	2	457.4	80.2	
J-297	260.0	2	457.4	85.4	
J-298	262.0	5	457.4	84.5	
J-299	277.0	2	457.4	78.1	
J-300	277.0	2	457.4	78.1	
J-301	275.0	2	457.4	78.9	
J-302	279.0	2	457.4	77.2	
J-303	283.0	0	457.5	75.5	
J-304	289.0	2	425.1	58.9	
J-305	300.0	2	425.1	54.1	
J-306	300.0	2	425.1	54.1	
J-307	273.0	2	425.1	65.8	
J-308	290.0	2	425.1	58.4	
J-309	272.0	2	425.0	66.2	
J-310	255.0	2	425.7	73.8	
J-311	271.0	2	425.7	66.9	
J-312	293.0	2	425.7	57.4	
J-313	293.0	2	425.7	57.4	
J-314	274.0	2	425.7	65.6	
J-315	280.0	2	425.7	63.1	
J-316	283.0	2	425.7	61.8	
J-317	276.0	2	425.8	64.8	
J-318	279.0	2	425.7	63.5	
J-319	282.0	2	425.7	62.2	
J-320	284.0	2	426.2	61.5	
J-321	251.0	2	426.5	75.9	
J-322	238.0	2	426.5	81.5	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-323	237.0	2	426.5	82.0	
J-324	209.0	0	427.4	94.5	
J-325	268.0	2	456.5	81.6	
J-326	278.0	2	456.3	77.1	
J-327	281.0	2	456.3	75.8	
J-328	280.0	2	456.1	76.2	
J-329	277.0	2	456.1	77.5	
J-330	273.0	2	456.1	79.2	
J-331	271.0	2	456.1	80.1	
J-332	267.0	2	456.1	81.8	
J-333	265.0	2	456.1	82.7	
J-334	259.0	2	456.2	85.3	
J-335	276.0	2	456.1	77.9	
J-336	288.0	2	456.1	72.7	
J-337	289.0	2	456.0	72.3	
J-338	270.0	2	456.1	80.5	
J-339	258.0	2	456.5	85.9	
J-340	254.0	0	456.2	87.5	
J-341	253.0	0	456.2	87.9	
J-342	250.0	2	456.0	89.1	
J-343	257.0	2	455.6	85.9	
J-344	259.0	2	455.4	85.0	
J-345	264.0	2	455.8	83.0	
J-346	278.0	2	456.1	77.0	
J-347	246.0	2	426.9	78.3	
J-348	243.0	2	427.1	79.7	
J-349	213.0	0	427.1	92.6	
J-350	212.0	2	427.1	93.1	
J-351	235.0	2	427.1	83.1	
J-352	326.0	2	456.5	56.5	
J-353	333.0	2	456.5	53.4	
J-354	335.0	2	456.5	52.6	
J-355	326.0	2	456.6	56.5	
J-356	329.0	2	456.5	55.2	
J-357	343.0	2	456.3	49.0	
J-358	333.0	2	456.2	53.3	
J-359	323.0	2	456.2	57.6	
J-360	287.0	2	455.9	73.1	
J-362	333.0	2	456.4	53.4	
J-363	352.0	2	456.7	45.3	
J-364	352.0	2	457.3	45.5	
J-365	356.0	2	456.5	43.5	
J-366	361.0	4	456.0	41.1	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-367	361.0	0	456.0	41.1	
J-368	299.0	2	455.9	67.9	
J-369	301.0	2	455.9	67.0	
J-370	342.0	2	456.3	49.5	
J-371	348.0	2	454.1	45.9	
J-372	338.0	2	454.0	50.2	
J-373	340.0	2	454.0	49.3	
J-374	351.0	2	453.5	44.3	
J-375	347.0	6	453.3	46.0	
J-376	316.0	6	453.3	59.4	
J-377	318.0	6	453.2	58.5	
J-378	309.0	2	451.3	61.6	
J-379	311.0	3	451.4	60.7	
J-380	329.0	2	451.4	53.0	
J-381	332.0	18	451.5	51.7	
J-382	335.0	49	451.6	50.4	
J-383	303.0	2	451.5	64.2	
J-384	280.0	2	451.5	74.2	
J-385	285.0	0	451.5	72.0	
J-387	284.0	2	451.4	72.4	
J-388	280.0	7	451.4	74.2	
J-389	292.0	2	451.4	69.0	
J-390	294.0	4	451.4	68.1	
J-392	303.0	7	451.4	64.2	
J-394	297.0	4	451.4	66.8	
J-395	295.0	2	451.4	67.7	
J-396	312.0	10	451.4	60.3	
J-397	305.0	14	451.4	63.4	
J-398	318.0	19	451.5	57.8	
J-399	300.0	8	451.4	65.5	
J-400	323.0	2	451.6	55.6	
J-401	328.0	2	451.7	53.5	
J-402	331.0	2	451.9	52.3	
J-403	331.0	2	452.4	52.5	
J-404	333.0	2	452.4	51.6	
J-405	347.0	2	452.4	45.6	
J-407	330.0	2	452.6	53.0	
J-408	336.0	4	452.9	50.6	
J-409	334.0	13	453.0	51.5	
J-410	360.0	2	453.3	40.4	
J-411	356.0	2	453.3	42.1	
J-412	323.0	2	452.6	56.1	
J-413	350.0	2	452.6	44.4	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-414	358.0	2	452.6	40.9	
J-415	360.0	2	452.6	40.1	
J-416	360.0	2	452.6	40.1	
J-417	394.0	2	521.7	55.2	
J-418	410.0	2	521.7	48.3	
J-419	375.0	2	521.7	63.5	
J-420	363.0	2	521.7	68.6	
J-421	352.0	2	452.6	43.5	
J-422	351.0	0	452.6	44.0	
J-423	334.0	2	452.6	51.3	
J-424	355.0	2	452.6	42.2	
J-425	362.0	2	452.6	39.2	
J-426	377.0	2	521.7	62.6	
J-427	396.0	2	521.7	54.4	
J-428	390.0	2	521.7	57.0	
J-429	410.0	2	521.7	48.3	
J-430	409.0	2	521.7	48.7	
J-431	349.0	4	521.7	74.7	
J-432	355.0	4	521.7	72.1	
J-433	365.0	4	521.7	67.8	
J-434	373.0	2	521.7	64.3	
J-435	362.0	2	521.7	69.1	
J-436	330.0	3	521.7	82.9	
J-438	341.0	2	453.0	48.5	
J-439	342.0	2	453.0	48.0	
J-440	346.0	2	454.2	46.8	
J-441	353.0	2	454.4	43.9	
J-442	360.0	2	455.1	41.1	
J-443	362.0	2	455.8	40.6	
J-446	362.0	2	521.7	69.1	
J-448	404.0	2	521.7	50.9	
J-449	382.0	2	521.7	60.4	
J-450	359.0	2	521.7	70.4	
J-451	360.0	2	455.8	41.4	
J-452	350.0	2	454.5	45.2	
J-453	348.0	2	454.2	46.0	
J-454	348.0	2	521.7	75.1	
J-455	373.0	2	521.7	64.3	
J-456	362.0	2	521.7	69.1	
J-457	387.0	2	521.7	58.3	
J-458	294.0	2	448.8	67.0	
J-460	285.0	2	436.8	65.7	
J-461	280.0	2	431.6	65.6	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-462	268.0	2	430.7	70.4	
J-463	255.0	2	429.6	75.5	
J-464	269.0	2	454.7	80.3	
J-465	260.0	2	455.3	84.5	
J-467	232.0	0	429.2	85.3	
J-468	225.0	2	429.2	88.3	
J-469	265.0	2	434.9	73.5	
J-470	271.0	2	436.8	71.7	
J-471	248.0	2	435.1	80.9	
J-472	205.0	2	433.7	98.9	
J-473	197.0	20	432.2	101.8	
J-474	198.0	2	431.2	100.9	
J-475	200.0	2	431.2	100.0	
J-476	205.0	2	431.2	97.9	
J-478	198.0	2	431.2	100.9	
J-479	201.0	2	431.2	99.6	
J-480	207.0	2	433.7	98.1	
J-481	199.0	2	432.2	100.9	
J-482	224.0	2	435.1	91.3	
J-483	232.0	2	435.1	87.9	
J-484	197.0	2	430.6	101.1	
J-485	201.0	2	430.6	99.3	
J-486	197.0	2	429.7	100.7	
J-487	200.0	2	429.7	99.4	
J-488	203.0	2	429.6	98.0	
J-489	202.0	2	429.6	98.5	
J-490	204.0	2	429.6	97.6	
J-491	206.0	2	429.6	96.7	
J-492	220.0	2	429.6	90.7	
J-493	216.0	2	429.6	92.4	
J-494	301.0	2	457.1	67.6	
J-495	268.0	2	457.3	81.9	
J-496	258.0	2	426.9	73.1	
J-497	267.0	2	426.3	68.9	
J-498	269.0	2	426.1	68.0	
J-499	255.0	2	457.1	87.5	
J-500	269.0	0	457.2	81.4	
J-501	263.0	2	425.7	70.4	
J-502	250.0	8	427.1	76.6	
J-503	253.0	2	427.1	75.3	
J-504	360.0	2	521.7	70.0	
J-505	319.0	2	457.3	59.8	
J-506	318.0	2	457.3	60.3	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-507	269.0	13	425.7	67.8	
J-508	274.0	4	457.5	79.4	
J-509	369.0	2	521.7	66.0	
J-510	352.0	2	521.7	73.4	
J-511	362.0	2	452.6	39.2	
J-512	362.0	2	452.6	39.2	
J-514	218.0	2	426.6	90.3	
J-516	343.0	0	452.6	47.4	
J-517	330.0	64	452.6	53.1	
J-520	313.0	0	453.3	60.7	
J-521	301.0	0	454.0	66.2	

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-1	T-2	J-2	0.07	877	0.49	120.0	306
P-2	J-2	J-3	0.02	191	0.49	120.0	306
P-3	J-3	J-4	0.11	403	0.86	130.0	304
P-4	J-4	J-5	0.10	378	0.86	130.0	302
P-5	J-5	J-6	0.14	509	0.85	130.0	299
P-6	J-6	J-7	0.09	349	0.84	130.0	297
P-7	J-7	J-8	0.06	222	0.84	130.0	295
P-8	J-8	J-9	0.01	31	0.84	130.0	295
P-9	J-9	J-10	0.04	253	0.68	130.0	238
P-10	J-10	J-11	0.06	332	0.67	130.0	236
P-11	J-11	J-12	0.03	289	0.51	130.0	181
P-12	J-12	J-13	0.04	341	0.51	130.0	179
P-13	J-13	J-14	0.02	246	0.42	130.0	149
P-14	J-14	J-15	0.03	407	0.42	130.0	147
P-15	J-15	J-16	0.02	288	0.41	130.0	144
P-16	J-16	J-17	0.01	364	0.22	130.0	77
P-17	J-17	J-18	0.00	59	0.21	130.0	75
P-18	J-18	J-19	0.00	191	0.09	130.0	33
P-19	J-19	J-20	0.00	98	0.04	130.0	15
P-20	J-20	J-21	0.00	212	0.04	130.0	6
P-21	J-21	J-22	0.00	216	0.03	130.0	4
P-22	J-22	J-23	0.00	346	0.01	130.0	2
P-23	J-23	J-24	0.00	101	0.01	130.0	2
P-24	J-20	J-25	0.00	189	0.04	130.0	7
P-25	J-25	J-26	0.00	216	0.03	130.0	4
P-26	J-26	J-23	0.00	51	0.02	130.0	3
P-27	J-19	J-27	0.00	315	0.04	130.0	15
P-28	J-27	J-28	0.00	311	0.04	130.0	13
P-29	J-28	J-26	0.00	128	0.00	130.0	1
P-31	J-29	J-30	0.00	62	0.02	130.0	6
P-32	J-30	J-31	0.00	216	0.01	130.0	4
P-33	J-31	J-32	0.00	465	0.03	130.0	-9
P-34	J-32	J-33	0.00	546	0.07	130.0	-12
P-35	J-33	J-34	0.00	294	0.07	130.0	-11
P-36	J-34	J-35	0.00	272	0.12	130.0	-19
P-37	J-35	J-36	0.00	223	0.04	130.0	7
P-38	J-35	J-37	0.01	305	0.18	130.0	-28
P-39	J-37	J-38	0.01	249	0.21	130.0	-33
P-40	J-38	J-39	0.02	350	0.28	130.0	-44
P-42	J-39	J-40	0.03	408	0.31	130.0	-48
P-43	J-40	J-41	0.01	214	0.28	130.0	-43
P-44	J-41	J-42	0.01	91	0.29	130.0	-46
P-45	J-42	J-43	0.04	680	0.31	130.0	-48

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-47	J-44	J-45	0.00	316	0.11	110.0	-18
P-48	J-45	J-46	0.01	287	0.14	110.0	-22
P-49	J-46	J-47	0.05	275	0.43	110.0	-67
P-50	J-47	J-48	0.11	338	0.61	110.0	-95
P-51	J-48	J-49	0.31	445	1.09	130.0	-171
P-52	J-49	T-2	0.19	274	1.09	130.0	-171
P-53	J-48	J-50	0.02	1,176	0.21	130.0	74
P-54	J-50	J-51	0.00	86	0.20	130.0	72
P-56	J-51	J-53	0.01	441	0.20	130.0	69
P-57	J-53	J-54	0.00	180	0.04	130.0	13
P-58	J-54	J-55	0.00	236	0.02	130.0	6
P-61	J-53	J-57	0.00	355	0.15	130.0	54
P-62	J-57	J-58	0.00	78	0.15	130.0	51
P-63	J-58	J-59	0.00	60	0.00	130.0	0
P-65	J-9	J-60	0.01	123	0.35	130.0	54
P-66	J-60	J-61	0.02	297	0.33	130.0	52
P-68	J-61	J-62	0.02	334	0.32	130.0	50
P-69	J-62	J-44	0.01	94	0.30	130.0	48
P-70	J-18	J-63	0.01	524	0.16	110.0	25
P-71	J-63	J-64	0.00	398	0.05	110.0	8
P-72	J-64	J-65	0.00	405	0.06	110.0	-9
P-73	J-65	J-66	0.01	87	0.29	110.0	-26
P-74	J-66	J-67	0.00	53	0.06	130.0	22
P-75	J-67	J-68	0.00	410	0.05	130.0	19
P-76	J-68	J-69	0.00	184	0.04	130.0	14
P-77	J-69	J-70	0.00	265	0.05	130.0	4
P-78	J-68	J-71	0.00	73	0.01	130.0	3
P-79	J-66	J-72	0.00	275	0.07	130.0	-23
P-80	J-72	J-73	0.00	619	0.06	130.0	-20
P-81	J-73	J-74	0.00	187	0.04	130.0	6
P-82	J-73	J-75	0.00	453	0.08	130.0	-28
P-83	J-75	J-76	0.00	218	0.07	110.0	10
P-84	J-76	J-77	0.00	262	0.05	110.0	8
P-85	J-77	J-72	0.00	361	0.04	110.0	6
P-86	J-66	J-78	0.00	181	0.08	130.0	-27
P-90	J-75	J-80	0.01	574	0.08	110.0	-7
P-91	J-78	J-81	0.00	738	0.08	130.0	-30
P-92	J-81	J-75	0.00	13	0.10	130.0	34
P-94	J-81	J-82	0.00	34	0.19	130.0	-66
P-95	J-82	J-83	0.00	45	0.03	130.0	-9
P-96	J-83	J-18	0.00	264	0.04	130.0	-14
P-97	J-82	J-84	0.00	254	0.17	130.0	-60
P-98	J-84	J-85	0.00	124	0.18	130.0	-62

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-99	J-85	J-16	0.00	275	0.18	130.0	-64
P-100	J-80	J-86	0.00	27	0.10	110.0	-9
P-101	J-86	J-87	0.00	27	0.01	130.0	3
P-102	J-87	J-85	0.00	220	0.00	130.0	1
P-104	J-88	J-89	0.00	393	0.03	120.0	-19
P-105	J-89	J-90	0.00	652	0.03	120.0	-21
P-106	J-90	J-91	0.00	276	0.05	120.0	-30
P-107	J-91	J-92	0.00	224	0.05	120.0	-32
P-108	J-92	J-93	0.00	121	0.05	120.0	-34
P-109	J-93	J-94	0.00	25	0.05	120.0	-34
P-110	J-94	J-95	0.00	241	0.07	120.0	-41
P-111	J-95	J-96	0.00	19	0.07	120.0	-43
P-113	J-97	J-98	0.01	39	0.97	120.0	-610
P-114	J-98	J-99	0.12	414	0.98	120.0	-612
P-115	J-99	J-100	0.36	1,238	0.98	120.0	-614
P-116	J-100	T-1	0.35	1,096	1.02	120.0	-638
P-118	J-97	J-103	0.41	344	1.59	110.0	560
P-120	J-103	J-104	0.02	13	1.59	110.0	560
P-121	J-96	J-105	0.00	348	0.06	110.0	2
P-122	J-33	J-106	0.00	35	0.07	110.0	-3
P-123	J-106	J-107	0.00	12	0.17	110.0	-7
P-124	J-107	J-108	0.02	256	0.19	110.0	-7
P-125	J-108	J-109	0.01	268	0.09	110.0	4
P-126	J-109	J-110	0.00	482	0.03	110.0	1
P-127	J-110	J-111	0.01	47	0.37	110.0	14
P-128	J-111	J-112	0.05	225	0.31	110.0	12
P-130	J-113	J-114	0.01	111	0.23	110.0	9
P-131	J-114	J-115	0.01	184	0.18	110.0	7
P-132	J-115	J-116	0.00	52	0.12	110.0	5
P-133	J-116	J-117	0.03	303	0.19	110.0	8
P-134	J-117	J-118	0.04	312	0.23	110.0	9
P-135	J-118	J-119	0.07	282	0.23	110.0	2
P-136	J-118	J-120	0.00	37	0.03	110.0	4
P-137	J-120	J-121	0.01	265	0.20	110.0	-32
P-138	J-121	J-122	0.03	573	0.23	110.0	-37
P-139	J-122	J-123	0.22	486	0.48	110.0	-19
P-140	J-123	J-47	0.17	300	0.54	110.0	-21
P-141	J-47	J-124	0.00	54	0.11	110.0	4
P-142	J-124	J-125	0.00	446	0.06	110.0	2
P-143	J-121	J-126	0.04	168	0.23	110.0	2
P-144	J-120	J-127	0.03	98	0.23	110.0	2
P-145	J-117	J-128	0.05	557	0.17	110.0	-4
P-146	J-128	J-129	0.10	428	0.27	110.0	-6

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-147	J-129	J-46	0.21	789	0.46	110.0	-40
P-148	J-116	J-130	0.01	337	0.13	110.0	-5
P-149	J-130	J-131	0.05	564	0.19	110.0	-7
P-150	J-131	J-132	0.06	800	0.17	110.0	7
P-151	J-132	J-133	0.00	85	0.06	110.0	2
P-152	J-112	J-134	0.05	280	0.30	110.0	12
P-153	J-134	J-113	0.01	53	0.29	110.0	11
P-154	J-134	J-135	0.01	526	0.09	110.0	-2
P-155	J-135	J-136	0.02	563	0.11	110.0	-4
P-156	J-136	J-131	0.01	291	0.11	110.0	4
P-157	J-131	J-129	0.06	294	0.31	110.0	-12
P-158	J-129	J-122	0.14	270	0.51	110.0	20
P-159	J-112	J-137	0.00	521	0.05	110.0	-2
P-160	J-137	J-138	0.02	567	0.10	110.0	-4
P-161	J-138	J-139	0.00	36	0.17	110.0	6
P-162	J-139	J-136	0.04	237	0.27	110.0	11
P-163	J-110	J-140	0.00	254	0.10	110.0	-15
P-164	J-140	J-141	0.00	285	0.11	110.0	-18
P-165	J-141	J-142	0.01	315	0.16	110.0	-26
P-166	J-142	J-143	0.01	232	0.18	110.0	-28
P-167	J-143	J-138	0.06	285	0.33	110.0	13
P-168	J-143	J-11	0.11	40	1.23	110.0	-48
P-170	J-109	J-145	0.00	263	0.00	110.0	0
P-171	J-145	J-146	0.00	280	0.05	110.0	-2
P-172	J-146	J-147	0.00	286	0.04	110.0	1
P-173	J-147	J-148	0.00	267	0.08	110.0	-3
P-174	J-148	J-143	0.02	366	0.14	110.0	-5
P-175	J-147	J-149	0.05	272	0.23	130.0	2
P-176	J-146	J-141	0.00	476	0.06	110.0	-6
P-177	J-145	J-140	0.00	482	0.03	130.0	0
P-178	J-108	J-150	0.02	525	0.17	110.0	-15
P-179	J-150	J-13	0.03	614	0.19	110.0	-17
P-180	J-13	J-151	0.00	115	0.12	110.0	10
P-185	J-106	J-153	0.02	1,081	0.07	110.0	3
P-186	J-38	J-154	0.00	44	0.18	110.0	7
P-200	J-161	J-162	0.01	417	0.11	110.0	4
P-202	J-161	J-163	0.01	62	0.27	110.0	11
P-203	J-163	J-164	0.05	345	0.27	110.0	11
P-204	J-164	J-165	0.05	196	0.35	110.0	-14
P-205	J-165	J-166	0.11	240	0.49	110.0	-19
P-206	J-166	J-167	0.00	43	0.17	110.0	-7
P-207	J-167	J-168	0.00	330	0.06	130.0	-9
P-208	J-168	J-169	0.00	344	0.07	130.0	-11

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-209	J-169	J-170	0.11	264	1.05	130.0	370
P-210	J-170	J-171	0.01	30	1.17	130.0	414
P-211	J-171	J-172	0.06	129	1.15	130.0	406
P-212	J-172	J-173	0.00	37	0.22	130.0	77
P-213	J-173	J-174	0.01	422	0.13	130.0	-20
P-214	J-174	J-164	0.01	452	0.14	130.0	-22
P-215	J-165	J-176	0.01	639	0.08	110.0	3
P-216	J-176	J-171	0.01	159	0.15	110.0	-6
P-217	J-176	J-177	0.47	232	0.69	110.0	7
P-218	J-177	J-178	0.05	188	0.23	110.0	2
P-219	J-177	J-179	0.03	120	0.23	110.0	2
P-221	J-182	J-183	0.07	278	0.23	110.0	2
P-222	J-182	J-184	0.00	32	0.03	110.0	-2
P-223	J-184	J-185	0.00	43	0.05	110.0	-4
P-224	J-185	J-186	0.02	58	0.47	110.0	41
P-225	J-186	J-187	0.10	393	0.44	110.0	39
P-226	J-187	J-188	0.00	9	0.47	110.0	41
P-227	J-188	J-189	0.00	30	0.16	110.0	14
P-229	J-190	J-191	0.02	185	0.26	110.0	23
P-230	J-191	T-3	0.02	216	0.26	110.0	23
P-231	J-188	J-193	0.04	354	0.28	110.0	25
P-232	J-193	J-190	0.07	743	0.26	110.0	23
P-233	T-3	J-194	0.14	1,475	0.53	120.0	-332
P-234	J-194	J-189	0.00	48	0.53	120.0	-334
P-235	J-189	J-195	0.19	606	0.92	130.0	-323
P-236	J-195	J-172	0.28	875	0.92	130.0	-325
P-237	J-185	J-197	0.09	267	0.52	110.0	-46
P-238	J-197	J-198	0.15	225	0.77	110.0	-68
P-239	J-198	J-173	0.11	83	1.07	110.0	-94
P-240	J-197	J-199	0.27	377	0.46	130.0	4
P-242	J-43	J-201	0.03	322	0.39	130.0	-61
P-243	J-201	J-44	0.02	187	0.40	130.0	-63
P-245	J-199	J-202	0.04	222	0.23	130.0	2
P-246	J-197	J-203	0.20	637	0.39	110.0	15
P-247	J-203	J-204	0.02	12	0.69	130.0	7
P-248	J-204	J-205	0.02	103	0.23	130.0	2
P-249	J-204	J-206	0.02	106	0.23	130.0	2
P-250	J-203	J-187	0.00	247	0.03	110.0	2
P-251	J-203	J-207	0.00	267	0.07	110.0	6
P-252	J-207	J-208	0.01	219	0.13	110.0	5
P-253	J-207	J-209	0.15	403	0.43	110.0	-17
P-254	J-209	J-198	0.20	418	0.49	110.0	-19
P-255	J-198	J-210	0.14	529	0.23	110.0	2

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-257	J-211	J-132	0.00	346	0.06	110.0	-2
P-258	J-139	J-212	0.00	48	0.16	110.0	-6
P-259	J-212	J-213	0.06	544	0.22	110.0	-9
P-260	J-213	J-43	0.09	557	0.28	110.0	-11
P-261	J-166	J-214	0.09	301	0.37	110.0	-15
P-262	J-214	J-161	0.19	623	0.48	140.0	19
P-263	J-214	J-215	0.18	249	0.62	110.0	-24
P-264	J-215	J-216	0.02	34	0.57	110.0	22
P-266	J-217	J-218	0.01	232	0.11	110.0	-4
P-267	J-218	J-90	0.00	74	0.16	110.0	-6
P-269	J-219	J-220	0.01	570	0.07	110.0	3
P-270	J-220	J-217	0.00	421	0.01	110.0	0
P-272	J-221	J-222	0.12	319	0.42	110.0	-17
P-273	J-222	J-216	0.14	268	0.51	110.0	-20
P-274	J-86	J-223	0.00	228	0.02	120.0	-14
P-275	J-223	J-88	0.00	139	0.03	120.0	-17
P-280	J-228	J-225	0.00	221	0.01	130.0	-2
P-281	J-225	J-224	0.02	471	0.11	110.0	4
P-282	J-225	J-229	0.00	251	0.06	130.0	-9
P-283	J-229	J-230	0.04	438	0.35	130.0	55
P-284	J-230	J-231	0.02	206	0.34	130.0	53
P-285	J-231	J-232	0.02	254	0.33	130.0	51
P-286	J-232	J-215	0.00	61	0.31	130.0	49
P-287	J-214	J-234	0.11	606	0.29	110.0	-12
P-288	J-234	J-235	0.04	147	0.35	110.0	-14
P-289	J-235	J-236	0.13	243	0.52	110.0	-20
P-290	J-236	J-237	0.17	239	1.44	130.0	-507
P-291	J-237	J-238	0.01	175	0.27	130.0	42
P-292	J-238	J-239	0.00	82	0.20	130.0	32
P-293	J-239	J-240	0.44	403	0.76	110.0	30
P-294	J-240	J-241	0.02	257	0.20	110.0	8
P-295	J-241	J-242	0.02	359	0.14	110.0	6
P-296	J-242	J-169	0.04	103	1.09	130.0	384
P-297	J-242	J-243	0.17	395	1.08	130.0	-380
P-298	J-243	J-244	0.06	118	1.15	130.0	-406
P-299	J-244	J-245	0.06	127	1.18	130.0	-416
P-300	J-245	J-246	0.02	34	1.19	130.0	-418
P-301	J-246	J-236	0.02	24	1.38	130.0	-485
P-302	J-244	J-247	0.05	194	0.34	130.0	8
P-303	J-247	J-235	0.02	176	0.20	130.0	-4
P-304	J-238	J-249	0.00	187	0.06	110.0	5
P-305	J-243	J-250	0.01	841	0.15	130.0	24
P-306	J-247	J-252	0.07	192	0.40	130.0	9

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-307	J-253	J-254	0.00	160	0.06	110.0	-2
P-308	J-254	J-94	0.01	250	0.11	110.0	-4
P-309	J-96	J-255	0.00	268	0.08	120.0	-48
P-310	J-255	J-97	0.00	70	0.08	120.0	-50
P-312	J-256	J-257	0.00	342	0.03	130.0	-4
P-313	J-257	J-237	0.00	77	0.04	130.0	-7
P-314	J-237	J-258	0.28	325	1.58	130.0	-558
P-316	J-259	J-260	0.11	119	1.63	130.0	-576
P-317	J-260	J-261	0.23	369	0.73	110.0	65
P-318	J-261	J-262	0.21	356	0.71	110.0	62
P-319	J-262	J-263	0.18	188	0.71	110.0	28
P-320	J-263	J-264	0.52	629	0.66	110.0	26
P-321	J-264	J-240	0.03	459	0.22	110.0	-20
P-322	J-102	J-265	0.00	216	0.06	110.0	-2
P-324	J-266	J-267	0.00	289	0.06	110.0	2
P-325	J-260	J-268	0.13	115	1.82	130.0	-643
P-326	J-268	J-269	0.31	266	1.88	130.0	-662
P-327	J-269	J-270	1.75	1,384	1.95	130.0	-688
P-328	J-270	J-271	0.05	144	0.99	130.0	-349
P-329	J-271	J-272	0.25	693	1.00	130.0	-351
P-330	J-272	J-273	0.02	659	0.23	130.0	-83
P-331	J-273	J-274	0.05	1,833	0.24	130.0	-85
P-332	J-274	J-275	0.00	52	0.30	130.0	47
P-333	J-275	J-276	0.00	291	0.12	130.0	43
P-334	J-276	J-277	0.00	229	0.08	130.0	29
P-335	J-277	J-278	0.00	200	0.05	130.0	19
P-336	J-278	J-279	0.00	136	0.04	130.0	4
P-337	J-278	J-280	0.00	329	0.03	130.0	11
P-338	J-280	J-281	0.00	51	0.02	130.0	7
P-339	J-281	J-282	0.00	820	0.02	130.0	3
P-340	J-282	J-283	0.00	316	0.01	130.0	-1
P-341	J-283	J-284	0.00	294	0.03	130.0	-5
P-342	J-284	J-277	0.00	358	0.04	130.0	-6
P-343	J-276	J-285	0.00	381	0.06	130.0	10
P-344	J-285	J-286	0.00	531	0.02	130.0	4
P-345	J-286	J-282	0.00	233	0.00	130.0	0
P-346	J-285	J-284	0.00	173	0.01	130.0	2
P-349	J-287	J-289	0.00	180	0.12	130.0	19
P-350	J-289	J-290	0.00	165	0.07	130.0	12
P-351	J-290	J-291	0.00	503	0.02	130.0	4
P-352	J-290	J-292	0.00	336	0.04	130.0	4
P-353	J-289	J-293	0.00	336	0.02	130.0	4
P-354	J-287	J-294	0.00	331	0.07	130.0	-23

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-355	J-294	J-295	0.01	4,028	0.08	130.0	-27
P-356	J-295	J-296	0.00	417	0.06	130.0	9
P-357	J-296	J-297	0.00	254	0.01	130.0	2
P-358	J-298	J-296	0.00	141	0.05	130.0	-5
P-359	J-295	J-299	0.02	351	0.25	130.0	-39
P-360	J-299	J-300	0.00	63	0.01	130.0	2
P-361	J-299	J-301	0.01	107	0.27	130.0	-43
P-362	J-301	J-302	0.00	92	0.01	130.0	2
P-363	J-301	J-58	0.02	331	0.30	130.0	-48
P-364	J-56	J-303	0.00	143	0.00	130.0	0
P-365	J-304	J-305	0.00	71	0.03	110.0	-2
P-366	J-305	J-306	0.00	293	0.10	110.0	-9
P-367	J-306	J-207	0.01	201	0.18	110.0	-16
P-368	J-307	J-305	0.08	408	0.23	130.0	-2
P-369	J-305	J-308	0.04	209	0.23	130.0	2
P-370	J-306	J-52	0.04	209	0.23	130.0	2
P-371	J-306	J-309	0.14	735	0.23	130.0	2
P-372	J-170	J-310	0.00	66	0.28	130.0	-44
P-373	J-310	J-311	0.02	594	0.22	130.0	-35
P-374	J-311	J-312	0.00	352	0.03	130.0	4
P-375	J-312	J-313	0.00	325	0.01	130.0	2
P-376	J-311	J-314	0.02	333	0.27	130.0	-42
P-378	J-56	J-55	0.00	36	0.02	130.0	-6
P-379	J-314	J-315	0.02	375	0.28	130.0	-44
P-380	J-315	J-316	0.00	61	0.03	110.0	2
P-381	J-315	J-317	0.07	187	0.55	110.0	-49
P-382	J-317	J-264	0.03	199	0.32	110.0	-28
P-383	J-264	J-318	0.14	461	0.39	110.0	15
P-384	J-318	J-319	0.00	143	0.06	110.0	2
P-385	J-318	J-310	0.01	535	0.12	110.0	11
P-386	J-317	J-320	0.42	618	0.59	110.0	-23
P-387	J-320	J-321	0.24	304	0.64	110.0	-25
P-388	J-321	J-322	0.01	390	0.10	110.0	-9
P-389	J-322	J-323	0.01	592	0.12	110.0	-11
P-390	J-323	J-321	0.02	313	0.21	110.0	19
P-391	J-323	J-262	0.05	290	0.36	110.0	-32
P-392	J-269	J-324	0.00	107	0.00	130.0	0
P-393	J-104	J-325	0.24	371	0.58	110.0	23
P-394	J-325	J-326	0.23	426	0.52	110.0	20
P-395	J-326	J-327	0.00	124	0.06	110.0	2
P-396	J-326	J-328	0.11	328	0.41	110.0	16
P-397	J-328	J-329	0.02	83	0.36	110.0	14
P-398	J-329	J-330	0.04	285	0.25	110.0	10

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-399	J-330	J-331	0.02	209	0.19	110.0	7
P-400	J-331	J-332	0.00	266	0.07	110.0	3
P-401	J-332	J-333	0.04	495	0.20	110.0	-8
P-402	J-333	J-334	0.04	216	0.31	110.0	-12
P-403	J-334	J-335	0.01	555	0.07	110.0	3
P-404	J-335	J-328	0.00	202	0.01	110.0	0
P-405	J-336	J-329	0.00	200	0.06	110.0	-2
P-406	J-337	J-331	0.05	205	0.23	110.0	-2
P-407	J-338	J-333	0.05	184	0.23	110.0	-2
P-408	J-104	J-339	0.26	243	1.52	110.0	535
P-409	J-339	J-340	0.25	233	1.51	110.0	532
P-410	J-340	J-341	0.03	26	1.46	110.0	515
P-411	J-341	J-342	0.24	241	1.46	110.0	515
P-412	J-342	J-343	0.35	346	1.46	110.0	513
P-413	J-343	J-344	0.22	220	1.45	110.0	511
P-414	J-344	J-345	0.38	181	1.40	110.0	-123
P-415	J-345	J-346	0.30	304	0.93	110.0	-82
P-416	J-346	J-332	0.00	309	0.09	110.0	-8
P-417	J-334	J-340	0.07	177	0.44	110.0	-17
P-421	J-348	J-349	0.01	359	0.11	110.0	-4
P-422	J-349	J-268	0.00	32	0.11	130.0	-17
P-423	J-349	J-350	0.00	266	0.08	130.0	12
P-424	J-350	J-351	0.04	271	0.25	110.0	10
P-426	J-346	J-352	0.47	548	0.86	110.0	-76
P-427	J-352	J-353	0.00	101	0.05	110.0	4
P-428	J-353	J-354	0.00	163	0.03	110.0	2
P-429	J-352	J-355	0.03	119	0.64	130.0	-100
P-430	J-355	J-356	0.05	138	0.52	110.0	46
P-432	J-357	J-358	0.10	408	0.44	110.0	39
P-433	J-358	J-359	0.06	138	0.59	110.0	52
P-434	J-359	J-360	0.22	563	0.57	110.0	50
P-440	J-362	J-352	0.16	367	0.46	110.0	-18
P-441	J-362	J-358	0.16	487	0.40	110.0	16
P-442	J-355	J-363	0.15	285	0.95	130.0	-148
P-443	J-363	J-364	0.56	437	1.97	130.0	-694
P-444	J-364	T-1	0.73	561	1.97	130.0	-696
P-445	J-363	J-365	0.18	215	1.54	130.0	543
P-446	J-365	J-366	0.56	687	1.53	130.0	541
P-447	J-366	J-367	0.00	67	0.00	130.0	0
P-448	J-360	J-368	0.00	174	0.05	110.0	4
P-449	J-368	J-369	0.00	268	0.03	110.0	2
P-450	J-360	J-345	0.16	537	0.49	110.0	43
P-451	J-356	J-370	0.17	546	0.49	110.0	43

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-452	J-370	J-357	0.04	138	0.47	110.0	41
P-454	J-366	J-371	1.91	507	2.31	110.0	361
P-455	J-371	J-372	0.10	334	0.57	110.0	90
P-456	J-372	J-373	0.01	186	0.10	110.0	2
P-457	J-371	J-374	0.57	261	1.72	110.0	269
P-458	J-374	J-375	0.20	341	0.85	110.0	134
P-459	J-375	J-376	0.01	434	0.11	110.0	17
P-460	J-376	J-377	0.06	280	0.27	110.0	6
P-462	J-378	J-379	0.10	210	0.75	110.0	-117
P-463	J-379	J-380	0.03	296	0.35	110.0	-56
P-464	J-380	J-381	0.01	117	0.24	110.0	-22
P-465	J-381	J-382	0.11	430	0.44	110.0	-39
P-466	J-382	J-380	0.12	539	0.41	110.0	36
P-467	J-379	J-383	0.07	480	0.41	110.0	-64
P-468	J-383	J-384	0.03	828	0.18	110.0	27
P-469	J-384	J-385	0.00	32	0.00	110.0	0
P-470	J-384	J-387	0.01	283	0.16	110.0	25
P-471	J-387	J-388	0.00	209	0.07	110.0	11
P-472	J-388	J-389	0.00	331	0.03	110.0	4
P-473	J-389	J-390	0.00	52	0.01	110.0	-1
P-474	J-390	J-387	0.00	220	0.08	110.0	-12
P-475	J-392	J-390	0.00	232	0.04	110.0	-7
P-476	J-389	J-394	0.00	143	0.02	110.0	3
P-477	J-394	J-395	0.00	189	0.03	110.0	2
P-478	J-394	J-396	0.00	496	0.04	110.0	-3
P-479	J-396	J-397	0.01	217	0.16	110.0	14
P-480	J-396	J-398	0.04	307	0.31	110.0	-27
P-481	J-398	J-399	0.12	319	0.35	110.0	8
P-482	J-398	J-400	0.10	211	0.61	110.0	-54
P-483	J-400	J-383	0.10	437	0.60	130.0	94
P-484	J-400	J-401	0.10	187	0.96	130.0	-150
P-485	J-401	J-382	0.12	320	0.79	130.0	125
P-486	J-401	J-402	0.24	139	1.77	130.0	-277
P-487	J-402	J-403	0.44	259	1.78	130.0	-279
P-488	J-403	J-404	0.00	183	0.05	110.0	4
P-489	J-404	J-405	0.00	905	0.01	110.0	1
P-490	J-405	J-404	0.00	822	0.01	110.0	-1
P-491	J-403	J-407	0.21	116	1.82	130.0	-286
P-492	J-407	J-408	0.29	189	1.41	110.0	-222
P-493	J-408	J-409	0.10	312	0.62	110.0	-97
P-494	J-409	J-375	0.32	769	0.70	110.0	-110
P-495	J-408	J-410	0.41	732	0.82	110.0	-129
P-496	J-410	J-411	0.00	296	0.01	110.0	2

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-497	J-410	J-374	0.22	375	0.85	110.0	-133
P-498	J-412	J-413	0.00	427	0.03	110.0	-2
P-499	J-413	J-414	0.00	448	0.05	110.0	-4
P-500	J-414	J-415	0.00	230	0.05	110.0	4
P-501	J-415	J-416	0.00	161	0.03	110.0	2
P-503	J-417	J-418	0.00	443	0.04	110.0	-3
P-504	J-418	J-419	0.00	533	0.07	110.0	-6
P-505	J-419	J-420	0.00	57	0.13	110.0	-12
P-507	J-421	J-422	0.00	41	0.20	110.0	-18
P-508	J-422	J-423	0.00	235	0.03	110.0	2
P-509	J-414	J-424	0.01	291	0.13	110.0	-11
P-510	J-424	J-425	0.01	142	0.10	110.0	2
P-511	J-424	J-421	0.01	244	0.18	110.0	-16
P-512	J-417	J-426	0.00	423	0.01	110.0	-1
P-513	J-426	J-427	0.00	445	0.03	110.0	-3
P-514	J-427	J-428	0.00	134	0.03	110.0	2
P-515	J-427	J-418	0.00	305	0.01	110.0	-1
P-516	J-427	J-429	0.00	418	0.07	110.0	-6
P-517	J-429	J-430	0.00	204	0.01	110.0	-1
P-518	J-430	J-419	0.00	642	0.03	110.0	-3
P-519	J-426	J-431	0.00	250	0.01	110.0	-1
P-520	J-431	J-432	0.00	372	0.05	110.0	-5
P-521	J-432	J-433	0.01	402	0.10	110.0	-9
P-522	J-433	J-429	0.00	327	0.09	110.0	8
P-524	J-434	J-435	0.02	831	0.16	130.0	-25
P-527	J-435	J-436	0.00	211	0.14	130.0	-50
P-528	J-436	T-4	0.01	448	0.18	130.0	-64
P-530	J-438	J-439	0.00	183	0.03	110.0	2
P-531	J-438	J-440	1.12	330	1.81	110.0	-160
P-532	J-440	J-441	0.25	237	0.96	110.0	-85
P-533	J-441	J-442	0.67	608	0.99	110.0	-87
P-534	J-442	J-443	0.68	178	1.94	110.0	-171
P-535	J-443	J-366	0.23	228	1.12	110.0	-176
P-537	J-435	J-446	0.00	40	0.15	130.0	23
P-538	J-446	J-420	0.02	493	0.18	110.0	16
P-540	J-446	J-448	0.01	925	0.06	110.0	5
P-541	J-448	J-449	0.00	609	0.04	110.0	3
P-542	J-449	J-450	0.00	370	0.01	110.0	1
P-544	J-451	J-443	0.00	622	0.01	110.0	-2
P-545	J-442	J-452	0.57	582	0.93	110.0	82
P-546	J-452	J-453	0.25	266	0.90	110.0	80
P-547	J-453	J-440	0.09	103	0.88	110.0	77
P-549	J-454	J-436	0.00	622	0.07	110.0	-11

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-550	J-454	J-455	0.00	284	0.10	110.0	9
P-551	J-455	J-456	0.00	322	0.03	110.0	2
P-552	J-455	J-448	0.00	434	0.01	110.0	1
P-553	J-433	J-457	0.00	259	0.13	130.0	-20
P-554	J-457	J-434	0.00	266	0.14	130.0	-23
P-555	J-455	J-450	0.00	700	0.04	110.0	3
P-556	J-378	J-458	2.47	139	5.31	110.0	832
P-559	GPV-4	J-460	7.65	375	4.78	110.0	422
P-560	J-460	J-461	5.25	260	4.76	110.0	419
P-561	J-461	J-462	0.89	308	1.66	110.0	146
P-562	J-462	J-463	1.07	383	1.64	110.0	144
P-563	J-463	J-464	0.00	131	0.00	110.0	0
P-564	J-464	J-465	0.58	399	1.79	110.0	-629
P-568	J-463	J-467	0.41	152	1.61	110.0	142
P-569	J-467	J-270	0.01	31	0.97	130.0	341
P-570	J-467	J-468	0.00	620	0.03	110.0	2
P-571	J-467	J-469	5.65	1,083	2.29	110.0	-202
P-572	J-469	J-470	1.92	361	2.32	110.0	-204
P-573	J-470	GPV-4	6.22	323	4.64	110.0	-409
P-574	J-470	J-471	1.72	328	2.30	110.0	202
P-575	J-471	J-472	1.40	284	2.22	110.0	196
P-576	J-472	J-473	1.46	309	2.17	110.0	191
P-577	J-473	J-474	1.01	269	1.92	110.0	169
P-578	J-474	J-475	0.00	181	0.10	110.0	9
P-579	J-475	J-476	0.00	226	0.03	110.0	2
P-580	J-475	J-478	0.00	238	0.05	110.0	4
P-581	J-478	J-479	0.00	232	0.03	110.0	2
P-582	J-480	J-472	0.00	492	0.03	110.0	-2
P-583	J-481	J-473	0.00	495	0.03	110.0	-2
P-584	J-482	J-483	0.00	207	0.03	110.0	-2
P-585	J-483	J-471	0.00	651	0.05	110.0	-4
P-586	J-474	J-484	0.62	189	1.79	110.0	158
P-587	J-484	J-485	0.00	193	0.03	110.0	2
P-588	J-484	J-486	0.87	277	1.74	110.0	153
P-589	J-486	J-487	0.00	216	0.03	110.0	2
P-590	J-486	J-488	0.10	179	0.95	130.0	149
P-591	J-488	J-274	0.03	75	0.86	130.0	135
P-592	J-488	J-489	0.00	311	0.07	130.0	11
P-594	J-490	J-491	0.00	426	0.01	130.0	2
P-595	J-489	J-493	0.00	653	0.06	130.0	9
P-596	J-493	J-490	0.00	422	0.03	130.0	4
P-597	J-492	J-493	0.00	140	0.06	130.0	-2
P-599	J-28	J-494	0.00	258	0.03	130.0	10

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-600	J-494	J-29	0.00	378	0.02	130.0	8
P-601	J-151	J-40	0.01	511	0.09	110.0	8
P-603	J-11	J-495	0.00	456	0.05	110.0	4
P-604	J-495	J-144	0.00	446	0.03	110.0	2
P-605	J-229	J-246	0.01	311	0.19	130.0	-67
P-607	J-496	J-347	0.00	261	0.06	110.0	-2
P-609	J-497	J-256	0.00	385	0.01	130.0	-2
P-611	J-498	J-224	0.00	370	0.06	110.0	-2
P-613	J-499	J-217	0.00	231	0.06	110.0	-2
P-614	J-154	J-500	0.02	426	0.12	110.0	5
P-616	J-162	J-501	0.00	413	0.06	110.0	2
P-618	J-351	J-502	0.03	324	0.20	110.0	8
P-621	J-503	J-348	0.00	251	0.06	110.0	-2
P-622	J-450	J-504	0.00	139	0.03	110.0	2
P-624	J-45	J-505	0.09	320	0.23	110.0	2
P-626	J-46	J-506	0.00	344	0.03	110.0	2
P-629	J-507	J-221	0.10	453	0.32	110.0	-13
P-630	J-500	J-219	0.00	23	0.12	110.0	5
P-632	J-508	J-56	0.00	206	0.03	130.0	-4
P-634	J-509	J-417	0.00	159	0.03	110.0	-2
P-635	J-420	J-510	0.00	54	0.03	110.0	2
P-639	J-422	J-512	0.00	320	0.13	130.0	-20
P-643	J-265	J-514	0.00	533	0.05	110.0	-2
P-644	J-514	J-266	0.00	294	0.05	110.0	2
P-645	J-514	J-258	0.04	44	1.58	130.0	558
P-646	J-514	J-259	0.24	268	1.62	130.0	-569
P-648	PRV-1	J-287	0.00	20	0.00	130.0	0
P-651	J-281	GPV-3	0.00	9	0.00	130.0	0
P-652	GPV-3	PRV-1	0.00	9	0.00	130.0	0
P-653	J-512	J-511	0.00	92	0.14	130.0	-22
P-654	J-458	PRV-2	0.22	13	5.30	110.0	830
P-655	PRV-2	GPV-4	4.14	58	9.42	110.0	830
P-660	J-511	J-516	0.00	225	0.16	130.0	-25
P-661	J-516	J-407	0.05	439	0.42	130.0	66
P-662	J-438	J-516	0.42	177	1.76	130.0	155
P-663	J-516	J-517	0.01	343	0.18	130.0	64
P-666	J-347	J-259	0.01	378	0.11	130.0	-4
P-667	J-265	J-514	0.00	531	0.06	130.0	-2
P-668	J-514	J-266	0.00	294	0.06	130.0	2
P-669	J-344	J-465	0.13	118	1.79	130.0	632
P-672	J-376	J-520	0.00	129	0.02	110.0	3
P-673	J-520	J-378	1.97	146	4.58	110.0	718
P-674	J-376	J-520	0.00	129	0.02	130.0	3

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-677	J-521	J-520	0.67	498	2.02	130.0	712
P-678	J-464	J-521	0.72	674	1.78	130.0	627
P-679	J-521	J-372	0.01	469	0.24	130.0	-85
P-680	J-461	J-272	2.08	315	3.07	130.0	271

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
Tank Report

Current Time: 0.000 hours

Label	Elevation (Base) (ft)	Elevation (Minimum) (ft)	Elevation (Initial) (ft)	Elevation (Maximum) (ft)	Diameter (ft)	Flow (In net) (gpm)	Flow (Out net) (gpm)	Status (Calculated)	Hydraulic Grade (ft)	Percent Full (%)
T-1	380.0	380.0	458.0	470.1	34.00	-1,334	1,334	Emptying	458.0	86.6
T-2	380.0	432.9	458.0	470.1	39.00	-477	477	Emptying	458.0	67.5
T-3	377.0	377.0	425.0	425.1	60.00	355	-355	Filling	425.0	99.8
T-4	330.0	330.0	521.7	522.0	10.00	-64	64	Emptying	521.7	99.8

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
PRV Report

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	Hydraulic Grade Setting (Initial) (ft)
1139	PRV-1	218.0	6.0	0.000	393.6
1154	PRV-2	294.0	6.0	0.000	469.6

Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
76.0	0	432.8	457.4	0.00
76.0	830	448.6	448.6	0.00

Active Scenario: PHD Existing Conditions
PHD=1,520 GPM
GPV Report

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	General Purpose Valve Headloss Curve
1146	GPV-3	218.0	8.0	0.000	GPV Headloss Curve - Commons
1152	GPV-4	294.0	6.0	0.000	GPV Headloss Curve - Drake ST.

Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
0	429.6	432.8	3.20
409	444.5	443.0	1.48

Existing System at Maximum Buildout

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-2	319.0	0	457.9	60.1	
J-3	319.0	2	457.9	60.1	
J-4	327.0	2	457.8	56.6	
J-5	319.0	2	457.7	60.0	
J-6	307.0	2	457.5	65.1	
J-7	334.0	2	457.4	53.4	
J-8	322.0	0	457.4	58.6	
J-9	321.0	2	457.4	59.0	
J-10	318.0	2	457.3	60.3	
J-11	282.0	2	457.3	75.8	
J-12	262.0	2	457.2	84.5	
J-13	277.0	2	457.2	78.0	
J-14	278.0	2	457.2	77.5	
J-15	275.0	3	457.1	78.8	
J-16	278.0	4	457.1	77.5	
J-17	285.0	3	457.1	74.5	
J-18	288.0	2	457.1	73.2	
J-19	289.0	2	457.1	72.7	
J-20	287.0	2	457.1	73.6	
J-21	282.0	2	457.1	75.8	
J-22	284.0	2	457.1	74.9	
J-23	289.0	2	457.1	72.7	
J-24	291.0	2	457.1	71.9	
J-25	293.0	2	457.1	71.0	
J-26	290.0	2	457.1	72.3	
J-27	305.0	2	457.1	65.8	
J-28	303.0	2	457.1	66.7	
J-29	302.0	2	457.1	67.1	
J-30	302.0	2	457.1	67.1	
J-31	304.0	14	457.1	66.2	
J-32	303.0	2	457.1	66.7	
J-33	298.0	2	457.1	68.8	
J-34	279.0	8	457.1	77.1	
J-35	277.0	2	457.1	77.9	
J-36	272.0	7	457.1	80.1	
J-37	272.0	5	457.1	80.1	
J-38	279.0	5	457.1	77.1	
J-39	271.0	4	457.1	80.5	
J-40	259.0	3	457.2	85.7	
J-41	251.0	2	457.2	89.2	
J-42	248.0	2	457.2	90.5	
J-43	272.0	2	457.2	80.1	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-44	297.0	2	457.3	69.4	
J-45	324.0	2	457.3	57.7	
J-46	331.0	2	457.3	54.6	
J-47	310.0	2	457.3	63.8	
J-48	319.0	2	457.5	59.9	
J-49	319.0	0	457.8	60.1	
J-50	286.0	2	457.4	74.2	
J-51	286.0	2	457.4	74.2	
J-52	286.0	2	425.1	60.2	
J-53	283.0	2	457.4	75.5	
J-54	293.0	7	457.4	71.1	
J-55	285.0	0	457.4	74.6	
J-56	284.0	2	457.4	75.0	
J-57	279.0	2	457.4	77.2	
J-58	279.0	4	457.4	77.2	
J-59	279.0	0	457.4	77.2	
J-60	312.0	2	457.3	62.9	
J-61	308.0	2	457.3	64.6	
J-62	298.0	2	457.3	68.9	
J-63	307.0	18	457.1	64.9	
J-64	312.0	18	457.1	62.8	
J-65	315.0	18	457.1	61.5	
J-66	319.0	2	457.1	59.7	
J-67	319.0	4	457.1	59.7	
J-68	333.0	2	457.1	53.7	
J-69	334.0	10	457.1	53.3	
J-70	334.0	5	457.1	53.3	
J-71	330.0	3	457.1	55.0	
J-72	304.0	2	457.1	66.2	
J-73	303.0	2	457.1	66.7	
J-74	300.0	6	457.1	68.0	
J-75	290.0	3	457.1	72.3	
J-76	294.0	2	457.1	70.6	
J-77	309.0	2	457.1	64.1	
J-78	313.0	2	457.1	62.3	
J-80	274.0	3	457.1	79.2	
J-81	290.0	2	457.1	72.3	
J-82	290.0	3	457.1	72.3	
J-83	292.0	5	457.1	71.4	
J-84	284.0	2	457.1	74.9	
J-85	281.0	2	457.1	76.2	
J-86	275.0	2	457.1	78.8	
J-87	275.0	2	457.1	78.8	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-88	273.0	2	457.1	79.7	
J-89	271.0	2	457.1	80.5	
J-90	269.0	2	457.1	81.4	
J-91	270.0	2	457.1	81.0	
J-92	268.0	2	457.1	81.8	
J-93	268.0	0	457.1	81.8	
J-94	269.0	2	457.1	81.4	
J-95	269.0	2	457.1	81.4	
J-96	269.0	2	457.1	81.4	
J-97	267.0	0	457.1	82.3	
J-98	267.0	2	457.1	82.3	
J-99	270.0	2	457.3	81.0	
J-100	328.0	25	457.6	56.1	
J-102	261.0	2	426.5	71.6	
J-103	261.0	0	456.7	84.7	
J-104	261.0	2	456.7	84.7	
J-105	275.0	2	457.1	78.8	
J-106	298.0	1	457.1	68.8	
J-107	298.0	1	457.1	68.8	
J-108	294.0	4	457.1	70.6	
J-109	292.0	2	457.1	71.4	
J-110	299.0	2	457.1	68.4	
J-111	299.0	2	457.1	68.4	
J-112	296.0	2	457.0	69.7	
J-113	293.0	2	457.0	70.9	
J-114	294.0	2	457.0	70.5	
J-115	304.0	2	456.9	66.2	
J-116	305.0	2	456.9	65.7	
J-117	301.0	2	456.9	67.5	
J-118	296.0	2	456.9	69.6	
J-119	321.0	2	456.8	58.8	
J-120	295.0	36	456.9	70.0	
J-121	285.0	2	456.9	74.4	
J-122	290.0	2	456.9	72.2	
J-123	297.0	2	457.2	69.3	
J-124	312.0	2	457.3	62.9	
J-125	321.0	2	457.3	59.0	
J-126	292.0	2	456.8	71.3	
J-127	295.0	2	456.8	70.0	
J-128	291.0	2	457.0	71.8	
J-129	308.0	2	457.1	64.5	
J-130	311.0	2	457.0	63.1	
J-131	335.0	2	457.0	52.8	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-132	325.0	2	456.9	57.1	
J-133	324.0	2	456.9	57.5	
J-134	293.0	2	457.0	70.9	
J-135	308.0	2	457.0	64.5	
J-136	321.0	2	457.0	58.8	
J-137	307.0	2	457.0	64.9	
J-138	318.0	2	457.1	60.2	
J-139	318.0	2	457.1	60.2	
J-140	296.0	2	457.1	69.7	
J-141	291.0	2	457.1	71.9	
J-142	287.0	2	457.1	73.6	
J-143	283.0	2	457.1	75.3	
J-144	255.0	2	457.2	87.5	
J-145	281.0	2	457.1	76.2	
J-146	275.0	2	457.1	78.8	
J-147	269.0	2	457.1	81.4	
J-148	263.0	2	457.1	84.0	
J-149	276.0	2	457.1	78.3	
J-150	280.0	2	457.1	76.6	
J-151	275.0	2	457.2	78.8	
J-153	279.0	3	457.1	77.0	
J-154	278.0	2	457.1	77.5	
J-161	248.0	4	425.6	76.8	
J-162	253.0	2	425.6	74.7	
J-163	248.0	0	425.6	76.8	
J-164	255.0	2	425.6	73.8	
J-165	245.0	2	425.6	78.1	
J-166	233.0	2	425.7	83.4	
J-167	234.0	2	425.7	82.9	
J-168	238.0	2	425.7	81.2	
J-169	238.0	2	425.7	81.2	
J-170	255.0	0	425.6	73.8	
J-171	256.0	2	425.6	73.4	
J-172	262.0	4	425.5	70.8	
J-173	262.0	2	425.5	70.8	
J-174	270.0	2	425.6	67.3	
J-176	262.0	2	425.6	70.8	
J-177	239.0	2	425.1	80.5	
J-178	240.0	2	425.0	80.1	
J-179	238.0	2	425.0	80.9	
J-182	318.0	0	425.2	46.4	
J-183	319.0	2	425.1	45.9	
J-184	319.0	2	425.2	46.0	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-185	319.0	0	425.2	46.0	
J-186	319.0	2	425.2	46.0	
J-187	320.0	0	425.1	45.5	
J-188	320.0	2	425.1	45.5	
J-189	320.0	2	425.1	45.5	
J-190	319.0	0	425.0	45.9	
J-191	319.0	0	425.0	45.9	
J-193	304.0	2	425.1	52.4	
J-194	318.0	2	425.1	46.3	
J-195	296.0	2	425.3	55.9	
J-197	294.0	2	425.3	56.8	
J-198	264.0	6	425.4	69.9	
J-199	292.0	2	425.0	57.5	
J-201	292.0	2	457.3	71.5	
J-202	275.0	2	425.0	64.9	
J-203	306.0	0	425.1	51.5	
J-204	305.0	2	425.1	52.0	
J-205	302.0	2	425.1	53.3	
J-206	313.0	2	425.1	48.5	
J-207	297.0	2	425.1	55.4	
J-208	286.0	5	425.1	60.2	
J-209	284.0	2	425.3	61.1	
J-210	271.0	2	425.3	66.8	
J-211	298.0	2	456.9	68.8	
J-212	318.0	2	457.1	60.2	
J-213	305.0	2	457.1	65.8	
J-214	235.0	2	425.8	82.5	
J-215	245.0	2	426.0	78.3	
J-216	245.0	2	425.9	78.3	
J-217	269.0	2	457.1	81.4	
J-218	268.0	2	457.1	81.8	
J-219	269.0	2	457.1	81.4	
J-220	274.0	2	457.1	79.2	
J-221	254.0	4	425.7	74.3	
J-222	246.0	4	425.8	77.8	
J-223	275.0	2	457.1	78.8	
J-224	256.0	2	426.0	73.6	
J-225	256.0	2	426.0	73.6	
J-228	268.0	2	426.0	68.4	
J-229	243.0	2	426.0	79.2	
J-230	242.0	2	426.0	79.6	
J-231	242.0	2	426.0	79.6	
J-232	244.0	2	426.0	78.7	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-234	231.0	2	425.9	84.3	
J-235	230.0	2	425.9	84.8	
J-236	229.0	2	426.1	85.3	
J-237	224.0	2	426.2	87.5	
J-238	220.0	5	426.2	89.2	
J-239	220.0	2	426.2	89.2	
J-240	236.0	2	425.8	82.1	
J-241	232.0	2	425.8	83.8	
J-242	233.0	2	425.8	83.4	
J-243	225.0	2	425.9	86.9	
J-244	225.0	2	426.0	86.9	
J-245	227.0	2	426.0	86.1	
J-246	229.0	0	426.0	85.3	
J-247	226.0	3	425.9	86.5	
J-249	223.0	5	426.2	87.9	
J-250	222.0	25	425.9	88.2	
J-252	226.0	9	425.8	86.5	
J-253	281.0	2	457.1	76.2	
J-254	281.0	2	457.1	76.2	
J-255	267.0	2	457.1	82.3	
J-256	255.0	2	426.2	74.1	
J-257	224.0	2	426.2	87.5	
J-258	218.0	0	426.5	90.2	
J-259	217.0	2	426.8	90.8	
J-260	212.0	2	426.9	93.0	
J-261	209.0	2	426.6	94.2	
J-262	246.0	2	426.4	78.1	
J-263	256.0	2	426.3	73.7	
J-264	274.0	2	425.8	65.7	
J-265	256.0	2	426.5	73.8	
J-266	211.0	2	426.5	93.3	
J-267	214.0	2	426.5	92.0	
J-268	212.0	2	427.0	93.0	
J-269	211.0	27	427.3	93.6	
J-270	232.0	2	429.0	85.2	
J-271	228.0	2	429.1	87.0	
J-272	262.0	2	429.3	72.4	
J-273	271.0	2	429.3	68.5	
J-274	204.0	4	429.4	97.5	
J-275	201.0	4	429.4	98.8	
J-276	196.0	4	429.4	101.0	
J-277	202.0	4	429.4	98.4	
J-278	224.0	4	429.4	88.9	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-279	216.0	4	429.4	92.3	
J-280	217.0	4	429.4	91.9	
J-281	218.0	4	429.4	91.5	
J-282	210.0	4	429.4	94.9	
J-283	222.0	4	429.4	89.7	
J-284	214.0	4	429.4	93.2	
J-285	195.0	4	429.4	101.4	
J-286	191.0	4	429.4	103.1	
J-287	218.0	4	457.4	103.6	
J-289	222.0	4	457.4	101.8	
J-290	223.0	4	457.4	101.4	
J-291	274.0	4	457.4	79.3	
J-292	274.0	4	457.4	79.3	
J-293	270.0	4	457.4	81.1	
J-294	274.0	4	457.4	79.3	
J-295	304.0	2	457.4	66.4	
J-296	272.0	2	457.4	80.2	
J-297	260.0	2	457.4	85.4	
J-298	262.0	5	457.4	84.5	
J-299	277.0	2	457.4	78.0	
J-300	277.0	2	457.4	78.0	
J-301	275.0	2	457.4	78.9	
J-302	279.0	2	457.4	77.2	
J-303	283.0	0	457.4	75.5	
J-304	289.0	2	425.1	58.9	
J-305	300.0	2	425.1	54.1	
J-306	300.0	2	425.1	54.1	
J-307	273.0	2	425.0	65.8	
J-308	290.0	2	425.1	58.4	
J-309	272.0	2	425.0	66.2	
J-310	255.0	2	425.6	73.8	
J-311	271.0	2	425.6	66.9	
J-312	293.0	2	425.6	57.4	
J-313	293.0	2	425.6	57.4	
J-314	274.0	2	425.7	65.6	
J-315	280.0	2	425.7	63.0	
J-316	283.0	2	425.7	61.7	
J-317	276.0	2	425.7	64.8	
J-318	279.0	2	425.6	63.4	
J-319	282.0	2	425.6	62.1	
J-320	284.0	2	426.1	61.5	
J-321	251.0	2	426.4	75.9	
J-322	238.0	2	426.4	81.5	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-323	237.0	2	426.4	81.9	
J-324	209.0	0	427.3	94.4	
J-325	268.0	2	456.4	81.5	
J-326	278.0	2	456.2	77.1	
J-327	281.0	2	456.2	75.8	
J-328	280.0	2	456.1	76.2	
J-329	277.0	2	456.0	77.5	
J-330	273.0	2	456.0	79.2	
J-331	271.0	2	456.0	80.0	
J-332	267.0	2	456.0	81.8	
J-333	265.0	2	456.0	82.7	
J-334	259.0	2	456.1	85.3	
J-335	276.0	2	456.1	77.9	
J-336	288.0	2	456.0	72.7	
J-337	289.0	2	455.9	72.2	
J-338	270.0	2	456.0	80.5	
J-339	258.0	2	456.4	85.8	
J-340	254.0	0	456.2	87.5	
J-341	253.0	0	456.1	87.9	
J-342	250.0	2	455.9	89.1	
J-343	257.0	2	455.5	85.9	
J-344	259.0	2	455.3	84.9	
J-345	264.0	2	455.7	82.9	
J-346	278.0	2	456.0	77.0	
J-347	246.0	2	426.8	78.2	
J-348	243.0	2	427.0	79.6	
J-349	213.0	0	427.0	92.6	
J-350	212.0	2	427.0	93.0	
J-351	235.0	2	427.0	83.0	
J-352	326.0	2	456.5	56.4	
J-353	333.0	2	456.5	53.4	
J-354	335.0	2	456.5	52.6	
J-355	326.0	2	456.5	56.5	
J-356	329.0	2	456.5	55.1	
J-357	343.0	2	456.2	49.0	
J-358	333.0	2	456.1	53.3	
J-359	323.0	2	456.1	57.6	
J-360	287.0	2	455.8	73.1	
J-362	333.0	2	456.3	53.3	
J-363	352.0	2	456.7	45.3	
J-364	352.0	2	457.2	45.5	
J-365	356.0	2	456.5	43.5	
J-366	361.0	4	455.9	41.1	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-367	361.0	0	455.9	41.1	
J-368	299.0	2	455.8	67.9	
J-369	301.0	2	455.8	67.0	
J-370	342.0	2	456.3	49.4	
J-371	348.0	2	453.9	45.8	
J-372	338.0	2	453.8	50.1	
J-373	340.0	2	453.8	49.2	
J-374	351.0	2	453.3	44.3	
J-375	347.0	6	453.1	45.9	
J-376	316.0	6	453.1	59.3	
J-377	318.0	6	453.1	58.4	
J-378	309.0	2	451.1	61.5	
J-379	311.0	3	451.2	60.7	
J-380	329.0	2	451.3	52.9	
J-381	332.0	18	451.3	51.6	
J-382	335.0	52	451.4	50.3	
J-383	303.0	2	451.3	64.2	
J-384	280.0	2	451.3	74.1	
J-385	285.0	0	451.3	71.9	
J-387	284.0	2	451.2	72.4	
J-388	280.0	7	451.2	74.1	
J-389	292.0	2	451.2	68.9	
J-390	294.0	4	451.2	68.0	
J-392	303.0	7	451.2	64.1	
J-394	297.0	4	451.2	66.7	
J-395	295.0	2	451.2	67.6	
J-396	312.0	10	451.2	60.2	
J-397	305.0	14	451.2	63.3	
J-398	318.0	20	451.3	57.7	
J-399	300.0	8	451.2	65.4	
J-400	323.0	2	451.4	55.5	
J-401	328.0	2	451.5	53.4	
J-402	331.0	2	451.7	52.2	
J-403	331.0	2	452.2	52.4	
J-404	333.0	2	452.2	51.6	
J-405	347.0	2	452.2	45.5	
J-407	330.0	2	452.4	53.0	
J-408	336.0	4	452.7	50.5	
J-409	334.0	14	452.8	51.4	
J-410	360.0	2	453.1	40.3	
J-411	356.0	2	453.1	42.0	
J-412	323.0	2	452.4	56.0	
J-413	350.0	2	452.4	44.3	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-414	358.0	2	452.4	40.8	
J-415	360.0	2	452.4	40.0	
J-416	360.0	2	452.4	40.0	
J-417	394.0	2	521.7	55.2	
J-418	410.0	2	521.7	48.3	
J-419	375.0	2	521.7	63.5	
J-420	363.0	2	521.7	68.6	
J-421	352.0	2	452.4	43.5	
J-422	351.0	0	452.4	43.9	
J-423	334.0	2	452.4	51.2	
J-424	355.0	2	452.4	42.1	
J-425	362.0	2	452.4	39.1	
J-426	377.0	2	521.7	62.6	
J-427	396.0	2	521.7	54.4	
J-428	390.0	2	521.7	57.0	
J-429	410.0	2	521.7	48.3	
J-430	409.0	2	521.7	48.7	
J-431	349.0	4	521.7	74.7	
J-432	355.0	4	521.7	72.1	
J-433	365.0	4	521.7	67.8	
J-434	373.0	2	521.7	64.3	
J-435	362.0	2	521.7	69.1	
J-436	330.0	3	521.7	82.9	
J-438	341.0	2	452.9	48.4	
J-439	342.0	2	452.9	48.0	
J-440	346.0	2	454.0	46.7	
J-441	353.0	2	454.3	43.8	
J-442	360.0	2	455.0	41.1	
J-443	362.0	2	455.7	40.5	
J-446	362.0	2	521.7	69.1	
J-448	404.0	2	521.7	50.9	
J-449	382.0	2	521.7	60.4	
J-450	359.0	2	521.7	70.4	
J-451	360.0	2	455.7	41.4	
J-452	350.0	2	454.4	45.2	
J-453	348.0	2	454.1	45.9	
J-454	348.0	2	521.7	75.1	
J-455	373.0	2	521.7	64.3	
J-456	362.0	2	521.7	69.1	
J-457	387.0	2	521.7	58.3	
J-458	294.0	2	448.7	66.9	
J-460	285.0	2	436.6	65.6	
J-461	280.0	2	431.4	65.5	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-462	268.0	2	430.5	70.3	
J-463	255.0	2	429.4	75.5	
J-464	269.0	2	454.6	80.3	
J-465	260.0	2	455.2	84.4	
J-467	232.0	0	429.0	85.2	
J-468	225.0	2	429.0	88.3	
J-469	265.0	2	434.7	73.4	
J-470	271.0	2	436.6	71.6	
J-471	248.0	2	434.8	80.8	
J-472	205.0	2	433.4	98.8	
J-473	197.0	21	432.0	101.7	
J-474	198.0	2	431.0	100.8	
J-475	200.0	2	431.0	99.9	
J-476	205.0	2	431.0	97.8	
J-478	198.0	2	431.0	100.8	
J-479	201.0	2	431.0	99.5	
J-480	207.0	2	433.4	98.0	
J-481	199.0	2	432.0	100.8	
J-482	224.0	2	434.8	91.2	
J-483	232.0	2	434.8	87.8	
J-484	197.0	2	430.4	101.0	
J-485	201.0	2	430.4	99.2	
J-486	197.0	2	429.5	100.6	
J-487	200.0	2	429.5	99.3	
J-488	203.0	2	429.4	98.0	
J-489	202.0	2	429.4	98.4	
J-490	204.0	2	429.4	97.5	
J-491	206.0	2	429.4	96.7	
J-492	220.0	2	429.4	90.6	
J-493	216.0	2	429.4	92.3	
J-494	301.0	2	457.1	67.5	
J-495	268.0	2	457.2	81.9	
J-496	258.0	2	426.8	73.0	
J-497	267.0	2	426.2	68.9	
J-498	269.0	2	426.0	67.9	
J-499	255.0	2	457.1	87.4	
J-500	269.0	0	457.1	81.4	
J-501	263.0	2	425.6	70.3	
J-502	250.0	8	426.9	76.5	
J-503	253.0	2	427.0	75.3	
J-504	360.0	2	521.7	70.0	
J-505	319.0	2	457.2	59.8	
J-506	318.0	2	457.3	60.3	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Junction Report

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
J-507	269.0	13	425.5	67.7	
J-508	274.0	4	457.4	79.4	
J-509	369.0	2	521.7	66.0	
J-510	352.0	2	521.7	73.4	
J-511	362.0	2	452.4	39.1	
J-512	362.0	2	452.4	39.1	
J-514	218.0	2	426.5	90.2	
J-516	343.0	0	452.4	47.4	
J-517	330.0	67	452.4	53.0	
J-520	313.0	0	453.1	60.6	
J-521	301.0	0	453.8	66.1	

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-1	T-2	J-2	0.08	877	0.51	120.0	317
P-2	J-2	J-3	0.02	191	0.51	120.0	317
P-3	J-3	J-4	0.12	403	0.89	130.0	314
P-4	J-4	J-5	0.11	378	0.88	130.0	312
P-5	J-5	J-6	0.15	509	0.88	130.0	310
P-6	J-6	J-7	0.10	349	0.87	130.0	307
P-7	J-7	J-8	0.06	222	0.86	130.0	305
P-8	J-8	J-9	0.01	31	0.86	130.0	305
P-9	J-9	J-10	0.05	253	0.70	130.0	245
P-10	J-10	J-11	0.06	332	0.69	130.0	243
P-11	J-11	J-12	0.03	289	0.53	130.0	185
P-12	J-12	J-13	0.04	341	0.52	130.0	183
P-13	J-13	J-14	0.02	246	0.43	130.0	152
P-14	J-14	J-15	0.03	407	0.42	130.0	149
P-15	J-15	J-16	0.02	288	0.42	130.0	147
P-16	J-16	J-17	0.01	364	0.23	130.0	81
P-17	J-17	J-18	0.00	59	0.22	130.0	78
P-18	J-18	J-19	0.00	191	0.10	130.0	36
P-19	J-19	J-20	0.00	98	0.05	130.0	17
P-20	J-20	J-21	0.00	212	0.04	130.0	7
P-21	J-21	J-22	0.00	216	0.03	130.0	5
P-22	J-22	J-23	0.00	346	0.01	130.0	2
P-23	J-23	J-24	0.00	101	0.02	130.0	2
P-24	J-20	J-25	0.00	189	0.05	130.0	7
P-25	J-25	J-26	0.00	216	0.03	130.0	5
P-26	J-26	J-23	0.00	51	0.02	130.0	3
P-27	J-19	J-27	0.00	315	0.05	130.0	17
P-28	J-27	J-28	0.00	311	0.04	130.0	15
P-29	J-28	J-26	0.00	128	0.00	130.0	0
P-31	J-29	J-30	0.00	62	0.02	130.0	8
P-32	J-30	J-31	0.00	216	0.02	130.0	5
P-33	J-31	J-32	0.00	465	0.02	130.0	-8
P-34	J-32	J-33	0.00	546	0.07	130.0	-11
P-35	J-33	J-34	0.00	294	0.07	130.0	-11
P-36	J-34	J-35	0.00	272	0.12	130.0	-19
P-37	J-35	J-36	0.00	223	0.04	130.0	7
P-38	J-35	J-37	0.01	305	0.18	130.0	-28
P-39	J-37	J-38	0.01	249	0.21	130.0	-33
P-40	J-38	J-39	0.02	350	0.29	130.0	-45
P-42	J-39	J-40	0.03	408	0.32	130.0	-49
P-43	J-40	J-41	0.01	214	0.28	130.0	-44
P-44	J-41	J-42	0.01	91	0.30	130.0	-46
P-45	J-42	J-43	0.05	680	0.31	130.0	-49

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-47	J-44	J-45	0.00	316	0.11	110.0	-17
P-48	J-45	J-46	0.01	287	0.14	110.0	-22
P-49	J-46	J-47	0.05	275	0.44	110.0	-69
P-50	J-47	J-48	0.11	338	0.63	110.0	-98
P-51	J-48	J-49	0.33	445	1.14	130.0	-178
P-52	J-49	T-2	0.20	274	1.14	130.0	-178
P-53	J-48	J-50	0.03	1,176	0.22	130.0	78
P-54	J-50	J-51	0.00	86	0.21	130.0	75
P-56	J-51	J-53	0.01	441	0.21	130.0	73
P-57	J-53	J-54	0.00	180	0.04	130.0	14
P-58	J-54	J-55	0.00	236	0.02	130.0	7
P-61	J-53	J-57	0.00	355	0.16	130.0	56
P-62	J-57	J-58	0.00	78	0.15	130.0	54
P-63	J-58	J-59	0.00	60	0.00	130.0	0
P-65	J-9	J-60	0.01	123	0.37	130.0	57
P-66	J-60	J-61	0.03	297	0.35	130.0	55
P-68	J-61	J-62	0.03	334	0.34	130.0	53
P-69	J-62	J-44	0.01	94	0.32	130.0	50
P-70	J-18	J-63	0.02	524	0.17	110.0	27
P-71	J-63	J-64	0.00	398	0.06	110.0	9
P-72	J-64	J-65	0.00	405	0.06	110.0	-9
P-73	J-65	J-66	0.01	87	0.31	110.0	-27
P-74	J-66	J-67	0.00	53	0.07	130.0	23
P-75	J-67	J-68	0.00	410	0.06	130.0	20
P-76	J-68	J-69	0.00	184	0.04	130.0	15
P-77	J-69	J-70	0.00	265	0.05	130.0	5
P-78	J-68	J-71	0.00	73	0.01	130.0	3
P-79	J-66	J-72	0.00	275	0.07	130.0	-25
P-80	J-72	J-73	0.00	619	0.06	130.0	-21
P-81	J-73	J-74	0.00	187	0.04	130.0	6
P-82	J-73	J-75	0.00	453	0.08	130.0	-29
P-83	J-75	J-76	0.00	218	0.07	110.0	11
P-84	J-76	J-77	0.00	262	0.05	110.0	8
P-85	J-77	J-72	0.00	361	0.04	110.0	6
P-86	J-66	J-78	0.00	181	0.08	130.0	-29
P-90	J-75	J-80	0.01	574	0.08	110.0	-7
P-91	J-78	J-81	0.00	738	0.09	130.0	-31
P-92	J-81	J-75	0.00	13	0.10	130.0	36
P-94	J-81	J-82	0.00	34	0.20	130.0	-69
P-95	J-82	J-83	0.00	45	0.02	130.0	-7
P-96	J-83	J-18	0.00	264	0.04	130.0	-13
P-97	J-82	J-84	0.00	254	0.18	130.0	-65
P-98	J-84	J-85	0.00	124	0.19	130.0	-67

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-99	J-85	J-16	0.00	275	0.18	130.0	-62
P-100	J-80	J-86	0.00	27	0.11	110.0	-10
P-101	J-86	J-87	0.00	27	0.03	130.0	10
P-102	J-87	J-85	0.00	220	0.02	130.0	7
P-104	J-88	J-89	0.00	393	0.04	120.0	-27
P-105	J-89	J-90	0.00	652	0.05	120.0	-29
P-106	J-90	J-91	0.00	276	0.06	120.0	-38
P-107	J-91	J-92	0.00	224	0.07	120.0	-41
P-108	J-92	J-93	0.00	121	0.07	120.0	-43
P-109	J-93	J-94	0.00	25	0.07	120.0	-43
P-110	J-94	J-95	0.00	241	0.08	120.0	-50
P-111	J-95	J-96	0.00	19	0.08	120.0	-53
P-113	J-97	J-98	0.01	39	1.00	120.0	-628
P-114	J-98	J-99	0.13	414	1.01	120.0	-630
P-115	J-99	J-100	0.38	1,238	1.01	120.0	-632
P-116	J-100	T-1	0.36	1,096	1.05	120.0	-657
P-118	J-97	J-103	0.42	344	1.61	110.0	568
P-120	J-103	J-104	0.02	13	1.61	110.0	568
P-121	J-96	J-105	0.00	348	0.06	110.0	2
P-122	J-33	J-106	0.00	35	0.06	110.0	-2
P-123	J-106	J-107	0.00	12	0.16	110.0	-6
P-124	J-107	J-108	0.02	256	0.18	110.0	-7
P-125	J-108	J-109	0.01	268	0.11	110.0	4
P-126	J-109	J-110	0.00	482	0.04	110.0	2
P-127	J-110	J-111	0.01	47	0.39	110.0	15
P-128	J-111	J-112	0.05	225	0.33	110.0	13
P-130	J-113	J-114	0.02	111	0.25	110.0	10
P-131	J-114	J-115	0.01	184	0.19	110.0	7
P-132	J-115	J-116	0.00	52	0.13	110.0	5
P-133	J-116	J-117	0.03	303	0.20	110.0	8
P-134	J-117	J-118	0.04	312	0.24	110.0	9
P-135	J-118	J-119	0.08	282	0.24	110.0	2
P-136	J-118	J-120	0.00	37	0.03	110.0	5
P-137	J-120	J-121	0.01	265	0.21	110.0	-34
P-138	J-121	J-122	0.03	573	0.24	110.0	-38
P-139	J-122	J-123	0.24	486	0.50	110.0	-20
P-140	J-123	J-47	0.19	300	0.56	110.0	-22
P-141	J-47	J-124	0.00	54	0.12	110.0	5
P-142	J-124	J-125	0.00	446	0.06	110.0	2
P-143	J-121	J-126	0.05	168	0.24	110.0	2
P-144	J-120	J-127	0.03	98	0.24	110.0	2
P-145	J-117	J-128	0.06	557	0.18	110.0	-4
P-146	J-128	J-129	0.10	428	0.28	110.0	-6

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-147	J-129	J-46	0.23	789	0.48	110.0	-42
P-148	J-116	J-130	0.02	337	0.14	110.0	-5
P-149	J-130	J-131	0.05	564	0.20	110.0	-8
P-150	J-131	J-132	0.06	800	0.18	110.0	7
P-151	J-132	J-133	0.00	85	0.06	110.0	2
P-152	J-112	J-134	0.06	280	0.32	110.0	12
P-153	J-134	J-113	0.01	53	0.31	110.0	12
P-154	J-134	J-135	0.02	526	0.09	110.0	-2
P-155	J-135	J-136	0.02	563	0.11	110.0	-4
P-156	J-136	J-131	0.01	291	0.12	110.0	5
P-157	J-131	J-129	0.06	294	0.32	110.0	-13
P-158	J-129	J-122	0.15	270	0.54	110.0	21
P-159	J-112	J-137	0.00	521	0.05	110.0	-2
P-160	J-137	J-138	0.02	567	0.11	110.0	-4
P-161	J-138	J-139	0.00	36	0.18	110.0	7
P-162	J-139	J-136	0.04	237	0.29	110.0	11
P-163	J-110	J-140	0.00	254	0.10	110.0	-16
P-164	J-140	J-141	0.00	285	0.12	110.0	-19
P-165	J-141	J-142	0.01	315	0.17	110.0	-27
P-166	J-142	J-143	0.01	232	0.18	110.0	-29
P-167	J-143	J-138	0.07	285	0.35	110.0	14
P-168	J-143	J-11	0.11	40	1.29	110.0	-50
P-170	J-109	J-145	0.00	263	0.01	110.0	0
P-171	J-145	J-146	0.00	280	0.05	110.0	-2
P-172	J-146	J-147	0.00	286	0.04	110.0	2
P-173	J-147	J-148	0.00	267	0.08	110.0	-3
P-174	J-148	J-143	0.02	366	0.14	110.0	-6
P-175	J-147	J-149	0.06	272	0.24	130.0	2
P-176	J-146	J-141	0.00	476	0.06	110.0	-6
P-177	J-145	J-140	0.00	482	0.02	130.0	0
P-178	J-108	J-150	0.02	525	0.18	110.0	-15
P-179	J-150	J-13	0.04	614	0.20	110.0	-18
P-180	J-13	J-151	0.00	115	0.13	110.0	11
P-185	J-106	J-153	0.02	1,081	0.08	110.0	3
P-186	J-38	J-154	0.00	44	0.18	110.0	7
P-200	J-161	J-162	0.02	417	0.12	110.0	5
P-202	J-161	J-163	0.01	62	0.24	110.0	10
P-203	J-163	J-164	0.05	345	0.24	110.0	10
P-204	J-164	J-165	0.05	196	0.33	110.0	-13
P-205	J-165	J-166	0.11	240	0.47	110.0	-18
P-206	J-166	J-167	0.00	43	0.18	110.0	-7
P-207	J-167	J-168	0.00	330	0.06	130.0	-9
P-208	J-168	J-169	0.00	344	0.08	130.0	-12

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-209	J-169	J-170	0.10	264	1.01	130.0	356
P-210	J-170	J-171	0.01	30	1.12	130.0	396
P-211	J-171	J-172	0.06	129	1.10	130.0	387
P-212	J-172	J-173	0.00	37	0.21	130.0	75
P-213	J-173	J-174	0.00	422	0.11	130.0	-18
P-214	J-174	J-164	0.01	452	0.13	130.0	-20
P-215	J-165	J-176	0.01	639	0.08	110.0	3
P-216	J-176	J-171	0.01	159	0.17	110.0	-6
P-217	J-176	J-177	0.52	232	0.72	110.0	7
P-218	J-177	J-178	0.05	188	0.24	110.0	2
P-219	J-177	J-179	0.03	120	0.24	110.0	2
P-221	J-182	J-183	0.08	278	0.24	110.0	2
P-222	J-182	J-184	0.00	32	0.03	110.0	-2
P-223	J-184	J-185	0.00	43	0.05	110.0	-5
P-224	J-185	J-186	0.01	58	0.44	110.0	38
P-225	J-186	J-187	0.08	393	0.41	110.0	36
P-226	J-187	J-188	0.00	9	0.40	110.0	35
P-227	J-188	J-189	0.00	30	0.10	110.0	9
P-229	J-190	J-191	0.01	185	0.24	110.0	21
P-230	J-191	T-3	0.02	216	0.24	110.0	21
P-231	J-188	J-193	0.03	354	0.27	110.0	24
P-232	J-193	J-190	0.06	743	0.24	110.0	21
P-233	T-3	J-194	0.12	1,475	0.49	120.0	-310
P-234	J-194	J-189	0.00	48	0.50	120.0	-312
P-235	J-189	J-195	0.17	606	0.87	130.0	-306
P-236	J-195	J-172	0.25	875	0.87	130.0	-308
P-237	J-185	J-197	0.08	267	0.49	110.0	-43
P-238	J-197	J-198	0.14	225	0.73	110.0	-64
P-239	J-198	J-173	0.10	83	1.03	110.0	-91
P-240	J-197	J-199	0.29	377	0.48	130.0	5
P-242	J-43	J-201	0.03	322	0.40	130.0	-63
P-243	J-201	J-44	0.02	187	0.41	130.0	-65
P-245	J-199	J-202	0.05	222	0.24	130.0	2
P-246	J-197	J-203	0.18	637	0.37	110.0	14
P-247	J-203	J-204	0.02	12	0.72	130.0	7
P-248	J-204	J-205	0.02	103	0.24	130.0	2
P-249	J-204	J-206	0.02	106	0.24	130.0	2
P-250	J-203	J-187	0.00	247	0.01	110.0	-1
P-251	J-203	J-207	0.00	267	0.09	110.0	8
P-252	J-207	J-208	0.01	219	0.13	110.0	5
P-253	J-207	J-209	0.14	403	0.41	110.0	-16
P-254	J-209	J-198	0.19	418	0.47	110.0	-18
P-255	J-198	J-210	0.15	529	0.24	110.0	2

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-257	J-211	J-132	0.00	346	0.06	110.0	-2
P-258	J-139	J-212	0.00	48	0.17	110.0	-7
P-259	J-212	J-213	0.07	544	0.23	110.0	-9
P-260	J-213	J-43	0.10	557	0.29	110.0	-11
P-261	J-166	J-214	0.08	301	0.35	110.0	-14
P-262	J-214	J-161	0.18	623	0.47	140.0	18
P-263	J-214	J-215	0.17	249	0.60	110.0	-23
P-264	J-215	J-216	0.02	34	0.60	110.0	23
P-266	J-217	J-218	0.01	232	0.12	110.0	-5
P-267	J-218	J-90	0.01	74	0.18	110.0	-7
P-269	J-219	J-220	0.01	570	0.06	110.0	2
P-270	J-220	J-217	0.00	421	0.00	110.0	0
P-272	J-221	J-222	0.13	319	0.44	110.0	-17
P-273	J-222	J-216	0.15	268	0.54	110.0	-21
P-274	J-86	J-223	0.00	228	0.04	120.0	-22
P-275	J-223	J-88	0.00	139	0.04	120.0	-24
P-280	J-228	J-225	0.00	221	0.02	130.0	-2
P-281	J-225	J-224	0.02	471	0.12	110.0	5
P-282	J-225	J-229	0.00	251	0.06	130.0	-9
P-283	J-229	J-230	0.04	438	0.36	130.0	56
P-284	J-230	J-231	0.02	206	0.34	130.0	54
P-285	J-231	J-232	0.02	254	0.33	130.0	51
P-286	J-232	J-215	0.00	61	0.31	130.0	49
P-287	J-214	J-234	0.11	606	0.28	110.0	-11
P-288	J-234	J-235	0.04	147	0.34	110.0	-13
P-289	J-235	J-236	0.13	243	0.52	110.0	-20
P-290	J-236	J-237	0.17	239	1.41	130.0	-498
P-291	J-237	J-238	0.01	175	0.27	130.0	42
P-292	J-238	J-239	0.00	82	0.20	130.0	31
P-293	J-239	J-240	0.42	403	0.74	110.0	29
P-294	J-240	J-241	0.02	257	0.20	110.0	8
P-295	J-241	J-242	0.02	359	0.14	110.0	5
P-296	J-242	J-169	0.04	103	1.05	130.0	370
P-297	J-242	J-243	0.16	395	1.04	130.0	-367
P-298	J-243	J-244	0.05	118	1.12	130.0	-394
P-299	J-244	J-245	0.06	127	1.15	130.0	-405
P-300	J-245	J-246	0.02	34	1.15	130.0	-407
P-301	J-246	J-236	0.02	24	1.35	130.0	-475
P-302	J-244	J-247	0.06	194	0.36	130.0	8
P-303	J-247	J-235	0.02	176	0.20	130.0	-5
P-304	J-238	J-249	0.00	187	0.06	110.0	5
P-305	J-243	J-250	0.02	841	0.16	130.0	25
P-306	J-247	J-252	0.07	192	0.42	130.0	9

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-307	J-253	J-254	0.00	160	0.06	110.0	-2
P-308	J-254	J-94	0.01	250	0.12	110.0	-5
P-309	J-96	J-255	0.00	268	0.09	120.0	-57
P-310	J-255	J-97	0.00	70	0.10	120.0	-60
P-312	J-256	J-257	0.00	342	0.03	130.0	-5
P-313	J-257	J-237	0.00	77	0.05	130.0	-7
P-314	J-237	J-258	0.27	325	1.56	130.0	-549
P-316	J-259	J-260	0.11	119	1.61	130.0	-568
P-317	J-260	J-261	0.23	369	0.72	110.0	64
P-318	J-261	J-262	0.21	356	0.70	110.0	62
P-319	J-262	J-263	0.18	188	0.70	110.0	27
P-320	J-263	J-264	0.50	629	0.64	110.0	25
P-321	J-264	J-240	0.03	459	0.22	110.0	-19
P-322	J-102	J-265	0.00	216	0.06	110.0	-2
P-324	J-266	J-267	0.00	289	0.06	110.0	2
P-325	J-260	J-268	0.12	115	1.80	130.0	-634
P-326	J-268	J-269	0.31	266	1.85	130.0	-654
P-327	J-269	J-270	1.72	1,384	1.93	130.0	-681
P-328	J-270	J-271	0.05	144	0.97	130.0	-343
P-329	J-271	J-272	0.25	693	0.98	130.0	-345
P-330	J-272	J-273	0.01	659	0.22	130.0	-77
P-331	J-273	J-274	0.04	1,833	0.23	130.0	-80
P-332	J-274	J-275	0.00	52	0.31	130.0	49
P-333	J-275	J-276	0.00	291	0.13	130.0	45
P-334	J-276	J-277	0.00	229	0.09	130.0	30
P-335	J-277	J-278	0.00	200	0.06	130.0	20
P-336	J-278	J-279	0.00	136	0.05	130.0	4
P-337	J-278	J-280	0.00	329	0.03	130.0	11
P-338	J-280	J-281	0.00	51	0.02	130.0	7
P-339	J-281	J-282	0.00	820	0.02	130.0	3
P-340	J-282	J-283	0.00	316	0.01	130.0	-1
P-341	J-283	J-284	0.00	294	0.03	130.0	-5
P-342	J-284	J-277	0.00	358	0.04	130.0	-7
P-343	J-276	J-285	0.00	381	0.07	130.0	10
P-344	J-285	J-286	0.00	531	0.03	130.0	4
P-345	J-286	J-282	0.00	233	0.00	130.0	0
P-346	J-285	J-284	0.00	173	0.01	130.0	2
P-349	J-287	J-289	0.00	180	0.13	130.0	20
P-350	J-289	J-290	0.00	165	0.08	130.0	12
P-351	J-290	J-291	0.00	503	0.03	130.0	4
P-352	J-290	J-292	0.00	336	0.05	130.0	4
P-353	J-289	J-293	0.00	336	0.03	130.0	4
P-354	J-287	J-294	0.00	331	0.07	130.0	-25

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-355	J-294	J-295	0.01	4,028	0.08	130.0	-29
P-356	J-295	J-296	0.00	417	0.06	130.0	9
P-357	J-296	J-297	0.00	254	0.02	130.0	2
P-358	J-298	J-296	0.00	141	0.05	130.0	-5
P-359	J-295	J-299	0.02	351	0.26	130.0	-41
P-360	J-299	J-300	0.00	63	0.02	130.0	2
P-361	J-299	J-301	0.01	107	0.29	130.0	-45
P-362	J-301	J-302	0.00	92	0.02	130.0	2
P-363	J-301	J-58	0.02	331	0.32	130.0	-50
P-364	J-56	J-303	0.00	143	0.00	130.0	0
P-365	J-304	J-305	0.00	71	0.03	110.0	-2
P-366	J-305	J-306	0.01	293	0.11	110.0	-9
P-367	J-306	J-207	0.01	201	0.19	110.0	-17
P-368	J-307	J-305	0.09	408	0.24	130.0	-2
P-369	J-305	J-308	0.04	209	0.24	130.0	2
P-370	J-306	J-52	0.04	209	0.24	130.0	2
P-371	J-306	J-309	0.16	735	0.24	130.0	2
P-372	J-170	J-310	0.00	66	0.26	130.0	-40
P-373	J-310	J-311	0.02	594	0.21	130.0	-33
P-374	J-311	J-312	0.00	352	0.03	130.0	5
P-375	J-312	J-313	0.00	325	0.02	130.0	2
P-376	J-311	J-314	0.02	333	0.25	130.0	-40
P-378	J-56	J-55	0.00	36	0.02	130.0	-7
P-379	J-314	J-315	0.02	375	0.27	130.0	-42
P-380	J-315	J-316	0.00	61	0.03	110.0	2
P-381	J-315	J-317	0.07	187	0.53	110.0	-47
P-382	J-317	J-264	0.03	199	0.31	110.0	-27
P-383	J-264	J-318	0.13	461	0.37	110.0	15
P-384	J-318	J-319	0.00	143	0.06	110.0	2
P-385	J-318	J-310	0.01	535	0.11	110.0	10
P-386	J-317	J-320	0.39	618	0.57	110.0	-22
P-387	J-320	J-321	0.23	304	0.63	110.0	-25
P-388	J-321	J-322	0.01	390	0.10	110.0	-9
P-389	J-322	J-323	0.01	592	0.12	110.0	-11
P-390	J-323	J-321	0.02	313	0.21	110.0	19
P-391	J-323	J-262	0.05	290	0.36	110.0	-32
P-392	J-269	J-324	0.00	107	0.00	130.0	0
P-393	J-104	J-325	0.25	371	0.59	110.0	23
P-394	J-325	J-326	0.24	426	0.53	110.0	21
P-395	J-326	J-327	0.00	124	0.06	110.0	2
P-396	J-326	J-328	0.11	328	0.41	110.0	16
P-397	J-328	J-329	0.02	83	0.37	110.0	14
P-398	J-329	J-330	0.04	285	0.24	110.0	10

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-399	J-330	J-331	0.02	209	0.18	110.0	7
P-400	J-331	J-332	0.00	266	0.06	110.0	3
P-401	J-332	J-333	0.04	495	0.19	110.0	-8
P-402	J-333	J-334	0.05	216	0.32	110.0	-12
P-403	J-334	J-335	0.01	555	0.07	110.0	3
P-404	J-335	J-328	0.00	202	0.01	110.0	1
P-405	J-336	J-329	0.00	200	0.06	110.0	-2
P-406	J-337	J-331	0.06	205	0.24	110.0	-2
P-407	J-338	J-333	0.05	184	0.24	110.0	-2
P-408	J-104	J-339	0.27	243	1.54	110.0	543
P-409	J-339	J-340	0.26	233	1.53	110.0	540
P-410	J-340	J-341	0.03	26	1.48	110.0	523
P-411	J-341	J-342	0.25	241	1.48	110.0	523
P-412	J-342	J-343	0.36	346	1.48	110.0	520
P-413	J-343	J-344	0.22	220	1.47	110.0	518
P-414	J-344	J-345	0.39	181	1.41	110.0	-125
P-415	J-345	J-346	0.31	304	0.94	110.0	-83
P-416	J-346	J-332	0.00	309	0.09	110.0	-8
P-417	J-334	J-340	0.07	177	0.45	110.0	-18
P-421	J-348	J-349	0.01	359	0.12	110.0	-5
P-422	J-349	J-268	0.00	32	0.11	130.0	-18
P-423	J-349	J-350	0.00	266	0.08	130.0	13
P-424	J-350	J-351	0.04	271	0.27	110.0	10
P-426	J-346	J-352	0.49	548	0.88	110.0	-78
P-427	J-352	J-353	0.00	101	0.05	110.0	5
P-428	J-353	J-354	0.00	163	0.03	110.0	2
P-429	J-352	J-355	0.03	119	0.66	130.0	-103
P-430	J-355	J-356	0.05	138	0.53	110.0	47
P-432	J-357	J-358	0.11	408	0.45	110.0	40
P-433	J-358	J-359	0.06	138	0.61	110.0	53
P-434	J-359	J-360	0.23	563	0.58	110.0	51
P-440	J-362	J-352	0.16	367	0.47	110.0	-18
P-441	J-362	J-358	0.17	487	0.41	110.0	16
P-442	J-355	J-363	0.16	285	0.97	130.0	-152
P-443	J-363	J-364	0.58	437	2.01	130.0	-707
P-444	J-364	T-1	0.75	561	2.01	130.0	-709
P-445	J-363	J-365	0.18	215	1.57	130.0	552
P-446	J-365	J-366	0.58	687	1.56	130.0	550
P-447	J-366	J-367	0.00	67	0.00	130.0	0
P-448	J-360	J-368	0.00	174	0.05	110.0	5
P-449	J-368	J-369	0.00	268	0.03	110.0	2
P-450	J-360	J-345	0.17	537	0.50	110.0	44
P-451	J-356	J-370	0.17	546	0.50	110.0	44

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-452	J-370	J-357	0.04	138	0.48	110.0	42
P-454	J-366	J-371	1.97	507	2.34	110.0	367
P-455	J-371	J-372	0.10	334	0.58	110.0	91
P-456	J-372	J-373	0.01	186	0.11	110.0	2
P-457	J-371	J-374	0.59	261	1.74	110.0	273
P-458	J-374	J-375	0.21	341	0.86	110.0	135
P-459	J-375	J-376	0.00	434	0.10	110.0	15
P-460	J-376	J-377	0.07	280	0.28	110.0	6
P-462	J-378	J-379	0.09	210	0.71	110.0	-111
P-463	J-379	J-380	0.03	296	0.34	110.0	-53
P-464	J-380	J-381	0.01	117	0.23	110.0	-20
P-465	J-381	J-382	0.10	430	0.44	110.0	-38
P-466	J-382	J-380	0.11	539	0.40	110.0	35
P-467	J-379	J-383	0.07	480	0.39	110.0	-61
P-468	J-383	J-384	0.03	828	0.19	110.0	30
P-469	J-384	J-385	0.00	32	0.00	110.0	0
P-470	J-384	J-387	0.01	283	0.18	110.0	28
P-471	J-387	J-388	0.00	209	0.08	110.0	12
P-472	J-388	J-389	0.00	331	0.03	110.0	5
P-473	J-389	J-390	0.00	52	0.01	110.0	-2
P-474	J-390	J-387	0.00	220	0.08	110.0	-13
P-475	J-392	J-390	0.00	232	0.05	110.0	-7
P-476	J-389	J-394	0.00	143	0.03	110.0	4
P-477	J-394	J-395	0.00	189	0.03	110.0	2
P-478	J-394	J-396	0.00	496	0.03	110.0	-3
P-479	J-396	J-397	0.01	217	0.16	110.0	14
P-480	J-396	J-398	0.04	307	0.31	110.0	-27
P-481	J-398	J-399	0.13	319	0.37	110.0	8
P-482	J-398	J-400	0.10	211	0.63	110.0	-56
P-483	J-400	J-383	0.10	437	0.60	130.0	93
P-484	J-400	J-401	0.10	187	0.97	130.0	-151
P-485	J-401	J-382	0.13	320	0.80	130.0	125
P-486	J-401	J-402	0.24	139	1.78	130.0	-279
P-487	J-402	J-403	0.45	259	1.80	130.0	-281
P-488	J-403	J-404	0.00	183	0.05	110.0	5
P-489	J-404	J-405	0.00	905	0.01	110.0	1
P-490	J-405	J-404	0.00	822	0.01	110.0	-1
P-491	J-403	J-407	0.21	116	1.84	130.0	-289
P-492	J-407	J-408	0.30	189	1.45	110.0	-226
P-493	J-408	J-409	0.11	312	0.64	110.0	-99
P-494	J-409	J-375	0.34	769	0.72	110.0	-113
P-495	J-408	J-410	0.42	732	0.84	110.0	-131
P-496	J-410	J-411	0.00	296	0.02	110.0	2

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-497	J-410	J-374	0.23	375	0.87	110.0	-136
P-498	J-412	J-413	0.00	427	0.03	110.0	-2
P-499	J-413	J-414	0.00	448	0.05	110.0	-5
P-500	J-414	J-415	0.00	230	0.05	110.0	5
P-501	J-415	J-416	0.00	161	0.03	110.0	2
P-503	J-417	J-418	0.00	443	0.04	110.0	-3
P-504	J-418	J-419	0.01	533	0.08	110.0	-7
P-505	J-419	J-420	0.00	57	0.14	110.0	-12
P-507	J-421	J-422	0.00	41	0.21	110.0	-19
P-508	J-422	J-423	0.00	235	0.03	110.0	2
P-509	J-414	J-424	0.01	291	0.13	110.0	-12
P-510	J-424	J-425	0.01	142	0.11	110.0	2
P-511	J-424	J-421	0.01	244	0.19	110.0	-17
P-512	J-417	J-426	0.00	423	0.02	110.0	-1
P-513	J-426	J-427	0.00	445	0.03	110.0	-3
P-514	J-427	J-428	0.00	134	0.03	110.0	2
P-515	J-427	J-418	0.00	305	0.01	110.0	-1
P-516	J-427	J-429	0.00	418	0.07	110.0	-6
P-517	J-429	J-430	0.00	204	0.01	110.0	-1
P-518	J-430	J-419	0.00	642	0.04	110.0	-3
P-519	J-426	J-431	0.00	250	0.01	110.0	-1
P-520	J-431	J-432	0.00	372	0.06	110.0	-5
P-521	J-432	J-433	0.01	402	0.10	110.0	-9
P-522	J-433	J-429	0.00	327	0.09	110.0	8
P-524	J-434	J-435	0.02	831	0.17	130.0	-26
P-527	J-435	J-436	0.00	211	0.15	130.0	-53
P-528	J-436	T-4	0.01	448	0.19	130.0	-67
P-530	J-438	J-439	0.00	183	0.03	110.0	2
P-531	J-438	J-440	1.15	330	1.84	110.0	-162
P-532	J-440	J-441	0.25	237	0.98	110.0	-86
P-533	J-441	J-442	0.69	608	1.00	110.0	-88
P-534	J-442	J-443	0.71	178	1.98	110.0	-174
P-535	J-443	J-366	0.23	228	1.14	110.0	-179
P-537	J-435	J-446	0.00	40	0.16	130.0	25
P-538	J-446	J-420	0.03	493	0.19	110.0	17
P-540	J-446	J-448	0.01	925	0.06	110.0	5
P-541	J-448	J-449	0.00	609	0.04	110.0	4
P-542	J-449	J-450	0.00	370	0.01	110.0	1
P-544	J-451	J-443	0.00	622	0.02	110.0	-2
P-545	J-442	J-452	0.59	582	0.95	110.0	84
P-546	J-452	J-453	0.26	266	0.92	110.0	81
P-547	J-453	J-440	0.09	103	0.89	110.0	79
P-549	J-454	J-436	0.00	622	0.07	110.0	-11

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-550	J-454	J-455	0.00	284	0.10	110.0	9
P-551	J-455	J-456	0.00	322	0.03	110.0	2
P-552	J-455	J-448	0.00	434	0.01	110.0	1
P-553	J-433	J-457	0.00	259	0.14	130.0	-21
P-554	J-457	J-434	0.00	266	0.15	130.0	-24
P-555	J-455	J-450	0.00	700	0.04	110.0	4
P-556	J-378	J-458	2.47	139	5.32	110.0	833
P-559	GPV-4	J-460	7.65	375	4.78	110.0	421
P-560	J-460	J-461	5.25	260	4.75	110.0	419
P-561	J-461	J-462	0.88	308	1.66	110.0	146
P-562	J-462	J-463	1.07	383	1.63	110.0	144
P-563	J-463	J-464	0.00	131	0.00	110.0	0
P-564	J-464	J-465	0.60	399	1.81	110.0	-638
P-568	J-463	J-467	0.41	152	1.60	110.0	141
P-569	J-467	J-270	0.01	31	0.97	130.0	340
P-570	J-467	J-468	0.00	620	0.03	110.0	2
P-571	J-467	J-469	5.62	1,083	2.28	110.0	-201
P-572	J-469	J-470	1.92	361	2.31	110.0	-204
P-573	J-470	GPV-4	6.24	323	4.64	110.0	-409
P-574	J-470	J-471	1.73	328	2.31	110.0	203
P-575	J-471	J-472	1.40	284	2.23	110.0	196
P-576	J-472	J-473	1.46	309	2.17	110.0	191
P-577	J-473	J-474	1.00	269	1.91	110.0	168
P-578	J-474	J-475	0.00	181	0.11	110.0	9
P-579	J-475	J-476	0.00	226	0.03	110.0	2
P-580	J-475	J-478	0.00	238	0.05	110.0	5
P-581	J-478	J-479	0.00	232	0.03	110.0	2
P-582	J-480	J-472	0.00	492	0.03	110.0	-2
P-583	J-481	J-473	0.00	495	0.03	110.0	-2
P-584	J-482	J-483	0.00	207	0.03	110.0	-2
P-585	J-483	J-471	0.00	651	0.05	110.0	-5
P-586	J-474	J-484	0.61	189	1.78	110.0	156
P-587	J-484	J-485	0.00	193	0.03	110.0	2
P-588	J-484	J-486	0.85	277	1.72	110.0	152
P-589	J-486	J-487	0.00	216	0.03	110.0	2
P-590	J-486	J-488	0.09	179	0.94	130.0	147
P-591	J-488	J-274	0.03	75	0.85	130.0	133
P-592	J-488	J-489	0.00	311	0.08	130.0	12
P-594	J-490	J-491	0.00	426	0.02	130.0	2
P-595	J-489	J-493	0.00	653	0.06	130.0	9
P-596	J-493	J-490	0.00	422	0.03	130.0	5
P-597	J-492	J-493	0.00	140	0.06	130.0	-2
P-599	J-28	J-494	0.00	258	0.04	130.0	13

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-600	J-494	J-29	0.00	378	0.03	130.0	10
P-601	J-151	J-40	0.01	511	0.10	110.0	9
P-603	J-11	J-495	0.00	456	0.05	110.0	5
P-604	J-495	J-144	0.00	446	0.03	110.0	2
P-605	J-229	J-246	0.01	311	0.19	130.0	-68
P-607	J-496	J-347	0.00	261	0.06	110.0	-2
P-609	J-497	J-256	0.00	385	0.02	130.0	-2
P-611	J-498	J-224	0.00	370	0.06	110.0	-2
P-613	J-499	J-217	0.00	231	0.06	110.0	-2
P-614	J-154	J-500	0.02	426	0.12	110.0	5
P-616	J-162	J-501	0.00	413	0.06	110.0	2
P-618	J-351	J-502	0.03	324	0.21	110.0	8
P-621	J-503	J-348	0.00	251	0.06	110.0	-2
P-622	J-450	J-504	0.00	139	0.03	110.0	2
P-624	J-45	J-505	0.09	320	0.24	110.0	2
P-626	J-46	J-506	0.00	344	0.03	110.0	2
P-629	J-507	J-221	0.11	453	0.34	110.0	-13
P-630	J-500	J-219	0.00	23	0.12	110.0	5
P-632	J-508	J-56	0.00	206	0.03	130.0	-4
P-634	J-509	J-417	0.00	159	0.03	110.0	-2
P-635	J-420	J-510	0.00	54	0.03	110.0	2
P-639	J-422	J-512	0.00	320	0.14	130.0	-21
P-643	J-265	J-514	0.00	533	0.06	110.0	-2
P-644	J-514	J-266	0.00	294	0.06	110.0	2
P-645	J-514	J-258	0.04	44	1.56	130.0	549
P-646	J-514	J-259	0.23	268	1.59	130.0	-560
P-648	PRV-1	J-287	0.00	20	0.00	130.0	0
P-651	J-281	GPV-3	0.00	9	0.00	130.0	0
P-652	GPV-3	PRV-1	0.00	9	0.00	130.0	0
P-653	J-512	J-511	0.00	92	0.15	130.0	-24
P-654	J-458	PRV-2	0.22	13	5.30	110.0	831
P-655	PRV-2	GPV-4	4.15	58	9.42	110.0	831
P-660	J-511	J-516	0.00	225	0.17	130.0	-26
P-661	J-516	J-407	0.05	439	0.41	130.0	64
P-662	J-438	J-516	0.43	177	1.79	130.0	158
P-663	J-516	J-517	0.01	343	0.19	130.0	67
P-666	J-347	J-259	0.01	378	0.12	130.0	-5
P-667	J-265	J-514	0.00	531	0.07	130.0	-3
P-668	J-514	J-266	0.00	294	0.07	130.0	3
P-669	J-344	J-465	0.13	118	1.82	130.0	640
P-672	J-376	J-520	0.00	129	0.01	110.0	1
P-673	J-520	J-378	2.01	146	4.62	110.0	724
P-674	J-376	J-520	0.00	129	0.01	130.0	2

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Headloss (ft)	Length (Scaled) (ft)	Velocity (ft/s)	Hazen-Williams C	Flow (gpm)
P-677	J-521	J-520	0.69	498	2.05	130.0	722
P-678	J-464	J-521	0.74	674	1.80	130.0	635
P-679	J-521	J-372	0.01	469	0.24	130.0	-86
P-680	J-461	J-272	2.08	315	3.07	130.0	271

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
Tank Report

Current Time: 0.000 hours

Label	Elevation (Base) (ft)	Elevation (Minimum) (ft)	Elevation (Initial) (ft)	Elevation (Maximum) (ft)	Diameter (ft)	Flow (In net) (gpm)	Flow (Out net) (gpm)	Status (Calculated)	Hydraulic Grade (ft)	Percent Full (%)
T-1	380.0	380.0	458.0	470.1	34.00	-1,367	1,367	Emptying	458.0	86.6
T-2	380.0	432.9	458.0	470.1	39.00	-494	494	Emptying	458.0	67.5
T-3	377.0	377.0	425.0	425.1	60.00	331	-331	Filling	425.0	99.8
T-4	330.0	330.0	521.7	522.0	10.00	-67	67	Emptying	521.7	99.8

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
PRV Report

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	Hydraulic Grade Setting (Initial) (ft)
1139	PRV-1	218.0	6.0	0.000	393.6
1154	PRV-2	294.0	6.0	0.000	469.6

Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
76.0	0	432.6	457.4	0.00
76.0	831	448.4	448.4	0.00

Active Scenario: PHD Max Buildout
PHD=1,597 GPM
GPV Report

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	General Purpose Valve Headloss Curve
1146	GPV-3	218.0	8.0	0.000	GPV Headloss Curve - Commons
1152	GPV-4	294.0	6.0	0.000	GPV Headloss Curve - Drake ST.

Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
0	429.4	432.6	3.20
409	444.3	442.8	1.48

murraysmith

APPENDIX O

FIRCREST MUNICIPAL CODE

Title 17
UTILITIES

Chapters:

Chapter 17.04
UNIFORM UTILITY BILLING AND COLLECTION SYSTEM

17.04.003 Authorized officers designated.

(a) The city manager, or authorized designee, shall keep an account for water, sewer and stormwater service used by any person, business, or other entity within the city service area. Such services shall be paid for by every utility account within the city's service area.

(b) The city manager, or authorized designee, shall place against these accounts all charges for water, sewer and stormwater service that are to be paid by every utility account, when these services are used by such person, business or other entity. Any service charges or other charges that are connected with the provision of utility services shall likewise be placed against these accounts. All charges shall be made in accordance with the terms of those ordinances of the city establishing the rates and fees for such services. (Ord. 1591 § 1, 2016; Ord. 1299 § 1, 2001; Ord. 1225 § 1, 1999; Ord. 966 § 1, 1990).

17.04.005 Creation of accounts – Deposits on renter-occupied premises.

At the time an account for either residential or commercial renter-occupied premises is requested and before it is authorized, the city manager or his/her designee shall require that the person requesting services deposit with the city a sum of money, for each service provided, as follows:

Water:	$45.00
Sewer:	$175.00
Stormwater:	$40.00

This provision does not in any way affect the property owner's liability for charges or the lien rights of the city against the premises to which the services are furnished as provided in FMC 17.04.080. Nothing in this chapter shall prevent the city from requiring additional or new

deposits, when the conditions so warrant. (Ord. 1594 § 1, 2017; Ord. 1307 § 1, 2002; Ord. 1070 § 1, 1994; Ord. 966 § 2, 1990).

17.04.007 Account set-up fees.

At the time a new account is requested to be established, there shall be an additional assessment to the account holder for recovering the costs of establishing said account for each requested utility as follows:

$6.50 for water service;
$2.50 for stormwater service;
$2.50 for sewer service. (Ord. 1352 § 1, 2004).

17.04.010 Billing generally.

There shall be one uniform billing and collection procedure for all city utility services, including but not limited to water, sewer, and stormwater. (Ord. 1591 § 2, 2016; Ord. 1299 § 2, 2001; Ord. 1225 § 2, 1999; Ord. 966 § 3, 1990; Ord. 643 § 1, 1972).

17.04.020 Bills – Preparation, delivery.

(a) The city shall cause a single utility bill, covering all utility services that are furnished by or through the city during the preceding month or accounting period, to be prepared and rendered on a bimonthly basis to each customer of utility service either within or outside the city limits.

(b) Such bill shall be due and payable by the last day of the month from and after the date of mailing.

(c) Once prepared, this bill shall be delivered to the customer by either depositing it in the United States mail and/or by electronic means, addressed either to the address shown on the application for utility service or to any change of address that has been submitted by the customer to the city.

(d) Deposit in the United States mail or electronically made available pursuant to subsection (c) of this section shall be deemed full and complete notice to the customer of the nature and amount of any particular utility billing. (Ord. 1591 § 3, 2016; Ord. 1299 § 3, 2001; Ord. 1194 § 1, 1998; Ord. 966 § 4, 1990; Ord. 643 § 2, 1972).

17.04.025 Budget payment plan.

The city manager, or authorized designee, is hereby authorized to create and implement a budget payment plan in accordance with state law. Such a plan shall permit the authorized customer to make payments of utility charges on an annual averaged basis rather than on a bimonthly basis, with at least one annual adjustment to ensure that the amount paid on an annual basis reflects the actual charges incurred. (Ord. 1299 § 4, 2001; Ord. 966 § 5, 1990).

17.04.027 Leak adjustments.

When excessive water meter registration is caused by broken or leaking water service pipes within or abutting upon the premises without the knowledge of the customer, an adjustment may be made upon written application for one month only in the case of monthly billing and for two months in the case of bimonthly billing during a 12-month period and after repairs have been made. The basis for adjustment shall be the normal consumption under similar operating conditions. (Ord. 1307 § 2, 2002).

17.04.030 Bills delinquent.

If the bill rendered as provided in FMC 17.04.020 is not paid when due, it shall be considered delinquent 10 days after the due date and a penalty fee of 10 percent of the outstanding balance on all accounts with an outstanding balance greater than $10.00 shall be added to the delinquent account. (Ord. 1307 § 3, 2002; Ord. 1299 § 5, 2001; Ord. 966 § 6, 1990; Ord. 643 § 3, 1972).

17.04.040 Payment delinquent – Service discontinued.

In the absence of any special arrangement or agreement with the city concerning payment, if a utility bill or any part thereof remains delinquent and unpaid a special notice to the effect that if the delinquent utility charges, together with the prior delinquent charges, are not paid in full within seven days from the date of mailing of the special notice, the city shall, within 48 hours thereafter, proceed to shut off and discontinue utility services to the premises until all utility charges are paid in full. (Ord. 1299 § 6, 2001; Ord. 966 § 7, 1990; Ord. 643 § 4, 1972).

17.04.045 Notice of delinquent account.

(a) Notice. If an account for utility service remains delinquent beyond seven days, the city shall notify the customer that service will be disconnected without further notice unless the delinquent account and all penalties are immediately paid in full, or special arrangements are made in accordance with FMC 17.04.050. Delivery of the notice shall occur in a way reasonably calculated to apprise the customer of the notice's contents. Written notice shall be conspicuously attached to the premises to which service is furnished, and an additional fee of $9.00 shall be assessed to the account holder for providing personal service of this notice. The notice shall also inform the customer of the date on which service may be disconnected, which shall be not less than 48 hours following delivery of the notice. The notice of delinquent account shall further state that if the consumer has questions or disputes concerning the amount of payment due, he or she may appeal to the city manager, or authorized designee, whose address and telephone number shall be stated on the notice of delinquent account.

(b) Disconnection of Service. If no notice is made to the city that the bill is disputed prior to the time indicated in the customer's notice as the date on which service may be disconnected, the city shall proceed by disconnecting water service to the delinquent customer's premises. All reconnections of service shall be subject to the provisions and fees outlined in FMC 17.04.070. (Ord. 1307 § 4, 2002; Ord. 1225 § 3, 1999; Ord. 966 § 8, 1990).

17.04.050 Payment delinquency – Enforcement actions.

(a) The city manager, or his designee, is hereby authorized and directed to promulgate administrative policies and procedures for the implementation of this chapter.

(b) If the customer is unable to pay the full amount of utility charges because of temporary financial difficulties or other hardship, the city manager, or his designee, may permit the customer to make deferred payment arrangements upon written application; provided, however, that the city will be under no obligation to enter into any deferred payment agreement with any customer who has not fully and satisfactorily complied with terms of any previous agreement.

(c) Failure to abide by the terms of the arrangement shall be cause for shut-off and discontinuance of utility services until the total utility charges that are due are paid in full. (Ord. 1307 § 5, 2002; Ord. 966 § 9, 1990; Ord. 643 § 5, 1972).

17.04.053 Deferred payments arrangements – Penalty, assessed.

If arrangements for deferred payments have been made, the city manager, or authorized designee, shall assess against such accounts the same penalty fees as set forth in FMC 17.04.030. (Ord. 1299 § 7, 2001; Ord. 966 § 10, 1990).

17.04.055 Delinquent account – Refusal of other city services.

If a bill becomes delinquent, no officer, agent, or employee of the city may authorize or permit any further city service or process any application for a permit from the city, when such application has been requested by the person in whose name an account stands delinquent; this requirement shall remain in effect until the delinquent account is paid in full. This section, however, shall not apply to the provision of water, sewer and stormwater service, but shall apply to connections, inspections, engineering and other like services furnished by the water, sewer and stormwater utilities. (Ord. 1591 § 4, 2016; Ord. 1299 § 8, 2001; Ord. 1225 § 4, 1999; Ord. 966 § 11, 1990).

17.04.057 Service charge for unpaid or dishonored payments.

A service charge of $35.00 shall be imposed upon any customer who, in full or partial payment of a city utility bill, tenders a payment drawn on or processed by a bank or other financial entity, which is thereafter returned to the city, for any reason, resulting in a dishonored payment to cover the additional costs to the city thereby entailed. (Ord. 1591 § 5, 2016; Ord. 1328 § 1, 2003; Ord. 1307 § 6, 2002; Ord. 966 § 12, 1990).

17.04.060 Service discontinuance – For other than payment failure.

In addition to nonpayment of a utility bill, the city may shut off and discontinue any or all utility services to a customer for failure to pay connection charges for any utility service furnished to such customer, or for the fraudulent, illegal or unauthorized use or abuse of any utility service, or the failure or refusal of the customer to comply with all rules, regulations or ordinances pertaining to the receipt and use of utility services furnished by the city. (Ord. 966 § 14, 1990; Ord. 643 § 6, 1972).

17.04.070 Disconnection/reconnection of utility services.

Should a customer fail to pay a delinquent bill pursuant to FMC 17.04.030, the city manager, or his/her designee, shall immediately cause the particular utility's services to be cut off from the premises. Such services shall be reconnected to the premises only upon full payment of all delinquent utility charges, and correction of any fraudulent, illegal or unauthorized use or abuse of any utility service, applicable to the particular premises, irrespective of who may have incurred the charges or who may have been responsible for the fraudulent, illegal or unauthorized use or abuse of utility services. In addition, one single reconnection fee of $25.00 shall be charged and paid prior to the reconnection of any utility service that was actually shut off and discontinued and that will require such reconnection to be made during regular working hours.

A charge of $155.00 shall be assessed for reconnections made at a customer's request outside of regular working hours. After-hours reconnections shall only be performed after authorization is received from the city manager, or his/her designee. Failure to comply with any and all provisions made will result in termination of water services without further notice. (Ord. 1591 § 6, 2016; Ord. 1514 § 1, 2011; Ord. 1307 § 7, 2002; Ord. 966 § 13, 1990; Ord. 643 § 7, 1972).

17.04.080 Liability for charges.

All owners of property shall remain ultimately and legally liable for the payment of any and all utility charges to the premises, regardless of whether such property is used for single-family, multiple dwelling or commercial purposes and regardless of the fact that the billings are made in the name of a tenant or other occupant of the premises. Such billings are for personal convenience only and shall not in any way affect the lien rights of the city against the premises to which the services are furnished. (Ord. 1225 § 5, 1999; Ord. 966 § 15, 1990; Ord. 643 § 8, 1972).

17.04.090 Right of lien.

(a) In addition to the right herein provided to shut off and discontinue utility service, the city shall have a lien for delinquent and unpaid utility charges, including late charges, against the premises to which such utility service has been furnished or is available. The lien shall be effective for a total of not to exceed six months' delinquent charges without the necessity of any writing or recording. In order to make such lien effective for more than six months, the city manager shall cause to be filed for record in the office of the county auditor of Pierce County a notice in substantially the following form:

Utility Lien Notice
City of Fircrest,)
)
v.)
)
)
Reputed Owner.)
)

- -

NOTICE IS HEREBY GIVEN that the City of Fircrest has and claims a lien for _____ charges against the following described premises situated in Pierce County, Washington, to wit:

(Here insert legal description of premises.)

Said lien is claimed for not exceeding six months charges and interest now delinquent, amounting to $_____, and is also claimed for future utility charges against said premises.

DATED this _____ day of _____, 20___.

CITY OF FIRCREST

By _____.

(b) The lien notice shall be signed by the city manager. The lien notice shall be recorded as prescribed by law for the recording of mechanics' liens. (Ord. 1307 § 8, 2002; Ord. 966 § 16, 1990; Ord. 733 § 1, 1979; Ord. 643 § 9, 1972).

17.04.100 Out-of-city service – Billing.

Repealed by Ord. 1591. (Ord. 1299 § 9, 2001; Ord. 1225 § 6, 1999; Ord. 966 § 17, 1990; Ord. 643 § 10, 1972).

17.04.110 Out-of-city service – Charge payment failure – Service discontinuance.

Repealed by Ord. 1591. (Ord. 1299 § 10, 2001; Ord. 966 § 18, 1990; Ord. 643 § 11, 1972).

17.04.120 Out-of-city service – Right of lien.

Repealed by Ord. 1591. (Ord. 966 § 19, 1990; Ord. 643 § 12, 1972).

17.04.130 Utility lien foreclosure – Authorized when.

The city may foreclose its utility lien in an action in the superior court. All or any of the tracts subject to the lien may be proceeded against in the same action, and all parties appearing of record as owning or claiming to own, having or claiming to have any interest in or lien upon the tracts involved in the action shall be impleaded in the action as parties defendant. An action to foreclose a utility lien pursuant to a lien notice filed as required by this chapter must be commenced within two years from the date of filing thereof. An action to foreclose a six months' lien may be commenced at any time after six months subsequent to the furnishing of the utility service for which payment has not been made. The service of summons and all other proceedings

except as provided specifically under this chapter, including appeal, order of sale, sale, redemption and issuance of deed shall be governed by the statutes of the state of Washington now or hereafter in force relating to the foreclosure of mortgages on real property. The terms "judgment debtor" or "successor in interest" in the statutes of the state of Washington governing redemption when applied under this chapter shall include an owner or a vendee. All sales shall be subject to the right of redemption within one year from date of sale. At any time after deed is issued to it pursuant to a foreclosure of a lien, the city may lease or sell or convey the property conveyed thereunder at public or private sale for such price and on such terms as may be determined by the resolution of the city council. (Ord. 1307 § 9, 2002; Ord. 966 § 20, 1990; Ord. 733 § 2, 1979).

17.04.140 Utility lien foreclosure – Trial.

A utility lien foreclosure action shall be tried before the court without a jury. The court may allow, in addition to the delinquent charges, interest on the service charges at a rate not exceeding 12 percent per year from date of delinquency, costs and disbursements as provided by the statutes of the state of Washington and such attorneys' fees as the court may adjudge reasonable. If the owners and parties interested in any particular tract default, the court may enter judgment of foreclosure and sale as to such parties and tracts and the action may proceed as to the remaining defendants and tracts. The judgment shall specify separately the amount of the utility charges, with interest, penalty and costs chargeable to each tract. The judgment shall have the effect of a separate judgment as to each tract described in the judgment and any appeal should not invalidate or delay the judgment except as to the property concerning which the appeal is taken. The judgment of the court shall order the tracts therein described sold at one general sale, and an order of sale shall issue pursuant thereto for the enforcement of the judgment. Judgment may be entered as to any one or more separate tracts involved in the action and the court shall retain jurisdiction of other properties. (Ord. 1307 § 10, 2002; Ord. 1299 § 11, 2001; Ord. 733 § 3, 1979).

17.04.150 Utility lien – Enforcement – Alternative method.

As an additional and concurrent method of enforcing the lien authorized under this chapter, the city of Fircrest may shut off and discontinue any or all utility services to the premises to which such utility service was furnished after the charges become delinquent and unpaid, and until the charges are paid. The right to enforce the lien by cutting off and refusing utility services shall not be exercised after two years from the date of the recording of the utility lien notice provided under this chapter except to enforce the payment of six months' charges for which no lien notice is required to be recorded. (Ord. 1307 § 11, 2002; Ord. 966 § 21, 1990; Ord. 733 § 4, 1979).

17.04.160 Statutes adopted by reference.

(a) RCW 9A.61.010, 9A.61.020, 9A.61.050, 9A.61.060, and 9A.61.070 are hereby adopted by reference.

(b) RCW 80.28.240 is hereby adopted by reference. (Ord. 960 §§ 1, 2, 1990).

17.04.170 Amendments to statutes adopted.

The amendment, addition or repeal by the Washington State Legislature of any section of any of the adopted statutes shall be deemed to amend the ordinance codified in this chapter and the statutes contained herein which are adopted by reference in conformity with the amendment, addition or repeal, and it shall not be necessary for the legislative authority of this city to take any action with respect to such addition, amendment or repeal as provided by RCW 35.21.180. (Ord. 960 § 3, 1990).

Chapter 17.08
METER TAMPERING

17.08.010 Purpose.

The purpose of this chapter is to provide more effective methods and remedies for dealing with cases of tampering with, and diverting around, utility meters and other city equipment and to thereby protect the financial resources of the city and the rate-paying public. (Ord. 966 § 23, 1990).

17.08.020 Billing procedure.

(a) Any customer, owner, or person in control of premises receiving unmeasured or unauthorized utility services is responsible for paying the full amount of said services, as reasonably determined by the utility to have been obtained either by diversion around the meter or by unmetered or unauthorized use as a result of meter tampering, alteration or replacement.

(b) Any customer, owner or person in control of premises who receives utility services for which payment, consumption or other utility records have been falsified is responsible for paying the full amount of utility services, as reasonably determined by the utility to have been obtained.

(c) Any city utility becoming aware of the fact that particular utility services have been obtained without full payment either through tampering, alteration, bypass, or falsification of records, shall bill the recipient for the full amount of said services; such amount shall reasonably be determined by said utility in good faith, after using the best known estimating methods.

(d) The recipient of utility services that have been obtained without full payment either through tampering, alteration, bypass, or falsification of records shall also be responsible and billed for the costs incurred by the city as a result of investigation, damages, repair, and bookkeeping.

(e) Notice of a supplemental bill shall be sent to the recipient of unauthorized or unmetered utility services. The supplemental bill shall be added to the next regular utility bill and shall be collected under the normal collection procedures. The notice of a supplemental billing shall consist of the following:

(1) Billing amount for unauthorized or unmetered utility services under subsection (a) of this section;
(2) Related costs pursuant to subsection (d) of this section;

(3) A $310.00 penalty fee, pursuant to FMC 17.08.040; and
(4) Notice apprising the recipient of the right to an administrative appeal pursuant to FMC 17.08.030.

(f) Deposit in the United States mail shall be deemed full and complete notice of the nature, amount, and right to appeal the supplemental billing.

(g) Liability for the supplemental billing shall be in addition to, and notwithstanding, any charge, conviction or acquittal under FMC 17.08.040.

(h) The supplemental billing shall be placed on the next forthcoming utility bill and shall be collected under the normal collection procedures as set forth in Chapter 17.04 FMC. (Ord. 1515 § 1, 2011; Ord. 966 § 24, 1990).

17.08.030 Administrative appeal.

(a) Within 13 days of deposit of the notice of supplemental billing in the United States mail pursuant to FMC 17.08.020(f), the recipient may file a written notice of appeal. The notice of appeal shall state the reasons why the recipient is contesting the supplemental billing.

(b) The administrative appeal shall be decided by the city manager, or his authorized designee, within 20 days of the date of receipt of the notice of appeal.

(c) The amount of the supplemental bill shall remain on the recipient's utility bill but shall not be collected by the city until the final determination of the appeal.

(d) If the determination on appeal is adverse to the recipient, the city shall proceed to collect the full amount of the supplemental bill from the date the original bill should have been paid had no appeal been filed. (Ord. 1299 § 13, 2001; Ord. 966 § 25, 1990).

17.08.040 Penalty fee.

For each single instance of receipt of unauthorized or unmetered utility services, a $310.00 penalty fee shall be assessed. (Ord. 1515 § 2, 2011; Ord. 966 § 26, 1990).

17.08.050 Intent to deprive – Rebuttable presumption.

For the purposes of FMC 17.08.040, there shall be a rebuttable presumption that the recipient of unauthorized, unmetered or incorrectly metered utility services intended to deprive the utility of proper payment for its service. This presumption does not apply if the diversion of the utility's service or the tampering, alteration, or replacement of the utility's metering equipment is reasonably attributed to accident or accidental malfunction of the utility's metering equipment. (Ord. 966 § 27, 1990).

Chapter 17.10
UTILITY SERVICES, PERMITS AND INSPECTIONS

17.10.010 Title.
This chapter shall be known and may be cited or referred to as the public works plan review, building permit issuance, and connections and inspections notices policy for utility services of the city of Fircrest. (Ord. 1620 § 1, 2018; Ord. 1278 § 1, 2001. Formerly 18.10.010).

17.10.020 Applicability.
Prior to issuance of any building permit for new construction in the city of Fircrest, an applicant for said permit shall submit an application to the building department for review of utility services with a scaled site plan showing the nature, size and location of the water (including size and location of the meter, and underground sprinkler systems if applicable), sewer, and stormwater lines, the location of the building(s), existing curbs and adjacent streets and a set of drawings for each utility for which service will be required. Such application shall be accompanied by the sewerage system plan review fee, the water system plan review fee, and the stormwater drainage system plan review fee as provided in FMC 17.10.030 or 17.10.040. (Ord. 1620 § 1, 2018; Ord. 1278 § 2, 2001. Formerly 18.10.020).

17.10.030 Plan review fee amount.
(a) Single-Family Residence. An applicant for a single-family and duplex residence shall pay a nonrefundable fee of $35.00 per utility for review of each of the utility services for which review is required: water connection (including underground sprinkler system), sanitary sewer connection, and erosion control and stormwater drainage.

(b) Other than a Single-Family Residence. An application for other than a single-family residence shall be accompanied by an intake fee of $50.00 per utility and a deposit fee of $100.00 per utility for review of each of the utility services for which review is required: water connection, sanitary sewer connection, erosion control and stormwater drainage, and underground sprinkler system. The intake fee, to cover the cost of processing, is non-refundable. If the deposit fee exceeds the city's total cost of review, the balance shall be promptly refunded to the applicant. If the deposit fee is insufficient to cover the city's total cost of review, the applicant shall pay the balance prior to issuance of any building permit. (Ord. 1620 § 1, 2018; Ord. 1278 § 3, 2001. Formerly 18.10.030).

17.10.040 Calculation of total fees.
The total fee for which any applicant shall be responsible shall include the actual costs incurred by the city in processing the application, calculated as follows:

(a) All services provided by city staff shall be charged at a rate equal to current hourly wages and benefits plus 15 percent overhead.

(b) All services provided by the city engineer or other consultants and agents of the city shall be charged as the same are charged to the city for said services.

(c) The actual cost of all other costs incurred by the city. (Ord. 1620 § 1, 2018; Ord. 1278 § 4, 2001. Formerly 18.10.040).

17.10.050 Cancellation, withdrawal or denial of application.

If any application is withdrawn or canceled, the applicant shall remain responsible for payment of the city's actual costs incurred prior to the city's receipt of a written cancellation or withdrawal notification. If the city approval of any such application is denied, the applicant shall remain responsible for payment of the city's actual costs incurred prior to the denial. If an application or request is withdrawn, canceled or denied, the actual costs incurred by the city for which the applicant is responsible shall be calculated as enumerated in FMC 17.10.040. (Ord. 1620 § 1, 2018; Ord. 1278 § 5, 2001. Formerly 18.10.050).

17.10.060 Plan review.

The public works department, its employees or authorized agents, shall inspect the premises and review said plans for conformity with city standards and return a written report to the building permit application file containing all information pertinent to such connection, including, but not limited to, a certificate of water and/or sewer availability, the location of the building and property on which it is situated with reference to the nearest main lines, shall mark on the plans any changes that are required, and shall sign and date the plans. (Ord. 1620 § 1, 2018; Ord. 1278 § 6, 2001. Formerly 18.10.060).

17.10.070 Utilities building permit fees payment.

The connection fees as provided in FMC 20.04.030 and 21.04.130 and other charges as now enacted or hereafter amended by the city shall be paid at time of building permit issuance.
The general facilities charges as provided by FMC 20.04.025 and 21.01.030 shall be paid at any time prior to building permit issuance and shall be nonrefundable. All associated sewer and water connections shall be completed within four years of payment of the general facilities charges. After four years, if the water and sewer connections are not made, all general facilities charges which have been paid shall be credited toward the current general facilities charges. The current general facilities charges shall be imposed and the applicant shall pay all required general facilities charges. (Ord. 1620 § 1, 2018; Ord. 1288 § 1, 2001; Ord. 1278 § 7, 2001. Formerly 18.10.070).

17.10.080 Utility connection and inspection notices.

The city will inspect all connections and extensions to its water, sewer, and stormwater systems prior to any of the work being covered.

The applicant must provide 48 hours' notice to the public works department for the city to do location, inspections, or connections.

If reinspections of the work are required by the city, the applicant shall pay the city's additional costs prior to issuance of a final inspection or certificate of occupancy and additional costs will be calculated as enumerated in FMC 17.10.040. (Ord. 1620 § 1, 2018; Ord. 1278 § 8, 2001. Formerly 18.10.080).

Title 21
WATER

Chapters:

CHAPTER 21.01
CONNECTION FEE IN LIEU OF ASSESSMENT

21.01.010 Connection to main authorized.

Persons owning property, either within or without the limits of the city, adjacent to or abutting upon any available water main installed by the city and which property has not been previously assessed or charged for such water main, may connect to the water main for water service upon first making written application and being subject to the following terms and conditions of this chapter. (Ord. 521, 1965; Ord. 279 § 28, 1955).

21.01.020 Compliance with regulations and payment of usual fees.

Applicant shall pay all usual and ordinary fees required for purposes of connection to the water system of the city, and shall be subject to and comply with all other provisions of this title or any amendments or changes thereto. (Ord. 1279 § 1, 2001; Ord. 521, 1965; Ord. 279 § 28(a), 1955).

21.01.030 General facilities charge.

Each connection to the city water system shall be charged a water general facilities charged based on the customer's proportionate share of the existing facilities and the planned capital improvements at the time of connection. The general facilities charge shall be paid as specified in FMC 17.10.070 for each property served based on the meter size required to provide the water service requested, as shown in the following table:

(a) The following general facilities charges shall be as follows:

Meter Size	General Facilities Charge
5/8"	$4,400
1"	$11,000
1-1/2"	$22,000
2"	$35,200
3"	$70,400
4"	$110,000

(b) Such general facilities charges shall be credited to the specific premises served and no other property, and the premises shall be noted by address and permanently filed in the records of the city. Properties with existing services shall be considered to have satisfied the general facilities charges; however, change of use shall require payment for any differential in residential equivalents.

(c) The general facility charge schedule shall be updated annually at a rate adjusted in accordance with the consumer price index (CPI-W) for the Seattle-Tacoma-Bremerton area ending December of each year to be effective January 1st of the following year. (Ord. 1619 § 1, 2018; Ord. 1464 § 1, 2008; Ord. 1292 § 1, 2001; Ord. 1279 § 2, 2001; Ord. 1098 § 1, 1995; Ord. 961 § 4, 1990; Ord. 521, 1965; Ord. 279 § 28(b), 1955).

21.01.040 Record of payment.

Repealed by Ord. 1098. (Ord. 521, 1965; Ord. 279 § 28(c), 1955).

21.01.050 Special approval for multiple use of single connection.

No more than one residence or one commercial establishment may be served by or through a single connection to the water main without special approval of the city council, and upon payment of such additional connection charges as the circumstances shall warrant. (Ord. 521, 1965; Ord. 279 § 28(d), 1955).

21.01.060 Fees considered revenue of water fund.

All water service connection fees hereunder shall be considered revenue of the water fund. (Ord. 521, 1965; Ord. 279 § 28(e), 1955).

21.01.070 Application of general regulations.

All other ordinances, rules and regulations of the city relating to the use, maintenance and connections for water service in the city of Fircrest, as now or hereafter adopted, shall apply with equal force to all water service connections hereunder. (Ord. 521, 1965; Ord. 279 § 28(f), 1955).

CHAPTER 21.04
SERVICE WITHIN CITY

21.04.010 Title and citation.

This title shall be known and may be cited or referred to as the water ordinance of the city. (Ord. 279 § 1, 1955).

21.04.020 Applicability.

The city will supply and sell water when and as available, both for domestic and commercial use and consumption within and without corporate limits of the city. (Ord. 941 § 1, 1989; Ord. 279 § 2, 1955).

21.04.030 Residential rate.

Water furnished by the city of Fircrest for single-family residential and multiple dwelling units use and consumption within Fircrest city limits shall be furnished through metered connections and shall be charged for on the following basis:

(a) Single-family residential units with an accessory dwelling unit (ADU), as defined by FMC 22.58.012, shall be billed as one dwelling unit.

(b) A bimonthly ready to serve charge for each meter, regardless of size, per connection, shall be billed in accordance with the following schedule:

Residential and Multiple Dwelling
Water Ready to Serve Charge

Year	2017	2018	2019
Ready to Serve Charge	$34.00	$35.50	$37.00

(c) A charge for water consumed through each meter shall be billed in accordance with the following schedule:

Consumption Tier for Residential and
Multiple Dwelling Units

	2017	2018	2019
Tier 1 (0 – 1,000 cf)	$0.0100	$0.0104	$0.0109
Tier 2 (1,001 – 4,000 cf)	$0.0150	$0.0157	$0.0163
Tier 3 (4,001 – + cf)	$0.0250	$0.0261	$0.0272

(d) Water furnished by the city of Fircrest for single-family residential and multiple dwelling units use and consumption outside the Fircrest city limits shall be charged as outlined in subsections (a) and (b) of this section with an additional bimonthly surcharge of $25.00.

(e) All rates and charges imposed by this section shall be collected in full for service furnished during any month or fractional month. (Ord. 1627 § 2, 2018; Ord. 1589 § 1, 2016; Ord. 1446 § 1,

2007; Ord. 1365 § 1, 2005; Ord. 1287 § 1, 2001; Ord. 1119 § 1, 1996; Ord. 1086 § 1, 1994; Ord. 1016 § 1, 1992; Ord. 979 § 1, 1990; Ord. 891 § 1, 1988; Ord. 745 § 1, 1980).

21.04.031 Nonresidential rate.

Repealed by Ord. 1365. (Ord. 941 § 2, 1989).

21.04.040 Commercial rate.

Water furnished by the city of Fircrest for commercial or industrial use and consumption within the Fircrest city limits shall be furnished through metered connections and shall be charged for on the following basis:

(a) A bimonthly ready to serve charge for each meter regardless of size, per connection, shall be in accordance with the following schedule:

Commercial Water Ready to Serve Charge

Year	2017	2018	2019
Ready to Serve Charge	$34.00	$35.50	$37.00

(b) A charge for water consumed through each meter shall be in accordance with the following schedule:

Consumption Tier for Commercial Units

	2017	2018	2019
Tier 1 (0 – 2,000 cf)	$0.0120	$0.0124	$0.0129
Tier 2 (2,001 – 4,200 cf)	$0.0170	$0.0177	$0.0183
Tier 3 (4201 – + cf)	$0.0270	$0.0281	$0.0292

(c) Where more than one commercial business or establishment receives water through a single metered connection, each separate commercial business or establishment shall be charged a separate ready to serve charge that will include the same rate schedule as listed above.

(d) All rates and charges imposed by this section shall be collected in full for service furnished during any month or fractional month. (Ord. 1589 § 2, 2016; Ord. 1287 § 2, 2001; Ord. 1119 § 2, 1996; Ord. 1098 § 3, 1995; Ord. 1086 § 2, 1994; Ord. 1016 § 2, 1992; Ord. 979 § 2, 1990; Ord. 891 § 2, 1988; Ord. 745 § 2, 1980).

21.04.050 Separate irrigation service.

Customers are encouraged to separate water service for irrigation from the regular service. When either the residential or commercial customer wishes to do so, a second meter may be installed ahead of the existing meter at the customer's expense; or if additional capacity is required, a new connection will be made with the appropriate connection and general facilities charges being assessed and paid. In either case no additional ready to serve rate will be charged; however, the metered rate for tier 2 in this chapter will be billed. In every case the irrigation

service line shall contain a city-approved backflow valve to prevent the flow of groundwater into the regular water line. (Ord. 1589 § 3, 2016; Ord. 1279 § 3, 2001; Ord. 1098 § 4, 1995; Ord. 279 § 5, 1955).

21.04.060 Multiple dwellings defined.

A “multiple dwelling” is defined to be the space provided for the separate occupancy of an individual or family unit with separate living quarters and kitchen. Multiple dwellings shall consist of all places wherein more than one dwelling unit is located and where water is supplied to two or more dwelling units through a single connection to the water lines of the city. (Ord. 1589 § 4, 2016; Ord. 1279 § 4, 2001; Ord. 891 § 3, 1988; Ord. 745 § 3, 1980).

21.04.080 Commercial use of portion of dwelling unit.

Private dwellings in which space is occasionally used for the conduct of business by a person residing therein will be served under the residential meter and rate. The commercial rate shall apply to water furnished to a dwelling which is regularly or primarily used for commercial purposes such as professional or business office, shop or store, studio or other gainful activity wherein the suite has a fixture count of six or more units. (This would be equivalent to an ordinary half bath.) (Ord. 1098 § 5, 1995; Ord. 279 § 8, 1955).

21.04.090 Connection size.

All connections to the water distribution system of the city of Fircrest shall conform to the following and it is unlawful for any person to make, cause to be made, or authorize any other connection to the water distribution system without prior approval of the city:

(a) The minimum connection size shall be three-quarter-inch service line which shall be served with a five-eighths-inch meter.

(b) Where water pressure as determined by the general superintendent is or may be less than 50 pounds per square inch, the connection size shall be not less than one inch. This then will be considered to be a residential equivalent without incremental facility charge being due.

(c) The size of commercial connections shall be determined by the general superintendent; provided, however, that the size of commercial connections may not exceed two inches without prior approval of the city council.

(d) Connections for fire sprinkler systems shall be in such size as may be approved by the city manager or his/her designee.

(e) At each connection, a meter yoke shall be installed at the dwelling or building, whether or not the water shall be furnished through metered connections. (Ord. 1098 § 10, 1995; Ord. 961 § 7, 1990; Ord. 499, 1964; Ord. 408, 1961; Ord. 385, 1960; Ord. 279 § 9, 1955).

21.04.100 Meters – Right of entry.

The city shall have the right to install and maintain meters at any building or premises receiving water from the city whether such water be charged for at the metered rate or not. Authorized city employees shall have the right to enter upon all premises receiving water for the purpose of installing and servicing meters and for the purpose of determining the amount of water consumed. (Ord. 279 § 10, 1955).

21.04.110 Application for service.

Repealed by Ord. 1279. (Ord. 1098 § 6, 1995; Ord. 279 § 11, 1955).

21.04.120 Connections required by the city – Notice to consumer.

If the city changes the point of service of an existing connection through a main upgrade or other change so as to require that an additional or altered connection be made at a particular building or premises, the city shall notify the owner and consumer in writing. The city will install the replacement service line and meter to the property line at no additional expense to the property owner. The property owner will be responsible for the connection to the residence or commercial building. (Ord. 1098 § 7, 1995; Ord. 279 § 12, 1955).

21.04.130 Service connection fee and meter drop-in fee.

A service connection fee or meter drop-in fee shall be charged and collected by the city for each new permanent connection to its water distribution system, which fee shall be paid before any water is furnished through such connection.

The service connection fee will be charged in the event that the city is required to make the physical connection to the existing water main, extend the service line to the property line, and install a complete water meter assembly.

The meter drop-in fee will be charged in the event that a developer makes the physical connection to a new water main, extends the service line to the property line, and installs a water meter assembly, and the city inspects such work and installs the water meter in the water meter assembly. The service connection fees and meter drop-in fees will be charged as follows:

(a) Service Connection Fee.

Meter Size	Service Connection Fee
5/8"	$2,065
1"	$2,135
1-1/2"	$2,315
2"	$2,840

For meters larger than two inches, the fee will be the actual costs of labor and materials for furnishing and installing the connection, plus an amount equal to 25 percent of the cost of labor and materials for overhead. In addition to the fees listed above, an additional fee of $25.00 per square foot of pavement restoration required for the connection shall be charged based on

measurements made at the time of the connection, and the actual costs of any other related costs shall be the responsibility of the property owner, payable to the city prior to final inspection. The service connection fee shall be updated annually at a rate adjusted in accordance with the consumer price index (CPI-W) for the Seattle-Tacoma-Bremerton area ending December of each year to be effective January 1st of the following year.

(b) Meter Drop-In Fee.

Meter Size	Service Connection Fee
5/8"	$430.00
1"	$485.00
1-1/2"	$590.00
2"	$740.00

The meter drop-in fee shall be updated annually at a rate adjusted in accordance with the consumer price index (CPI-W) for the Seattle-Tacoma-Bremerton area ending December of each year to be effective January 1st of the following year. (Ord. 1619 § 2, 2018; Ord. 1464 § 2, 2008; Ord. 1292 § 2, 2001; Ord. 1279 § 5, 2001; Ord. 1098 § 2, 1995; Ord. 961 § 5, 1990; Ord. 385, 1960; Ord. 279 § 13, 1955).

21.04.140 Temporary service.

Temporary connections to the water distribution system of the city may be made only when authorized in each individual instance by resolution of the city council. Such resolution may specify the amount which shall be paid as a service connection charge prior to making any such connection. Water furnished through temporary connections shall be charged for at the rate applicable to permanent connections. Temporary connections shall be limited to a period of 120 days, and may be extended by the city council for further periods of not to exceed 30 days each upon written request and without additional connection charges. (Ord. 279 § 14, 1955).

21.04.170 Costs of making connection – Extension of mains charge.

(a) Except as hereinafter provided, when an existing water main is available to which an ordinary connection can be made, the city will make all connections to its water distribution system, including the cost of meters, at its own expense, which is offset by the service connection fee.

(b) In the event any water main must be extended to the property to be served before a connection can be made, the applicant shall pay all cost of making such extension in addition to the service connection fee and general facilities charge. All such mains shall run to the far property line of the property involved.

If the city extends the mains, all costs and charges shall be the actual cost to the city, including but not limited to, engineering and preparation of cost estimates, labor plus 15 percent overhead, and supplies and materials. Alternatively, the city may allow a developer to extend the main based on approved engineering drawings with an approved professional engineer certification that the installation meets city and state standards.

The applicant shall pay all charges in advance based on city estimates at the time of application for a building permit.

At the end of the project, the developer shall pay the actual city cost less the estimated cost paid at time of building permit issuance. If the estimated cost exceeds the city's total cost, the balance shall be promptly refunded to the developer. If the estimated cost is insufficient to cover the city's total cost, the developer shall pay the balance prior to issuance of any final inspection or occupancy permit. (Ord. 1279 § 6, 2001; Ord. 1098 § 8, 1995; Ord. 279 § 17, 1955).

21.04.180 Connections to be made by city employees only.

Connections to or disconnections from the water distribution system of the city shall be made only by authorized employees, agents or officials of the city, and it is unlawful for any other person to make or cause to be made any such connection or disconnection.

The city may allow a developer, in conjunction with installation of an approved water main extension, to make connections to the water main extension; provided, that the developer has secured written city approval prior to issuance of a building permit based on city-approved engineering drawings, with an approved professional engineer certification that the connection meets the city and state standards; and provided, that the connections are inspected and approved by an authorized city employee or agent of the city prior to being covered. Should the developer fail to comply with any of the provisions of this section, the project may be shut down unless and until the city has determined that said installation complies with city standards. The actual cost to the city of additional labor and all other costs incurred by the city to enforce compliance shall be paid by the developer prior to approval of the project. (Ord. 1279 § 7, 2001; Ord. 279 § 18, 1955).

21.04.190 Repairs and trouble calls.

Ordinarily the city will not perform service line repairs beyond the meter or off the right-of-way. Occasionally when repairs are being made within these parameters it may be determined that the cause of the trouble is due to some defect on the customer's property. In such case the city at its option may make incidental repairs in the customer's line and bill the owner the actual cost of repairing the same, plus 15 percent. (Ord. 1098 § 9, 1995; Ord. 279 § 19, 1955).

21.04.200 Resale prohibited.

It is unlawful for any person to resell water received from the city. (Ord. 279 § 20, 1955).

21.04.210 City not liable for private damage.

The city shall not be liable for any damage to or which occurs on private property served with water by the city, which results from defective or improper appliances, pipes, conduits or other appurtenances and the fact that agents of the city may have connected or inspected the same at or subsequent to installation shall not operate to make the city liable for any such damage. (Ord. 1279 § 8, 2001; Ord. 279 § 21, 1955).

21.04.240 Fluoridation of water.

A source of fluoridation approved by the State Department of Health shall be added to the water supply of the city of Fircrest under the rules and regulations of the State Board of Health, such addition to be administered in a manner approved by the State Department of Health. (Ord. 323, 1957).

21.04.250 Sprinkling regulations authorized – Penalty for violation.

(a) Authority. Subject to review by the city council, the city manager is empowered to, from time to time and as circumstances require, regulate the use of water for sprinkling purposes in the city of Fircrest; said regulation to deal with:

(1) Time that sprinkling may be done by hours, and days and months;
(2) Amounts of water allowed to be used;
(3) Manner of applying water.

(b) Penalty for Violation. Violation of any of the provisions of this section or regulations enacted hereunder is a misdemeanor. (Ord. 987 § 42, 1991; Ord. 834 § 43, 1986; Ord. 294 §§ 1, 2, 1956).

21.04.260 Severability.

In the event any portion or provision of this chapter is found and held to be invalid, the remaining portions shall not be affected thereby. (Ord. 279 § 26, 1955).

Chapter 21.05
CROSS-CONNECTIONS

21.05.010 Definitions.

(a) “Approved backflow prevention assembly” means a device to counteract backpressures or prevent backsiphonage. This assembly must appear on the list of approved assemblies issued by the Washington State Board of Health.

(b) “Auxiliary supply” means any water source or system, other than the public water system, that may be available in the building or on the premises.

(c) “Backflow” means the flow in the direction opposite to the normal flow or the introduction of any foreign liquids, gases, or substances into the water system of the city of Fircrest water service area.

(d) “Backpressure” means a pressure (caused by a pump, elevated tank or piping, boiler, or other means) on the consumer’s side of the service connection that is greater than the pressure provided by the city’s water system and which may cause backflow.

(e) “Backsiphonage” means backflow due to a reduction in system pressure in the city’s distribution system.

(f) “Cross-connection” means any actual or potential physical arrangement where the city’s water system is connected, directly or indirectly, with any other nondrinkable water system or auxiliary system, sewer, drain conduit, hot tub, swimming pool, storage reservoir, plumbing fixture, swamp coolers, radiator flush kit, garden hose (aspirator) or any other device which contains, or may contain, contaminated water, sewage, or other liquid of unknown or unsafe quality which may be capable of imparting contamination to the public water system as a result of backflow. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other temporary or permanent devices through which, or because of which, backflow may occur are considered to be cross-connections.

(g) “Premises” means any piece of land to which water is provided by the city of Fircrest water system, including all structures, improvements, and other facilities located on it.

(h) “Public water system” means any system excluding a system serving one single-family residence, providing piped water for human consumption, and also referred to as “potable water.”

(i) “Purveyor” means any agency or subdivision of the state or any municipal corporation, firm, company, mutual or cooperative association, institution, partnership or person or any other entity that owns or operates a public water system. It also means three or more authorized agents of any such entities.

(j) “Reduced pressure principle assembly” means an assembly containing two independently acting approved check valves together with a hydraulically operated, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The assembly shall include properly located test cocks and tightly closing shut-off valves at the end of the assembly. A check valve is approved if it appears on the list of approved assemblies issued by the Washington State Board of Health. (Ord. 1439 § 2, 2007).

21.05.020 Purpose.

The purpose of these regulations is to protect the water supply of the city of Fircrest from contamination or pollution due to any existing or potential cross-connections. (Ord. 1439 § 3, 2007).

21.05.030 Cross-connection regulated.

(a) No cross-connections shall be created, installed, used or maintained with the water service area served by the city of Fircrest, except in accordance with these regulations.

(b) The director of public works or his/her designee shall have the authority to regulate the control or elimination of cross-connections pursuant to Chapter 246-290 WAC as it now exists or as it may hereafter be amended, and these regulations. The policies, procedures and other

criteria for determining appropriate levels of protection required shall be in accordance with the "Accepted Procedure and Practice in Cross-Connection Control Manual" – Pacific Northwest Section – American Water Works Association, Fifth Edition or any superseding edition.

(c) The city of Fircrest requires that all plumbing and sprinkler plans be submitted to the city of Fircrest public works department for review and approval prior to installation on all new construction for any plumbing or sprinkler system changes. (Ord. 1439 § 4, 2007).

21.05.040 Backflow prevention assemblies requirement.

Approved backflow prevention assemblies shall be installed and tested by a certified contractor/agency at the expense of the owner, either at the service connection or within the premises, as determined by a certified cross-connection inspector employed by the city of Fircrest in each of the following circumstances:

(a) If the nature and extent of any activity on the premises, or the materials used in connection with any activity on the premises, or materials stored on the premises, could contaminate or pollute the drinking water supply.

(b) On premises having any one or more cross-connections as that term is defined in FMC 21.05.010(f).

(c) Internal cross-connections that are not correctable, or intricate plumbing arrangements which make it impractical to ascertain whether or not cross-connections exist.

(d) A repeated history of cross-connections being established or reestablished.

(e) Unduly restricted entry so that inspections for cross-connections cannot be made with sufficient frequency or with sufficient notice to assure that cross-connections do not exist. A reduced pressure backflow assembly will be required to be installed at the service connection.

(f) Materials of a toxic or hazardous nature being used such that, if backsiphonage should occur, a health hazard could result.

(g) Any mobile apparatus which uses the potable water system or water from any premises within the city of Fircrest water service area system.

(h) On any premises where installation of an approved backflow prevention assembly is deemed to be necessary to accomplish the purpose of these regulations in the judgment of a certified cross-connection specialist employed by the city of Fircrest.

(i) On any premises where an appropriate cross-connection report form has not been filed with the office of public works.

(j) All adopted unified plumbing codes must be maintained.

(k) All rental properties shall have a reduced pressure principle assembly at the service connection.

(l) All new construction plans shall be submitted to the public works department for review and determination of the necessity of an approved assembly.

(m) All multicommercial units and apartment buildings shall install a backflow assembly at the service connection.

(n) On any premises with a history of drug manufacturing activities. (Ord. 1439 § 5, 2007).

21.05.050 Installation requirements.

To ensure proper operation and accessibility of all backflow prevention assemblies, the following requirements shall apply to the installation of these assemblies.

(a) No part of the backflow prevention assembly shall be submerged in water or installed in a location subject to flooding. If installed in a vault or basement, adequate drainage and clearance shall be provided as per tested assembly specifications or as per subsection (f) of this section.

(b) Assemblies must be installed at the location specified in the inspection report by owner. Alternate locations must be approved in writing by the city of Fircrest public works department prior to installations.

(c) The assembly must be protected from freezing and other severe weather conditions.

(d) All backflow prevention assemblies to be installed shall be of a type and model pre-approved by the Washington State Board of Health and the city of Fircrest.

(e) Only assemblies specifically approved by the Washington State Board of Health for vertical installation may be installed vertically.

(f) The assembly shall be readily accessible with adequate room for maintenance and testing. Assemblies two inches and smaller shall have at least six inches clearance on all sides of the assembly. All assemblies larger than two inches shall have a minimum clearance of 12 inches on the back side, 24 inches on the test cock side, 12 inches below the assembly and 36 inches above the assembly.

(g) If written permission is granted to install the backflow assembly inside of the building, the assembly shall be readily accessible during regular working hours of 8:00 a.m. to 4:30 p.m., Monday through Friday.

(h) Upon completion of inspection by the city of Fircrest public works department or an authorized specialist employed by the city of Fircrest and where a backflow assembly is deemed

necessary, the type of assembly and installation plans shall be submitted to the city of Fircrest public works department for approval prior to installation.

(i) Upon completion of installation, the city of Fircrest public works department shall be notified and all assemblies must be inspected and tested by a state-certified tester. All backflow assemblies must be registered with the city of Fircrest public works department. Registration shall consist of date of installation, make, model, serial number of the backflow assembly, and initial test report. (Ord. 1439 § 6, 2007).

21.05.060 Access to premises.

Authorized employees of the city of Fircrest, with proper identification, shall have access during reasonable hours to all parts of a premises and within the building to which water is supplied. However, if any water user refuses access to a premises or to the interior of a structure at reasonable times and on reasonable notice for inspection by a cross-connection specialist appointed by the city of Fircrest, a reduced pressure principle assembly will be required to be installed at the service connection to the premises. (Ord. 1439 § 7, 2007).

21.05.070 Annual testing and repairs.

All backflow assemblies installed within the water service area served by the city of Fircrest shall be tested immediately upon installation and annually thereafter by a state-certified tester. All such assemblies found to be not functioning properly shall be promptly repaired or replaced by the water user. If any such assembly is not promptly repaired or replaced, the city of Fircrest may deny or discontinue water to the premises. All testing and repairs are the financial responsibility of the water user. Copies of the annual test results shall be provided to the director of public works. (Ord. 1439 § 8, 2007).

21.05.080 Costs of compliance.

All costs associated with purchase, installation, inspections, testing, replacement, maintenance, parts, and repairs of the backflow assembly are the financial responsibility of the property owner to which water is supplied. (Ord. 1439 § 9, 2007).

21.05.090 Termination of service.

Failure on the part of any water user to discontinue the use of all cross-connections and to physically separate cross-connections is sufficient cause for the immediate discontinuance of public water service to the premises (WAC 246-290-490). The city of Fircrest reserves the right to deny service or discontinue the supply of water to any water user not in compliance with this and all other applicable regulations pertaining to public water systems. (Ord. 1439 § 10, 2007).

21.05.100 Cross-connections a nuisance – Connections with other systems authorized when.

It is unlawful for any person to install or maintain a cross-connection between any private water supply within or adjacent to any premises and the public water supply system to the city. Any

such cross-connection or inter-connection now existing or hereafter installed is declared a nuisance and may be abated at once without notice by the director by disconnecting such cross-connections or by cutting off the supply of water from the city distribution system to the premises supplied. (Ord. 1439 § 11, 2007).

21.05.110 Director of public works interpretation authority.

The director of public works or his/her designee shall have the authority to decide any questions which may arise pertinent to the interpretation and/or the application of the regulations of this chapter. (Ord. 1439 § 12, 2007).

21.05.120 Violation – Penalty.

Any person, firm, or corporation willfully violating any of the provisions of this chapter shall be guilty of a misdemeanor, and on conviction thereof shall be punished as set forth in FMC 9.56.010. (Ord. 1439 § 13, 2007).

Chapter 21.06
WATER UTILITY CREDIT FOR LOW-INCOME SENIORS AND LOW-INCOME DISABLED PERSONS

21.06.010 Purpose.

The purpose of these regulations is to provide a credit to low-income seniors and low-income disabled persons on their water ready to serve charges. (Ord. 1619 § 3, 2018; Ord. 1589 § 5, 2016; Ord. 1493 § 1, 2010).

21.06.020 Applicability.

To city of Fircrest water customers living in one-family or individually billed two-family or multifamily units who have been certified eligible for a low-income senior or low-income disabled person discount by Tacoma Power; and:

(a) Are a single occupant or the head of a household or the spouse of the head of the household; and

(b) Reside in the dwelling unit; and

(c) Are billed or are the spouse of a person billed by the city of Fircrest for water service; and

(d) Customers who have been certified eligible by Tacoma Power for a low-income senior or low-income disabled person discount must provide the city of Fircrest evidence that they are receiving such a discount by Tacoma Power. The discounted rate will begin the first day of the current bimonthly billing cycle in which the aforementioned evidence is received by the city of Fircrest. If a customer closes the active account and establishes a new account, or if a customer has never

applied for the discount rate, then the customer must apply in accordance with the hereinabove criteria. (Ord. 1619 § 4, 2018; Ord. 1589 § 6, 2016; Ord. 1493 § 2, 2010).

21.06.030 Bimonthly rate.

Seventy-five percent of the bimonthly ready to serve charge calculated under FMC 21.04.030(a). (Ord. 1589 § 7, 2016; Ord. 1493 § 3, 2010).

21.06.040 Renewal.

During the month of January of each year, in order to continue to receive the water utility credit in the ensuing year, any person receiving a water utility credit from the city of Fircrest, as a low-income senior or a low-income disabled person, shall provide evidence to the city manager or his/her designee that they are still receiving a low-income senior or a low-income disabled person discount from Tacoma Power. (Ord. 1589 § 8, 2016; Ord. 1493 § 4, 2010).

21.06.050 City manager interpretation authority.

The city manager or his/her designee shall have the authority to decide any questions which may arise pertinent to the interpretation and/or the application of the regulations of this chapter. (Ord. 1493 § 5, 2010).

Chapter 21.08
SERVICE OUTSIDE CITY

21.08.010 Out-of-city service – Applicability.

The city will furnish water for use or consumption outside the corporate limits of the city when and as available. Each application for such service must be approved by the city council. Except as modified by this chapter, the provisions of this title shall be fully applicable to out-of-city service. The following special provisions and conditions shall be applicable to such service. (Ord. 279 § 24, 1955)

21.08.020 Application for service – Agreements.

Application for out-of-city service shall be in writing upon a form to be provided by the city. Application shall contain or be accompanied by, the appropriate service connection and processing fees, a description of the type of service desired, the location of the building or premises to be served, an agreement by the applicant to pay all charges and to abide by all existing and future ordinances, rules and regulations pertaining to the water utility, an agreement to assume full responsibility for the maintenance and repair of all pipes and appurtenances beyond the corporate limits of the city, and an agreement to hold the city harmless for any damage or injury caused to any person or property because of the existence, maintenance or operation of any pipe or pipeline outside the city. The applicant must also furnish to the satisfaction of the city proof that he has an easement or right-of-way for any pipelines to be laid outside the city. (Ord. 279 § 24(a), 1955)

21.08.030 Application with consent of other municipal corporation.

If the service requested is for property located within a municipal corporation operating a water utility, such application must be accompanied by the written consent of such other municipal corporation that the city may furnish water to such applicant. (Ord. 279 § 24(b), 1955)

21.08.040 Service connection fees – Process fees.

A service connection fee of $1,200 on an unpaved street and $1,200 plus $12.00 per square foot for patching the street on a paved street shall be charged for out-of-city service and a processing fee of $50.00 shall be charged for the processing of each application. In the event service is refused to any applicant, the city shall refund the service connection fee, but shall retain the process fee as its compensation for processing the application. In the event service is to be metered, or in the event the connection is larger than the standard three-quarter-inch size, the applicant shall pay the cost of a suitable meter or the extra cost of the larger connection fee as the case may be, in addition to the basic connection fee. (Ord. 961 § 6, 1990; Ord. 385, 1960; Ord. 279 § 24(c), 1955).

21.08.050 Limited responsibility of city.

In the event any application for out-of-city service is approved by the council, the obligation of the city will be to furnish water from the nearest available point of its water distribution system. The city shall not own or be in any way responsible for the maintenance or repair of any pipe, pipeline or appurtenances thereof outside the city. (Ord. 279 § 24(d), 1955).

21.08.060 Applicant's responsibility to point of connection.

It shall be the responsibility of the applicant to bring the pipeline through which his premises are to be served to the point of connection with the city's distribution system at his own expense; and he shall furnish, in addition to the pipeline, a suitable shut-off valve on said line at a convenient point to be designated by the city. In the event the applicant elects to construct such pipeline himself, the work shall be done to the satisfaction of the city. If the applicant so elects, the city will install such pipeline with its own labor and will charge the applicant the actual cost thereof, plus 15 percent, which shall be estimated and paid in advance as near as may be. In any event, all connections to or disconnections from the distribution system of the city shall be made only by the city in the manner provided in FMC 21.04.180. (Ord. 279 § 24(e), 1955).

21.08.070 Repair of streets charged to applicant.

In the event any streets, sidewalks, or curbing are broken during the installation of out-of-city service, the city shall repair the same and shall charge the applicant the actual cost thereof, plus 15 percent, which shall be estimated and paid in advance as near as may be. (Ord. 279 § 24(f), 1955).

21.08.080 Agreement.

A written agreement shall be executed by the city and the applicant to cover all out-of-city service which may be approved or allowed subsequent to November 22, 1955. Except as specified above, out-of-city service shall be furnished on the same basis as service within the city and shall be governed by the provisions of this and other applicable ordinances. (Ord. 279 § 24(h), 1955).

21.08.090 Connection violation.

It shall be a violation of this title giving the city the right to shut off service without notice, for any consumer to make or cause to be made or permit to be made any connection to any pipe or pipeline under his control outside the corporate limits of the city where the effect thereof would be that some other person other than the applicant might receive water service through such connection. (Ord. 365, 1959; Ord. 279 § 24(g), 1955).

Chapter 21.12
UNDERGROUND SPRINKLING SYSTEMS

21.12.010 Installation requirements.

Underground sprinkling systems may be installed within the city subject to the following requirements:

(a) A permit for such installation shall be first obtained from the water department of the city and the proposed system shall be subject to inspection and approval by such water department prior to installation;

(b) The fee for such permit shall be such sum as required by the plumbing code; provided, that if the permit is obtained at the same time as the general building permit, no additional fee shall be charged for the sprinkling system;

(c) All underground sprinkling systems shall have a separate shut-off valve installed upon city property, accessible to the city crew without going upon private property;

(d) Such underground sprinkling system shall be equipped with a backwater valve to prevent water from backing up from the sprinkling system and contaminating the public water system. (Ord. 577 § 1, 1967)

21.12.020 Metered where.

Where the lot size exceeds 13,000 square feet or where multiple-family dwellings exist on a single lot, the underground sprinkling system shall be metered, the meter size to be determined by the city water department based upon the requirements for such lot. Metered charges will be made during the months of May through September at the applicable commercial rates for water. There shall be no charge for the remaining months, nor shall there be any charge for sprinkling systems on lots under 13,000 square feet. (Ord. 577 § 2, 1967).

Chapter 21.16
PRIVATE WELLS

21.16.010 Private wells prohibited.

No person shall hereafter drill and install, or cause to be drilled, a private water well, as defined in Chapter 173-160 WAC, within the city of Fircrest except as allowed by Chapter 173-160 WAC. (Ord. 1032 § 1, 1993).

21.16.020 Exceptions.

This chapter shall not apply to the installation, digging or drilling of a water well by a municipal corporation within its own corporate borders. (Ord. 1032 § 1, 1993).

21.16.030 Violations.

Any person, firm or corporation violating any provision of this chapter shall be guilty of a misdemeanor. Such person, firm or corporation shall be deemed guilty of a separate offense for each and every day during any portion of which any violation of this chapter is committed, continued or permitted by such person, firm or corporation and shall be punished by a fine not to exceed $1,000, and each day such violation continues shall constitute a separate and distinct offense. (Ord. 1032 § 1, 1993).

AGENCY REVIEW COMMENTS

TO BE ADDED WHEN AVAILABLE

PUBLIC MEETING DOCUMENTATION

TO BE ADDED WHEN AVAILABLE