City of Fircrest

COMPREHENSIVE WATER SYSTEM PLAN

2014-2033

Prepared for:

City of Fircrest
115 Ramsdell Street
Fircrest, WA 98466-6999

Prepared by:

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Prepared on: September, 2013 - February, 2014

Revised on:

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Engineer's Certification

I hereby certify that this Comprehensive Water System Plan for:

The City of Fircrest

was prepared by me or by someone under my direct supervision and meets or exceeds the minimum requirements for such plans as defined under WAC 246.290.100.

_____
Trent J. Lougheed, P.E.
City Engineer

_____
Date

Plan Authors:

_____
Trent J. Lougheed, P.E.
City Engineer

_____
Charlie Severs, F.E.

CHAPTER ONE (Description of the Water System)

A. Ownership and Management

The City of Fircrest is a public agency located in Pierce County, Washington. The City is governed by a mayor and six Council members elected by the City residents. The mayor and Council members for 2014 are listed below:

- Mr. David Viafore, Mayor
- Mr. Matthew Jolibois, Mayor Pro Tem
- Ms. Shannon Reynolds, Council Member
- Mr. David Goodsell, Council Member
- Mr. Hunter George, Council Member
- Mr. Denny Waltier, Council Member
- Mr. Jason Medley, Council Member

The duties of the Council in regards to the Fircrest Water System are to approve the budget and fees proposed by the Public Works Department. The Public Works Department is responsible for maintenance and operation of the water system.

The Council meets twice a month. These meetings are open to the public. At the meetings, all City governmental matters that require Council approval are discussed.

The water system manager handles the day-to-day activities of the water system and reports to the Director of Public Works and the City Engineer. All matters that require City Council approval are then brought to the Council by the Director of Public Works for consideration. The manager notifies the Director of Public Works of any upcoming expenses and assists in planning the budget for the coming year. The system manager, Mr. Jeff Davis (WDM II/WDS II), has been managing the system for the past thirty two (32) years. Mr. Davis currently holds WDM II/WDS II Certificate #3443.

The City of Fircrest Public Works office is located at 115 Ramsdell Street, Fircrest, WA 98466. The Public Works business hours are:

7:00 AM to 3:30 PM, Monday through Friday from May through September
8:00 AM to 4:30 PM, Monday through Friday from October through April

The City of Fircrest Public Works Department office phone number is (253) 564-8900 and the fax number is (253) 564-3640.

B. System History and Background

The City of Fircrest owns and operates the water system serving the customers within the city limits and within a larger urban area of Tacoma and Pierce County immediately surrounding the City. The City of Fircrest provides water service to all the customers within the city limits and to a limited number of customers in the immediately adjacent vicinity.

The existing water system was originally developed by the Regents Park Investment Company and the City assumed ownership in 1926. Over the years, the City has continued to upgrade and replace original water system facilities. The water system has the overall appearance of providing a reasonable good degree of reliability and is efficiently operated and maintained.

The City relies on existing groundwater wells to provide 100 percent of the water resource required to serve the City. The existing distribution system facilities are served by three pressure zones divided into three subsystems. The water system includes a total storage capacity of 1.8 million gallons via three existing reservoirs. Individual service meters are installed. Based on the information presented later in this plan, it appears that the City's current source of supply facilities is of sufficient capacity to meet the existing and future water system demands through the end of the planning period.

In summary, the water system currently appears to be well maintained and operated, but is in need of a variety of capital improvements to benefit existing and future customers. This water system plan addresses the need for improvements to further correct remaining system deficiencies, as well as provide for anticipated growth in the City. The plan provides a recommended list of capital improvements along with a recommended schedule and estimated cost for their completion. All recommendations made within the water system plan are consistent with the requirements of the Federal Safe Drinking Water Act, and the rules and regulations of the State of Washington Board of Health regarding public water supplies.

C. Inventory of Existing Facilities

The water system described in this report has been assigned an identification number by the Washington State Department of Health. That number is: #25150T. The existing system and system characteristics are as follows:

- Fircrest Water System

  Water System ID #25150T
  2,673 residential connections (including apartment and duplex units)
  72 commercial connections (including parks and government buildings)

The City of Fircrest utilizes groundwater as its primary source of water supply. The Fircrest water supply system includes wells FW-4, FW-5 (emergency source), FW-6, FW-7, FW-8 and FW-9. Fircrest 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.

The Fircrest service area is divided into three different pressure zones due to the elevation of its reservoirs. The high pressure zone includes the high subsystem and the Fircrest golf course subsystem. The low pressure zone includes an area referred to as the low subsystem. The third pressure zone is the identified as the Weathervane pressure zone that is served by a booster station at the south end of the City. The high subsystem and the golf course subsystem are hydraulically compatible and can perform as one pressure zone if all valves are open between the two subsystems. The two subsystems generally operate together during high demand periods.

Table 1.1: Water System Inventory

Source Number	Source Capacity (gpm)
Well #4	550
Well #5	1,050
Well #6	300
Well #7	500
Well #8	600
Well #9	1,250
Reservoir	Reservoir Capacity (gal)
High Tank	200,000
Low Tank	1,000,000
Golf Course Tank	600,000
Pipe Size	Length of Pipe (LF)
2 inch	6,085
3 inch	1,385
4 inch	59,550
6 inch	45,620
8 inch	40,560
12 inch	38,205
16 inch	8,720

The low subsystem is supplemented by three existing pressure reducing stations during periods of high demand. The pressure reducing stations feed from the golf course and high subsystems. Contributions of the water supply system wells are divided among the various subsystems. FW-4 typically contributes to the low subsystem. However, valves near the well enable the flow from the well to be diverted to the high subsystem as well. FW-5 has been designated as an emergency source and contributes flow to the high subsystem, but can also be diverted to the low subsystem. FW-6, FW-7, FW-8 and FW-9 contribute to the golf course and high subsystems only. However, when water demands are high, the water from the high reservoir is diverted to the low reservoir to provide any additional source required for the low system. All wells utilized by the City of Fircrest are connected to the pipe distributed network. Information on the existing active water supply wells, reservoirs, and distribution system is presented in Table 1. 1.

Water reservoirs included in the Fircrest Water System currently consists of the high, low and golf course storage tanks. The high tank has a capacity of 200,000 gallons and the golf course tank has a capacity of 600,000 gallons. Both tanks have overflow elevations of approximately 470 feet. The low tank has a capacity of 1,000,000 gallons an overflow elevation of approximately 425 feet.

As previously mentioned, the existing water supply system also includes three pressure reducing stations. The stations are equipped with pressure reducing valves to regulate the system pressure in accordance with usage demands (fire flow versus domestic flows).

A booster pump facility is also included in the system. The facility is equipped with two 7.5 horsepower pumps and two 25 horsepower pumps. The pumps operate in parallel with one pump engaged during periods of lower demand and additional pumps engaged during high demand and fire flow type demand.

Distribution and transmission lines maintained by the City of Fircrest include more than 28 miles of piping. Pipe sizing in the system ranges from 2 to 16 inches in diameter.

The City of Fircrest does not have accurate information on the types of materials used in their piping system. However, most pipes within the system are believed to be asbestos cement. Recently installed piping is made of polyvinyl chloride (PVC) or Ductile Iron.

The City of Fircrest utilizes a well and reservoir telemetry and control system. The system is integrated between each of the wells and appropriate reservoirs. The telemetric control panels are located at the Fircrest Public Works Building. This telemetry (SCADA) system was replaced in 2009.

1. Pressure zones

Currently, the distribution system for the Fircrest Water System contains multiple pressure zones as described above. System pressures vary throughout the distribution networks with the average static pressure being at 58 psi (a complete fire flow map for the Fircrest Water System distribution network is provided in Appendix B of this plan). A breakdown of all subsystem pressure zones within the water system are as follows:

High Tank Pressure Zone	51 psi to 83 psi
Low Tank Pressure Zone	39 psi to 93 psi
Golf Course Pressure Zone	39 psi to 88 psi
Weathervane Booster Station Pressure Zone	48 psi to 71 psi

2. Adjacent water utilities

The City of Fircrest Water System service area boundary is surrounded by adjacent water systems operated by other municipal jurisdictions. The areas to the west and south of the City of Fircrest service area are served by the City of University Place, which are served by the City of Tacoma water system. The areas to the north and east are served by the City of Tacoma.

There is one emergency intertie within the Fircrest Water System to the City of Tacoma. This intertie consists of a spool-gap between the two water systems at the intersection of Orchard Street and South 25th Street on the northeast portion of the system in the proximity of the reservoirs. In the case of an emergency, the gap is filled with a source-type meter facing in the direction of the flow. This connection is conducted manually, and is not an automatic transfer. The water system receiving water then compensates the supplying system based on usage. There are no other emergency interties for the Fircrest Water System.

D. Related Plans

The only plan specifically related to this comprehensive water system plan is the Wellhead Protection Plan for this system, which was completed by Dames & Moore. Local documents that discuss water systems include the Pierce County Countywide Planning Policies (2005), the Pierce County Coordinated Water System Plan and Regional Supplement (2001) and the City of Fircrest Comprehensive Plan (2013). This Water System Plan is believed to be consistent with all three of these municipal plans.

E. Service Area Characteristics

The City of Fircrest consists of multiple plats and subdivisions. Fircrest is located in Pierce County, Washington and lies between the City of Tacoma and University Place above the southern portion of The Narrows in Puget Sound. The service area for the City of Fircrest Water System is as depicted on the 6-year/20-year Service Area Map provided in Appendix A of this plan.

The existing topography within the service area varies from gently sloping to steep hillsides. The boundary of the service area is limited by the ownership and topography. All areas surrounding the Fircrest Water System is served by the City of Tacoma, Tacoma Water System. Extending the service area is not an option because the entire area surrounding the City of Fircrest is served by Tacoma Water. Policies regarding service area boundaries and extensions to the water system have been discussed and articulated by water system management and the City Council.

A map is included under Appendix A "Service Area Maps". This map shows the service area for the Fircrest Water System. The existing, retail, and future service areas all have the exact same boundaries. The Fircrest Service Area is completely surrounded by the Tacoma Water Service Area; therefore expansion of this system's boundary is restricted. This map also shows the corporate city limits of Fircrest.

F. Service Area Policies

The City of Fircrest owns and operates the Fircrest Water System. Listed below are the policies of the City of Fircrest.

1. Satellite Service Policy:

   It is the current policy of the City of Fircrest to not provide management services to any water system that it does not own. If the City of Fircrest chooses to provide satellite management services in the future, the policies will be in harmony with the new satellite management program developed by the Washington State Department of Health. The City of Fircrest currently has no satellite water systems.

2. Wholesale customer list:

   The City of Fircrest has no wholesale customer list, and will not consider providing water to other utilities on a wholesale basis.

3. Wheeling Policy:

   The City of Fircrest is not currently, nor will they consider, wheeling water to any other water systems.

4. Annexation Policy:

   Annexation does not apply to the City of Fircrest.

5. Direct Connection and Remote System Policy:

   The City of Fircrest will have all new developments within their service area directly connected to the existing water system.

6. Design and Performance Standards Policy:

   All new development, direct line connections, and remote satellite systems will be required to meet the City of Fircrest's minimum design, construction and performance standards identified in Chapter Seven of this comprehensive water system plan.

7. Surcharge for Outside Customers:

   The City of Fircrest currently has a $12.50 surcharge for any customers that are not located within the Fircrest city limits.

8. Formation of Local Improvement Districts Outside Legal Boundaries:

   The City of Fircrest is not currently a Public Utility District (P.U.D.), therefore, by State law, can not create a Local Government Improvement District outside the City's legal boundaries.

9. Urban Growth Areas:

   The City of Fircrest service area boarders other jurisdictional water systems on all sides. Therefore, the City of Fircrest does not have a UGA designated boundary. The City of Fircrest will proactively plan and finance facilities in anticipation of growth while requiring new developments to pay for extensions and a fair share of the existing facilities that they will benefit from through hook up (or general facility) fees.

10. Latecomer Agreements:

    The City of Fircrest will allow latecomer agreements to only those applicants who propose to extend the water system in such a manner as not to adversely affect the

existing system. The latecomer agreement and process will be as provided by State law. The use of latecomer agreements by the City of Fircrest will allow for the equitability in the financing of system improvements and will positively affect (e.g., encourage) system expansion. State law allows for reimbursable work agreements (e.g., latecomer agreements) for a term not to exceed 15 years. Provisions for reimbursing the developer for an applicable extension will be completed as mutually agreeable to the developer and the City of Fircrest, and will be included in the conditions of service for the specific development.

11. Oversizing Policy:

All extensions of the City of Fircrest Water System will be completed in compliance with the material and construction standards provided for in Chapter Seven of the water system plan. This chapter provides for minimum pipe and other facility sizes that are designed to provide minimum fire flow in addition to the domestic service requirements. Should the extension of facilities include the necessity of "oversizing" to provide for service to future developments, the City of Fircrest will require this "oversizing" to be done by the developer with equitable reimbursement provided through a latecomer agreement or other mutually acceptable mechanism.

12. Cross-Connection Control Program:

The purpose of this policy is to protect the water supplies of the City 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 the City 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.

It shall be the responsibility of the City of Fircrest to protect the potable water system from contamination or pollution due to cross-connections.

Water service to any premises shall be contingent upon the customer providing cross-connection control in a manner approved by the City of Fircrest. Backflow devices required to be installed shall be a model listed in the USC Foundation for Cross-Connection Control and Hydraulic Research listing. All models listed in this listing are considered approved by the Washington State 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.

A complete cross-connection control program is available for review in Appendix F of this comprehensive water system plan.

13. Extension Policy:

The City of Fircrest will consider extensions of the existing water system if all costs associated with the extension and system upgrade requirements are paid by the collective group requesting the system extension. The City of Fircrest will require that all extensions will provide for the materials and construction standards established in Chapter Seven of the water system plan. Specific issues such as payment requirements and other issues involved with the conditions of service by the City of Fircrest will be provided by the City of Fircrest on a case-by-case basis.

14. Policies to Assume Ownership of an Existing Water System:

The City of Fircrest will not assume ownership of any existing water systems.

15. Policies to Assume Management of an Existing Water System:

The City of Fircrest must own any system that it operates. The City of Fircrest will not consider management of any system that it does not own.

16. Policies for Request for Water Service to New Development:

- Only development within the City of Fircrest boundaries will be considered for water service.

- Developer must submit a written request for water service and identifying the scope of the proposed project. The request will include the number of connections, size of the development, fire flow or sprinkler requirements, and any other engineering or financial information deemed necessary by the City of Fircrest.

- Developer will enter into a contract with the City of Fircrest to provide water service to the development before the City of Fircrest starts any work on the water system. Nothing in the contract will be out of accord with the City of Fircrest.

- Developer will be responsible for all development costs including engineering costs and the City of Fircrest will be in charge of conducting all water system construction inspections.

17. Policies for Water Fees:

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

Pavement Potholing: $25/sf pavement restoration

	Meter Size	Meter Eq.	GFC	Connection Fee
	5/8”	1.0	$4,000	$1,800
General Facilities	1”	2.5	$6,800	$1,870
Charge &	1.5”	5.0	$12,977	$2,050
Connection Fees	2”	8.0	$21,200	$2,575
	3”	16.0	$40,000	125% labor & Materials
	4”	25.0	$66,665	125% labor & Materials

All users will pay the monthly flat rate fee whether water is used or not. Once a water service is provided to a particular location, the water service will continue until the service is physically removed from the system.

18. Policies on Condition of Service within the Existing Service Area:

All fees shall be paid and kept current on all accounts or other arrangements made with the City of Fircrest for service to continue.

19. Interlocal Agreements:

Currently, the City of Fircrest has an interlocal agreement to provide water to the City of Tacoma Fire Department by means of fire hydrants. A copy of the interlocal agreement between the City of Fircrest and the City of Tacoma Fire Department is included in Appendix D stating water will be provided to the City of Tacoma Fire Department at no cost for purposes common of fire department use, has been provided.

20. Other Water Supply Agreements:

Aside from infrequent request for bulk amounts of water from area contractors, no formal supply agreements exist between the City of Fircrest and other water users.

CHAPTER TWO (Basic Planning Data)

A. Consistency Determinations

This comprehensive water system plan is consistent with the neighboring jurisdictions providing water to the surrounding area.

B. Population, Number of Service Connections, and ERUs

As with all existing water systems of any size, the daily number of service connections varies somewhat depending on the time of year. Currently, the Fircrest Water System has 2,739 single-family, apartment, and duplex residential service connections and 56 commercial service connections. The figures are based on the monthly water billings and data provided by the Fircrest Planning Department.

The estimated full-time population for the City of Fircrest was 6,080 people in 2012. This population is based from data obtained from the City of Fircrest Planning Department, and includes only full-time residents within the city limits. The correlation between population and water customers is not direct, so the equivalent residential units (ERUs) is estimated to be 3,790 based on the number and type of residential connections (1 ERU per single family home, apartment unit, and duplex unit) and the past consumption data of the existing non-residential customers (1 ERU per non-residential connection based on an ADD of 172 gallons per connection – multiplied by 2 for a MDD of 344 gallons per connection) that are connected to the water system.

Table 2.1: Determination of ERUs from 2012 Water Consumption Data

Customer Category	Consumption (gallons)	Total Number of Connections	Average Day Demand (gallons)	Number of ERUs
Single Family & Multi Family	171,986,346	2,739	172	2,739
Commercial	40,851,152	56	-	649
Public / City of Fircrest	7,985,738	-	-	126
Unaccounted / Distribution System Leakage	49,458,764	-	-	276
				3,790

C. Water Use and Data Reporting

The majority of future growth of water system customers will come from development of the few infill lots remaining in the City, the development of a potential plat of the now vacant parcel, and re-development of a vacant commercial property. It is anticipated that the existing land use in and around Fircrest will remain residential with isolated areas of commercial development.

The City of 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 local fire department with water for fighting fires. Actual water use is for drinking, bathing, washing, cooking and irrigation.

The larger commercial water users within the Fircrest Water System are TAPCO Credit Union, Whittier School, Whittier Park Irrigation, Fircrest Park Irrigation and the Fircrest Golf Course. The primary water use for TAPCO Credit Union, Whittier Park and Fircrest Park is for irrigation purposes. Whittier School water uses include irrigation, food preparation, cleaning, showers and other activities relating to a public school. The Fircrest Golf Course (private golf club) has their own water system for irrigation, but they do obtain potable water from the Fircrest Water System that is used for the clubhouse (showers, restaurant and bathrooms), swimming pool, maintenance facilities and pro shop.

Historical water use data, including source and service meter data from 2009 to 2013, has been provided as Attachment B in Appendix C (Conservation Plan). Comparing the water useage in 2009 (238,413,466 gallons) to 2013 (213,954,060 gallons), the water system has reduced the demand by approximately 11.4%.

D. Current and Future Land Use

Based on past population trends (growth patterns) between 2008 and 2013, as well as projected figures from the City of Fircrest Planning Department of known upcoming development, the City of Fircrest is projecting an average population growth rate of 0.20% over the life of this comprehensive water system plan update.

Table 2.2 shows equivalent residential connection (ERU) projections for the twenty-year planning period from 2014 to 2033.

Table 2.3 provides the historical connection data for the City of Fircrest Water System. This information was provided by the City of Fircrest.

Current land uses are residential and commercial in nature. However, some multi-family housing currently exists within the service area. Commercial and multi-family uses are not expected to increase significantly in the City of Fircrest over the next twenty years. However, some additional commercial and multi-family uses have been compensated for in the ERU projections listed below.

Table 2.2: Fircrest Equivalent Residential Unit Estimates

Year	Total ERUs/ % Change	Peak Hourly Demand (GPM)	Peak Hourly Demand w/ WUE Goals (-0.2%) (GPM)
2014	3,790 / 0.20%	1,520	1,517
2015	3,798 / 0.20%	1,523	1,520
2016	3,805 / 0.20%	1,526	1,523
2017	3,813 / 0.20%	1,529	1,526
2018	3,820 / 0.20%	1,532	1,539
2019	3,828 / 0.20%	1,535	1,532
2020	3,836/ 0.20%	1,538	1,535
2021	3,843 / 0.20%	1,541	1,538
2022	3,851 / 0.20%	1,544	1,541
2023	3,859 / 0.20%	1,547	1,544

2024	3,866 / 0.20%	1,549	1,546
2025	3,874 / 0.20%	1,552	1,549
2026	3,882 / 0.20%	1,556	1,553
2027	3,890 / 0.20%	1,559	1,556
2028	3,898 / 0.20%	1,562	1,559
2029	3,905 / 0.20%	1,564	1,561
2030	3,913 / 0.20%	1,567	1,564
2031	3,921 / 0.20%	1,570	1,567
2032	3,929 / 0.20%	1,574	1,571
2033	3,937 / 0.20%	1,577	1,574

Table 2.3: Historical Connection Data for the City of Fircrest

Year	New Connections	Total Connections
2011	-	2,795
2012	0	2,795
2013	0	2,795

E. Total Water Loss

Table 2.4 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 previous percentages (prior to 2013) exceed the maximum desired amount; however, the large numbers are "explainable". Leak detection of the system was conducted in 2011, and all major leaks have been repaired. The remaining known leaks (valves and hydrants) are scheduled to be repaired this year (2014).

Table 2.4: Water Loss

Year	Water Loss (%)
2009	10.2
2010	22.7
2011	26.4
2012	18.3
2013	7.5

F. Production and Consumption Totals

Production and consumption totals are in the data tables located in Appendix C, Attachment B (Conservation Program).

G. Annual Usage

Annual Usage totals are in the data tables located in Appendix C, Attachment B (Conservation Program).

CHAPTER THREE (System Analysis)

A. System Design Standards

The City of Fircrest uses Washington State Department of Health design standards, Washington State Department of Transportation Standards Specifications, and the standards listed in Chapter 7 for the any improvements project designed and constructed within the Fircrest Water System.

B. Water Quality Analysis

This system is not being treated for poor water quality. Currently, all wellhouses are equipped with fluoride injection systems. The fluoride is injected immediately after the well casing for each well. The injection system is automatically called on when the well pump is called on, and similarly is called off when the well pump shuts off, which allows the chemical injection to be flow-proportional. The injection pump can be manually adjusted to inject more or less solution into the water supply in the case the well production is modified or to meet the target residual concentrations within the water system. The objective of the fluoride treatment is to provide the water system with an injection rate at each supply source which results in a residual fluoride concentration of 0.8 to 1.3 mg/l. The water system is tested weekly for fluoride, and the injection pumps are adjusted as needed to achieve the proper concentrations. In analyzing the results from 2013, it is apparent that the injection concentration for the system (on average) would be on the lower end of the range, but the residual concentrations within the system are still typically 0.5 to 1.0 mg/l. The results are then sent to the Washington State Department of Health.

Currently, the Fircrest Water System is in compliance with the Safe Drinking Water Act. As shown in the IOC Section of Appendix H, all Fircrest test results indicate <0.01 mg/l (<10 ppb), which meets this requirement. Any additional pending regulations will be addressed upon the passing of the regulation in future comprehensive water system plan updates. At this time, it does not appear that any pending regulations would have a significant impact on the Fircrest Water System.

The Fircrest Water System meets all Washington State Department of Health standards. The most recent results of all required water quality testing is located in Appendix H.

C. System Inventory

The water system inventory is located in Table 3.1.

D. Capacity Analysis

A complete system analysis (including a “Source of Supply Analysis” and distribution system “Hydraulic Analysis” for the Fircrest Water System) appears in Appendix D of this plan. The “Source of Supply Analysis” and distribution system “Hydraulic Analysis” is based on the best information available at this time. If and when other information becomes available, the analyses will be updated and submitted to the Washington State Department of Health for review.

Currently, the City of Fircrest Water System 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 (see documentation in Appendix D). The "Source of Supply Analysis" provided (see Appendix D) indicates that the system is currently capable of serving the estimated maximum buildout connections (ERUs) based on Washington State Department of Health Design Manual standards; the number of ERUs to reach maximum buildout was estimated to be 3,790 ERUs. 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) connection count is estimated to be 3,828 ERUs based on data provided in Chapter Two (Basic Planning Data).

Table 3.1: Water System Inventory

Source Number	Source Capacity (gpm)
Well #4	550
Well #5	1,050
Well #6	300
Well #7	500
Well #8	600
Well #9	1,250
Reservoir	Reservoir Capacity (gal)
High Tank	200,000
Low Tank	1,000,000
Golf Course Tank	600,000
Pipe Size	Length of Pipe (LF)
2 inch	6,085
3 inch	1,385
4 inch	59,550
6 inch	45,620
8 inch	40,560
12 inch	38,205
16 inch	8,720

Another objective of this planning effort was to establish a distribution system hydraulic model for the Fircrest Water System (see Appendix D). 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 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 approaches the overflow elevations, a signal is sent to the well pumps to turn off.

As shown on the hydraulic model base map in Appendix D, the system is comprised of multiple pressure zones. 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. In 2008, the high zone and golf course zone were consolidated and are now referred to as the "high zone." 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 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 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 Daniels 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 has been consolidated with the high reservoir subsystem, and is isolated from the low subsystem by a series of "normally closed" gate valves and two pressure reducing valves.

The next pressure zone in the southwest corner of the service area boundary is part of the high/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).

Fire Flow requirements

Complete fire flow maps for the Fircrest service area are provided in Appendix B of this plan. Currently, the water system is able to meet the fire flow requirements throughout most of the water system for single-family residential and commercial areas.

Attached in Appendix B (Fire Flow) is a copy of the City of Fircrest Zoning Map. The Tacoma Fire Department serves the City of Fircrest, and has set fire flow requirements of 1,000 gpm for residential areas and 2,500 gpm for the commercial areas within the Fircrest Water System service area. The highlighted areas are those in which the water system is unable to meet these requirements while maintaining 20 psi residual pressure throughout the water system (as identified in the hydraulic analyses).

E. Summary of System Deficiencies

Some small localized areas have been identified where fire flows currently cannot be achieved, and distribution system improvements have been identified in Chapter Eight of this plan to provide fire flows for some of these areas.

F. Analysis of Possible Improvement Projects

The City intends to recoat the exterior of the High Tank reservoir, and install soft starts and fluoride monitors on each source. All other improvements proposed in Chapter Eight are watermain projects that will provide fire flow to areas that are currently deficient, while replacing old AC watermain.

CHAPTER FOUR (Water Use Efficiency and Source of Supply Analysis)

A. Water Efficiency Program (per WAC 246-290-810)

The City of Fircrest is required to develop and manage a conservation program per WAC 246-290-100 and WAC 246-290-810. It is anticipated that water conservation will become increasingly 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. A complete water conservation program is located in Appendix C of this water system plan.

B. Source and Service Meters

All sources and services within the water system are currently metered. Currently, the service meters are read every other month, and source meters are read monthly. The new SCADA system is capable of source meter readings at any desired interval.

C. Water Rights Self Assessment

The current wells and water rights are under the ownership of the City of Fircrest. Table 4.1 provides water right information for the Fircrest Water System. Copies of the City of Fircrest "Certificates of Water Right" are located in the individual well information of this comprehensive water plan. Additionally, a Water Right Self Assessment Form (Form 2-1a) is provided in Appendix C.

Table 4.1: Water Rights for the Fircrest Water System

Certificate	Primary ac. ft.	Supplemental ac. ft.	Priority Date
876-D	157	0	4/9/1940
877-D	315	0	6/1941
1322-A	123	0	5/8/1950
G2-00862C	65	0	1/20/1971
G2-00863C	200	0	1/20/1971
3150-A	193	595	4/17/1958
4449-A	337	788	5/22/1962
5374-A	0	800	3/8/1965
G2-00024C (9976)	546	0	1/6/1969
	1,936	2,183	

D. Interties

The Fircrest Water System currently has one emergency intertie with the City of Tacoma. This intertie is strictly for emergencies, and can only be used by installing a meter in a flanged gap in a vault in the direction of intended flow and opening two gate valves.

E. Reclaimed Water Opportunities

The City of Fircrest does not provide reclaimed water, and does not intend to provide for reclaimed water at this time. Reclamation is not possible at this time, because the City of Tacoma has not developed a reclaimed water system for the City of Fircrest to connect to. Additionally, the City of Fircrest does not own and/or operate a water treatment facility.

CHAPTER FIVE (Source Water Protection)

A complete Wellhead Protection Plan was prepared by Dames & Moore and submitted to the Northwest Drinking Water Division of the Washington State Department of Health in June of 1998. Per the direction of the Northwest Drinking Water Division, the existing Wellhead Protection Plan 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.

CHAPTER SIX (Operation and Maintenance Program)

A. Water System Management and Personnel

The following is a list of key City of Fircrest operations personnel along with a brief description of their respective duties:

1. Mr. Jeff Davis – Water System Manager II – (253) 564-8900

The following is a list of current subcontractors for the water system:

1. Jerome W. Morrissette and Associates, Inc. – Trent J. Lougheed, P.E. – (360) 352-9456

The following is a list of technical support services that the City of Fircrest utilizes:

1. Washington State Department of Health staff
2. JWM&A staff

B. Operator Certification

Jeffrey P. Davis	003443	CCS, WDM 2, WDS
James M. Marzano	004790	WDM 1, WDS
Tom J. Marzano	005687	WDM 1, WDS
Norman R. Parsons, Jr.	003744	CCS, WDM 2, WDS

C. Routine Operating Procedures

Routine Procedures

The routine operating procedures for the City of Fircrest are listed in Table 6.1 according to the frequency of maintenance. It is the responsibility of the water system manager to insure that the operation and maintenance of the water system is completed as described in this section. Items not listed in Table 6.l, such as valve and well pump maintenance, are conducted on an as-needed basis. Records of maintenance on equipment generally include only receipts for items purchased to repair equipment.

Reservoir inspections are conducted every five years. The high reservoir was last inspected in 2009, the low reservoir in 2012, and the golf course reservoir in 2012.

D. Water Quality Sampling Procedures

The water system shall be tested for water quality as shown in Appendix H and as described below.

Table 6.1: Routine Operating Procedures for the Fircrest Water System

ACTIVITY
DAILY
• Respond to customer questions and comments
• As necessary system repairs, new construction
• Water system locates as necessary
• Fluoride residual sampling/testing
WEEKLY
• Monitor water use for the City of Fircrest boundary area
• Inspect pump house to read meter and insure system is operating properly
MONTHLY
• Bacteria coliform samples collected
• Flush distribution lines
• Customer billing (bi-monthly) and payments posted to their accounts
ANNUALLY
• Field inspect all water systems, check for leaks, determine if backflow devices are required
• Chemical water samples collected as required
• Distribute conservation information to customers
• Exercise system valves and fire hydrants
• Required WSDOH reporting

1. Bacteriological Monitoring

The water sampling for bacterial contamination is found in the Coliform Monitoring Plan. The plan identifies dates and sampling locations for collection of bacteria water samples. Also included with the plan is a copy of a flyer developed by the Washington State Department of Health that could be given to customers to answer questions about coliform bacteria testing.

In the event that a bacteria water sample is found to contain coliform bacteria, a minimum of four repeat water samples will be required within 24 hours from when the coliform bacteria was detected in the water. Contact the Washington State Department of Health if this cannot be accomplished, especially after fecal/E. coli detection. For each positive bacteria sample collected, the four repeat samples will be collected at these locations:

- At the same location as the previous coliform presence sample was collected.
- At a site within five "active" service connections down-line from the previously mentioned coliform presence location.
- At a site within five "active" service connections up-line from the previously mentioned coliform presence location.
- At the reservoir and well sites.

During the following month, a total of five water samples must be collected. These follow-up samples include: the location for the routine monthly sample normally collected; the other four samples should be collected at: two near the site(s) showing coliform presence the previous month, one at the well, and one out in another part of the distribution system.

a. Coliform Maximum Contaminant Levels: There are two types of MCL violations: acute and nonacute. The type of violation is determined by the number of positive coliform bacteria samples collected and/or the type of coliform bacteria (coliform, fecal coliform or E. coli).

- Nonacute Coliform MCL: The Fircrest Water System collects seven bacteria samples each month, the nonacute coliform MCL will occur when two or more samples, including all ROUTINE and REPEAT samples, show a coliform presence. The nonacute MCL is based on a monthly sample result. Therefore, only one nonacute MCL violation can occur each month. Once a nonacute MCL violation has been determined in any month, it is the responsibility of the City of Fircrest to notify the Washington State Department of Health (within 30 days, but as soon as practical) and system customers. In this notification to the customers, there is required mandatory language. A copy of the form containing this mandatory language is included in Appendix E with the Coliform Monitoring Plan. The top part of the form must be completed and sent to all system users. The lower portion (in box) must also be completed on the copy sent to the Washington State Department of Health, Northwest Drinking Water Operations.

- Acute Coliform MCL: The determination of an acute MCL violation is the same for all water systems and does not depend on the number of monthly routine samples a system collects. An acute MCL violation occurs when a combination of two samples with certain results occur. Any of the following conditions constitute an acute MCL violation:

    - A ROUTINE sample with coliforms present and fecal coliforms present in a combination with a coliform present; REPEAT sample collected in follow-up.

    - A ROUTINE sample with coliforms present and E. coli present in combination with a coliform present; REPEAT sample collected in follow-up.

    - A ROUTINE sample with coliforms present in combination with a REPEAT sample having coliforms present and fecal coliforms present.

For an acute MCL violation to occur, a sample and at least one related repeat sample must:

- both have coliforms present, **AND**

- have fecal coliforms or E. coli present in one of these samples.

    - A ROUTINE sample with coliforms present in combination with a REPEAT sample having coliforms present and E. coli present.

Once an acute MCL violation has been determined, it is the responsibility of the City of Fircrest to notify the Washington State Department of Health (within 24 hours) and the customers. Immediate contact to the Washington State Department of Health is required if a fecal or E. coli routine and/or repeat sample is experienced. The system may notify the Washington State Department of Health at (360) 753-5090 or the after-hour emergency number at (877) 481-4901. In this notification to the customers, there is required mandatory language. A copy of the form containing this mandatory language is included in Appendix E with the Coliform Monitoring Plan. The top part of the form must be completed and sent to all system users. The lower portion (in box) must be completed on the copy sent to the Washington State Department of Health, Northwest Drinking Water Operations, 20435-72nd Avenue South, Suite 200, K17-12, Kent, WA 98032. Phone Number (253) 395-6750; Fax Number (253) 395-6760.

2. Inorganic Chemical and Physical Monitoring

The inorganic chemical analyses shall be collected once every three years from each source or well field. These inorganic analyses have had additional substances tested for as required under Phase II/V requirements. In some cases, a waiver may be granted by the Washington State Department of Health for some or all chemicals. These waivers are based on a susceptibility assessment for each well source.

Nitrate analyses are required annually for each source or well field. For the past several years, the City of Fircrest has conducted routine - annual nitrate testing. If nitrate values become greater than or equal to 5 mg/l, quarterly monitoring will be required.

When analyses determine that a MCL has been exceeded as determined in WAC 246-290-320(3), the regulations require the following actions:

The City of Fircrest shall:

- For nitrate, immediately take one additional sample from the same sampling point. If the average of the two samples exceeds the MCL, a violation is confirmed.

- For all other inorganic chemical and physical substances, collect three additional samples from the same sample point within thirty days. If the average of all four samples exceeds the MCL, a violation is confirmed.

3. Volatile Organic Chemicals Monitoring

The complete volatile organic chemical analyses shall be collected once every three years from each source or well field. In some cases, a waiver may be granted by the Washington State Department of Health for some or all chemicals. These waivers are based on a susceptibility assessment for each well source.

The procedure for follow-up to any water sample detecting the presence of a VOC is relatively extensive. The follow-up procedure covers three pages of regulations WAC 246-290-320(6). The procedure varies depending on which VOC is detected and the VOC concentration. In all cases, it requires additional samples. If and when a VOC is detected, review these regulations; if there are any questions concerning what sampling is required, consult the individual monitoring

schedules provided with this plan or contact either JWM&A or the Washington State Department of Health.

4. Lead/Copper Monitoring

Lead and copper sample location numbers are determined by system population. Initially, the City of Fircrest will have to identify 40 service connections that meet specific requirements. These include the date of construction (after 1982 or before 1983) and whether or not the plumbing has lead solder. When these sites are identified, first draw samples need to be analyzed for lead and copper. Initial sampling occurs in consecutive 6 month periods (first half and second half of the calendar year). Depending on whether the action level for lead and copper is exceeded, the concentration of lead and copper in these water samples will then determine if the number of samples can be reduced or whether corrosion treatment must be installed. Continued sampling is on an annual basis for two additional years with a reduced number of samples if previous testing indicates that the action levels were not exceeded. If no exceedance of action levels occurs within this time frame, sampling will continue every three years thereafter.

5. Other Monitoring

The Washington State Department of Health will require additional monitoring for chemicals. The water system will collect these samples as required. In the future, water samples will be collected for the following tests:

Inorganic (IOC)
Volatile Organic (VOC) Phase II/V
Synthetic Organic (SOC) Phase II/V
Radionuclides
Asbestos
Lead/Copper (corrosion)
Nitrate (annual)
Nitrite
Bacteria (monthly)
Fluoride (daily)

Some of these analyses are currently being done and others will be added in the future or as waivers allow. The City of Fircrest will refer to the Drinking Water Regulations, WAC 246-290 and the annual Washington State Department of Health Water Quality Monitoring Report for specific monitoring requirements.

Some of the costs for conducting these water quality monitoring tests may be reduced through waivers. The final costs for additional water sampling are hard to predict, but the City of Fircrest should estimate a minimum of $3,200 per source or well field to provide cash reserves for the sampling during the compliance period. This assumes some or all sources will receive waivers from some sampling requirements.

6. Record Keeping

The City of Fircrest is responsible for maintaining records on each water system for specified periods of time. These requirements are found in WAC 246-290-480. The General Manager is responsible to see these records are in order and accounted for. The records to be kept for the City of Fircrest are as described in the regulations:

- Bacteriological and turbidity analysis results shall be kept for five (5) years.
- Chemical analysis results shall be kept for as long as the system is in operation.
- Records of source meter reading shall be kept for ten years.
- Record of sanitary survey shall be kept for ten years.
- Records concerning variances or exceptions shall be kept for five years following expiration of variance or exception.
- Other records of operation and analyses required by the department shall be kept for three years. All records shall bear the signature of the operator in responsible charge of the water system or his or her representative. The City of Fircrest shall keep these records available for inspection by the department and shall send the records to the department if requested. Actual laboratory reports may be kept.

7. Customer Complaints

It will be the practice of the City of Fircrest that a record of all complaints and action taken be on file. If a complainant is unsatisfied, he or she should bring it to the City Council for resolution.

E. Coliform Monitoring Plan

A complete coliform monitoring plan is located in Appendix H of this plan.

F. Emergency Response Program

Table 6.2 lists common/anticipated emergencies and the response procedure to follow once the emergency has been identified.

Once the system has been placed onto emergency operation status, the following procedures shall be followed:

- Place all wells onto manual control
- Begin manual reservoir monitoring
- Identify the suspected system failure
- Contact the appropriate water system sub-contractor (electrician, plumber, engineer, etc.)

Table 6.2: Emergency Response Procedures

Emergency	Response procedure
Wellhouse emergency light is on.	Call the system manager immediately. Check the wellhouse to determine if the pump(s) are running. Check the reservoir(s) level to determine whether or not the system is stabilizing. Determine whether or not a system leak has occurred. Call the telephone company to verify that the phone line is in working order. Place all remaining wells onto manual control and begin emergency system operations procedures.*
Pump has failed to come on.	Call the system manager immediately. Check to verify that the circuit breaker has not been "thrown". Contact the pump supplier to arrange for replacement pump. Verify that system pressures are holding.
System is losing pressure.	Call the system manager immediately. Check to verify that the pressure relief valve is functioning properly. CAUTION: CARE MUST BE TAKEN WHEN DEALING WITH THE PRESSURE SYSTEM. IF NOTHING IS OBVIOUS - LEAVE THE SYSTEM ALONE UNTIL A KNOWLEDGEABLE OPERATOR ARRIVES.
Power is out to the wellhouse.	Call the system manager immediately. Obtain a gas powered generator and place the system on generated power supply. CAUTION: CARE MUST BE TAKEN WHEN CONNECTING THE SYSTEM T0 GENERATED POWER. CONTACT THE SYSTEM ELECTRICIAN FOR EXACT DIRECTIONS OR WAIT FOR A KNOWLEDGEABLE OPERATOR.
Reservoirs are overflowing.	Call the system manager immediately. Place the pump(s) onto manual control and determine if the pump(s) are running. If the pump(s) are running, turn the pump(s) off and begin to monitor the reservoir and system demands. Determine whether or not the float switches in the reservoir are functioning properly. Call the telephone company to determine whether or not the phone line is working properly.

*Emergency system operation procedures defined

- If determined by the water system manager, begin notifying system users of the emergency and move to emergency conservation measures

- Prior to removing the emergency status, perform all required system sterilization

- Remove the emergency status
- Notify system users that the emergency is over

- Resume normal system operations

F1. Emergency conservation measures described:

- Immediate suspension of all outside irrigation (residential)

- Immediate suspension of all car washing (residential)

- Encourage reduced water usage during the emergency

*SEE APPENDIX C FOR A COMPLETE CONSERVATION PLAN.

The list of the most vulnerable system facilities for the City of Fircrest Water System appear below:

Fircrest Water System

1. Source of supply (wells)
2. Reservoirs
3. Source meters
4. Distribution network
5. Pressure Reducing Valves
6. Booster Pumps

G. Safety Procedures

The City of Fircrest staff follows all safety procedures identified by the Washington State Department of Labor and Industries when performing work on the water system.

H. Cross-Connection Control Program

A complete cross-connection control program is provided in Appendix F of this water system plan.

I. Service and Source Reliability (per WAC 246-290-420)

The Fircrest Water System has source and storage facilities that provide a high level of redundancy to ensure that water system service is reliable for providing continual drinking water to all customers. There have been no significant problems with the existing sources, and when one source is taken off line, the additional sources are more than sufficient for meeting the needs of the system.

J. Summary of O&M Needs

The City of Fircrest currently has enough staff to provide the operations and maintenance requirements of the system. The system currently has no O&M deficiencies.

CHAPTER SEVEN *(Distribution Facility Design & Construction Standards)*

The following design standards are the minimum allowable by the City of Fircrest for any and all water improvement projects, whether designed by the City of Fircrest, or by another engineering firm/agency. The intent is that all projects be designed to the same standard to ensure uniformity of final product and of cost to the financier.

Superior design of water system improvements is one of the primary goals of the City of Fircrest. Although these standards are intended to apply to physical development within Fircrest, the standards do not apply for all situations. Compliance with these standards does not relieve the designer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for, competent work by design professionals. The City of Fircrest may, at its sole discretion for any reason, place more stringent requirements on a project than would normally be required under these standards.

Waiver of specific design criteria indicated in this Plan must be requested in writing and may be approved only by the City of Fircrest's engineer and system manager. The decision to grant, deny or modify the standards will be based upon evidence that the request can meet the following criteria:

1. The change will achieve the intended result in a comparable or even superior design and a better quality of improvement;
2. The change will not adversely affect safety and/or operation; and
3. The change will not adversely affect maintainability.

i. Incorporation of other standards

The existing standards listed below are hereby incorporated by reference, as modified herein:

- Standard Specifications for Road, Bridge and Municipal Construction (Washington State Department of Transportation/APWA) including APWA Supplement, latest edition.
- IAPMO Uniform Plumbing Code and Installation Standards, latest edition.
- Sizing Guidelines for Public Water Systems, Washington State Department of Health.
- Recommended Standards for Water Works, Great Lakes - Upper Mississippi River Board of State Sanitary Engineers, latest editions.

In conformance with WAC 246-290-110 and 246-290-120, the designer of any new water system, water system extension, or improvement to be accepted by the City of Fircrest must submit a project report and construction documents (plans and specifications) to the Washington State Department of Health, Drinking Water Division for review and approval, with the following exceptions:

1. Installation of valves, fittings and meters;
2. Installation of hydrants under WAC 246-290-230;
3. Repair of a system component or replacement with a similar component, even if an upgrade to the City of Fircrest current standard;

4. Maintenance or painting of surfaces not contacting potable water; and
5. Distribution mains if:

    a. The City of Fircrest provides the Washington State Department of Health with documentation from a professional engineer registered in the State of Washington certifying the construction, and that all construction meets the City of Fircrest standard material and construction specifications.

    b. The City of Fircrest provides documentation to the Washington State Department of Health of the pressure test results, disinfecting procedures used and tests performed, and water quality sample results obtained prior to placing the distribution main(s) in service.

ii. General design standards/requirements

The following standards apply to all areas served by the City of Fircrest, regardless of local government or land use policies. In cases of conflict between the standards and any City of Fircrest resolution, the resolution shall govern.

Ownership: All water lines and appurtenances shall be and remain the exclusive property of the City of Fircrest for future operation, maintenance and service responsibilities. The point of City of Fircrest ownership and responsibility shall end at the property line of the lot unless otherwise stated in the City of Fircrest letter of final acceptance.

Design Responsibility: Water infrastructure plans and specifications shall be prepared under the supervision of and signed by a professional engineer registered in the State of Washington, and shall comply with the design standards of the City of Fircrest. Plans shall indicate water infrastructure only, not all utilities for development on one drawing. The designer shall confirm requirements and criteria with the City of Fircrest engineer. The City of Fircrest may develop plans and specifications for a customer as the City of Fircrest workload allows at an agreeable cost to the customer. For design by a private engineer, a reproducible copy of the final design acceptable to the City of Fircrest engineer shall be delivered to the City of Fircrest prior to any improvement plan approval and commencement of work.

Pipe Sizing: The minimum size for main distribution lines shall not be less than six (6) inches in diameter when looped and eight (8) inches on a dead-end line. Pipe diameters less than six (6) inches may be used for short extensions off main distribution lines such as cul-de-sacs or outlying services (if approved by the City). Standard size pipe for serving 2 connections off the main distribution line shall be one (1) inch. Standard size pipe for serving one connection off the main line shall be 3/4 inch. Final approval of water pipe sizing shall rest solely with the City of Fircrest. In all cases, pipe size shall conform to Washington State Department of Health requirements.

Extensions and replacements to and within the City of Fircrest water system shall be sized to provide at least 30 psi residual pressure, during peak hourly design flow conditions at every service connection in the projected pressure zone (and at least 20 psi residual pressure during fire flow).

A customer will be required to pay for at least the minimum size pipe required to satisfy its flow. The City of Fircrest reserves the right to increase the nominal diameter of the pipe for the present or future needs of the City. Should the City of Fircrest exercise this option, the City of Fircrest may pay the difference in cost between the customer's pipe size requirements and the increased size selected, or may require the customer to pay the difference. The final selection of increased pipe size(s) and financing method, when paid for by the City of Fircrest, requires City Council approval.

Pipe Layout: All water pipe shall be designed to lie in public road right-of-way, or if not available, on private ingress-egress utility easement. Permanent easements shall be a minimum of 20 feet in width, unless approved otherwise by the City of Fircrest. Pipe shall be designed for a maximum trench depth of 72 inches and a minimum depth to top of pipe of 42 inches. All pipe shall maintain a positive or negative slope between respective high and low points in the waterline; high points shall be fitted with vacuum relief/air release assemblies. All layout by private consultants shall be coordinated with and reviewed by the City of Fircrest engineer for conformance with these and other requirements prior to issuance of final construction documents.

Water Services: Watermains constructed in platted areas shall include the installation of water services stubbed to common or individual lot corners. New services in nonplatted areas may be located by the customer by request and approval of the City of Fircrest. Water service installation shall include all materials indicated on the appropriate standard detail. Service lines that are part of a watermain extension shall be installed concurrent with the watermain installation. Services shall be connected to the watermains and extended to the customer's lot line with a tailpiece stubbed into the meter box prior to pressure and bacteriological testing of the watermain, if applicable. A permanent service shall not be installed until frontage grades are established and all water service fees are paid. The cost of service lines installed as part of a watermain extension shall be borne by the customer as part of the watermain installation cost.

All new water services shall be metered. To obtain a meter, the customer must apply for and pay all fees associated with a water service with meter prior to installation of the meter. Fees include, but are not limited to, water service/meter installation fee and hook up fee. All fees shall be based on the current schedule for each fee at the time of payment.

The customer is responsible for installation of its own service line (with all construction subject to the City's approval) from the connection or meter to the point of use. Water service lines should not exceed 300 feet from the meter to the point of use, in order to maintain adequate pressure. Service lines over 300 feet are not prohibited; however, the City of Fircrest cannot assure adequate pressure for these services as there are areas within the City of Fircrest where pressures are minimal.

Pressure Reducing Valves: A pressure reducing valve (PRV) is recommended when the static line pressure exceeds 80 psi. At the customer's request, the City of Fircrest will calculate or measure the water pressure at the customer's point of delivery as an aid to determining whether a PRV is needed. PRVs shall be installed on the customer's side of its water meter and shall be owned and maintained by the customer.

iii. Standard materials for City of Fircrest Water System

1. All workmanship and material shall be in accordance with City of Fircrest standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction, Washington State Department of Health regulations, and American Water Works Association standards.

2. A preconstruction meeting shall be held with City of Fircrest prior to the start of construction.

3. Watermain Pipe:

   - 2" to 12" inches in diameter shall be ductile iron meeting the requirement of AWWA C151 thickness class 50, except flanged, grooved or threaded shall be minimum thickness class 53. For ductile iron pipe non-restrained joints shall be rubber gasket, push-on type or mechanical type meeting the requirements of AWWA C111.

     Or

   - AWWA C900 PVC minimum DR 18 (class 150) with joints meeting the requirements of ASTM D3139.

     Or

   - Class 200 PVC conforming to ASTM D 2241. Class 200 PVC joints shall meet the requirements of ASTM D3139 using a restrained rubber gasket meeting the requirements of ASTM F477.

   Water main pipe 16" in diameter and larger shall be ductile iron meeting the requirements of AWWA C151 thickness class 50, except that flanged, grooved, or threaded shall be minimum thickness class 53.

   Watermain Fittings: Fittings for watermain pipe shall meet the requirements of AWWA C110 or AWWA C153. Joints shall meet the requirements of AWWA C104. Gaskets for flat-faced or raised-face fittings shall be 1/8" thick neoprene, durometer of 65 to 55.

   Pumphouse Interior Piping: Steel pipe 4 inches in diameter and smaller shall be hot-dip galvanized inside and out and meet the requirements of ASTM A 120. Fittings shall be either grooved Victaulic or shall be malleable iron threaded type with a pressure rating of 150 psi. Threaded fittings shall meet the requirements of ANSI B 16.3, ANSI B2.1, and ASTM A47, Grade 32510 and shall be banded and hot-dipped inside and out.

4. Watermain Valves: Watermain valves from 3" to 12" shall be resilient wedge gate valves conforming to AWWA C509, nonrising stem type, open counterclockwise, and be equipped with an "O" ring stuffing box. Underground valves shall be equipped with 2" square operating nut and cast iron two piece slip type standard design valve box with base corresponding to the size of the valve. Valve boxes shall be coal tar painted by the manufacturer using its standard. Valve box covers shall have the word "WATER" cast in

it. Watermain valves shall be Mueller, M&H, Kennedy, Clow or R/W. Existing valves shall be operated by City of Fircrest employees only.

5. Combination Air/Vacuum Valves: Combination air release/air vacuum valves shall be Valmatic Series 200.

6. Fire Hydrants: Fire hydrants shall be Clow Medallion, Dresser, M&H Reliant Style 929, or Mueller Centurion. Fire hydrants shall be equipped with 2 each 2.5" hose nozzles and 1 each 4.5" steamer nozzle. Steamer nozzles shall be equipped with a storz quick connect adapter meeting local fire department requirements.

7. Watermain Pressure Reducing Valves: Watermain pressure reducing valves shall be Roll Seal 110 PR with stainless steel body, natural rubber liner, victaulic ends and cone basket strainer. Pressure reducing valves shall be sized so that the maximum velocity is 20 feet/second or less.

8. Service Pipe: Service pipe between the watermain and the meter setter shall be polyethylene PE 3408 meeting the requirements of AWWA C901. Service pipe shall be high-molecular weight with a 160 or 200 psi rating as approved by the City of Fircrest. Pipe for either 3/4" or 1" size shall be SDR 7 (iron pipe size). Pipe for 1.25", 1.5" or 2" size shall be SDR 7 (iron pipe size).

9. Service Saddles: Service saddles shall be ductile iron body with double stainless steel straps.

10. Corporation Stops: Corporation stops shall be made of bronze alloy.

11. Meter Setter: Meter setters shall be Ford 70 series or Mueller H-14044 copper meter setter with check valve and union nut and swivel for connecting CC thread.

12. Service Backflow Preventers: All service backflow preventers shall be a model listed in the USC Foundation for Cross-Connection Control and Hydraulic Research listing. All devices in this listing are acceptable to the Washington State Department of Health with:

    Double check valves: Double check valves (3/4" to 2") shall be FEBCO 805Y with ball shutoffs.

    Reduced back pressure backflow preventer: Reduced pressure backflow preventers (3/4" to 2") shall be FEBCO 825Y with ball shutoffs.

13. Service Pressure Reducing Valves: Service pressure reducing valves (3/4" to 2" size) shall be Watts Series U5B.

14. Pressure Tanks: Pressure tanks under 120 gallons and operating at pressures less than 100 psi shall be captive air bladder tanks, Well X Trol or approved equal. Pressure tanks over 120 gallons and/or operating at pressures greater than 100 psi shall be ASME code rated captive air bladder tanks.

15. Circuit Breaker Panels: Circuit breaker panels shall be Cutler Hammer.

16. Pressure Switches: Pressure switches shall be Square D catalog number 9013 type FYG-2 J23, **without** low pressure cutout.

17. Float Switches: Float switches shall be rolling ball type S.J. Electro Systems or approved equal. Float switches shall **not** use mercury contacts.

18. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water which can be detected by a standard metal detector. Tape shall be Terra tape "D" or approved equal. In addition, toning (tracer) wire shall be installed over all pipe and services. Toning wire shall be UL listed, type UF, 14 gage copper taped to the top of the pipe to prevent movement during backfilling. The wire shall be laid loosely enough to prevent stretching damage. The wire shall be brought up and tied off at valve body or meter setter.

19. Provide traffic control plan(s) as required in accordance with MUTCD.

20. All water mains shall be staked for grades and alignment by an engineering or surveying firm capable of performing such work. Staking shall be maintained throughout construction.

21. Call underground locate at (800)424-5555 a minimum of 48 hours prior to any excavations.

22. City of Fircrest will be given 3 working days notice prior to scheduling a shutdown. Where connections require "Field Verification", connection points will be exposed by contractor and fittings verified 2 working days prior to scheduling City of Fircrest crews to make the taps and distributing shut-down notices.

23. At any connection to an existing line where a new valve is not installed, the existing valve must be pressure tested to City of Fircrest standards by the contractor prior to connection. If an existing valve fails to pass the test, the contractor shall make the necessary provisions to test the new line prior to connection to the existing system or install a new valve.

24. Any water main tap to existing City of Fircrest mains where the contractor encounters a coupling or existing assemblies, the contractor shall provide a minimum of 18" of clearance from coupling or assemblies to edge of tapping sleeve.

25. Any water main tap or connection shall be blocked according to the thrust blocking details. In the event the contractor can not supply adequate blocking, City of Fircrest will provide at a cost to the contractor the required blocking as per the detail for existing main line taps.

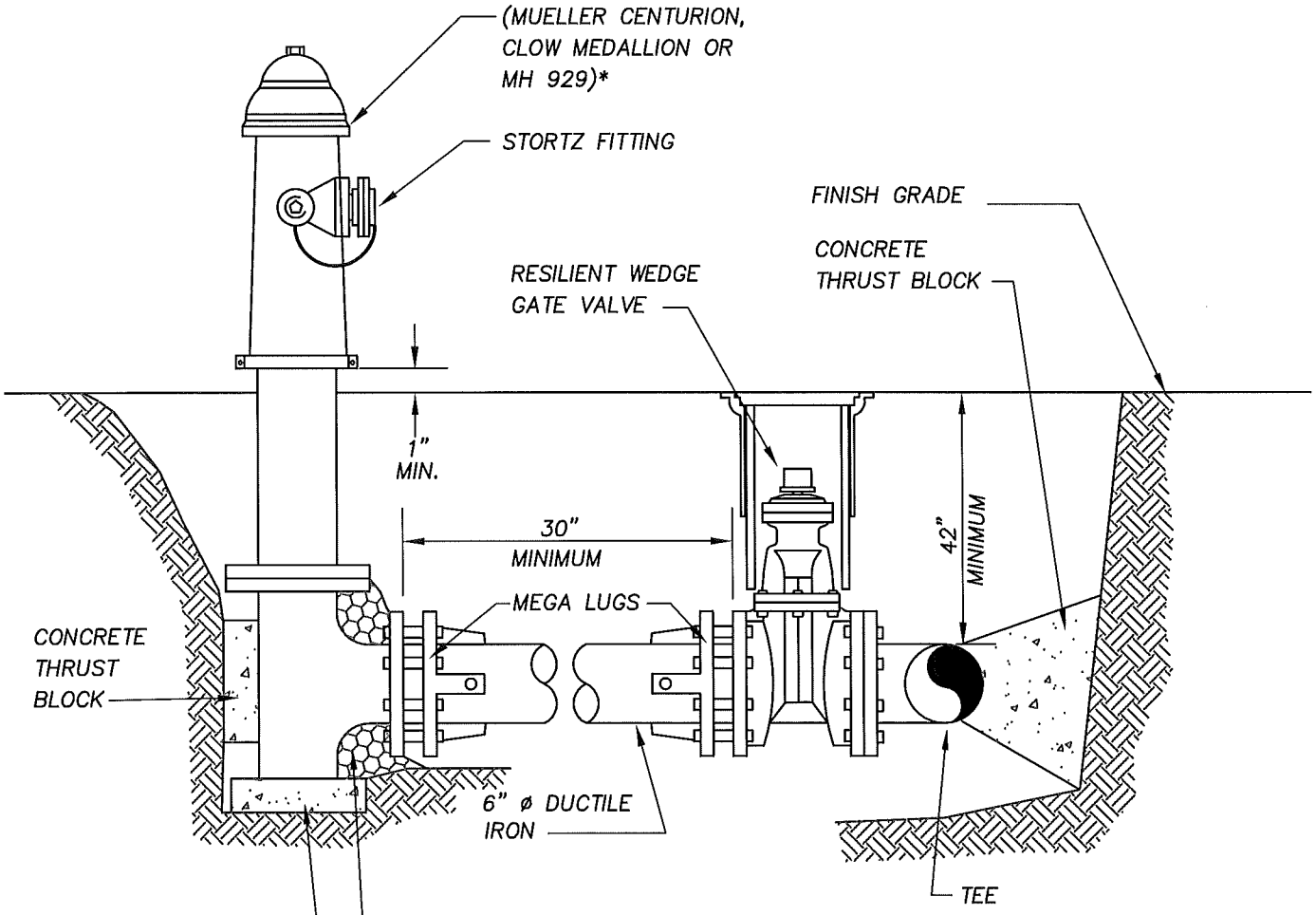
26. Water lines shall be blocked in accordance with the thrust blocking details.

27. A 4 foot square by 2 inch thick asphalt or concrete pad shall be installed around all valves and vacuum releases in county right-of-way.

28. All water mains shall be chlorinated, disinfected, and tested in conformance with the *WSDOT Standard Specifications for Road, Bridge and Municipal Construction,* AWWA C651 *Disinfecting Water Mains,* and the chlorinated water shall be de-chlorinated prior to disposal in conformance with AWWA C655 *Field Chlorination.* HDPE water mains shall not be chlorinated using dry powder placed directly into the pipe. Refer to the pipe manufacturer's written requirements for dilution of chlorine solutions prior to in-pipe use.

29. All PVC and ductile iron water mains shall be pressure tested to at least 225 PSI in conformance with the *WSDOT Standard Specifications for Road, Bridge and Municipal Construction.* All HDPE water mains shall be pressure tested in conformance with the pipe manufacturer's written pressure testing instructions, except that the minimum test pressure shall be 225 PSI.

30. Water mains crossing sewers shall be laid to provide a minimum vertical distance of eighteen (18) inches between the outside of the water main and the outside of the sewer. Water mains should cross above sewer lines. When sewer lines must cross above a water main, the water main shall be encased with a pressure rated casing pipe extending at least ten (10) feet on either side of the crossing.



TYPICAL FIRE HYDRANT DETAIL

NO SCALE

* (OR APPROVED EQUAL)

NOTES:

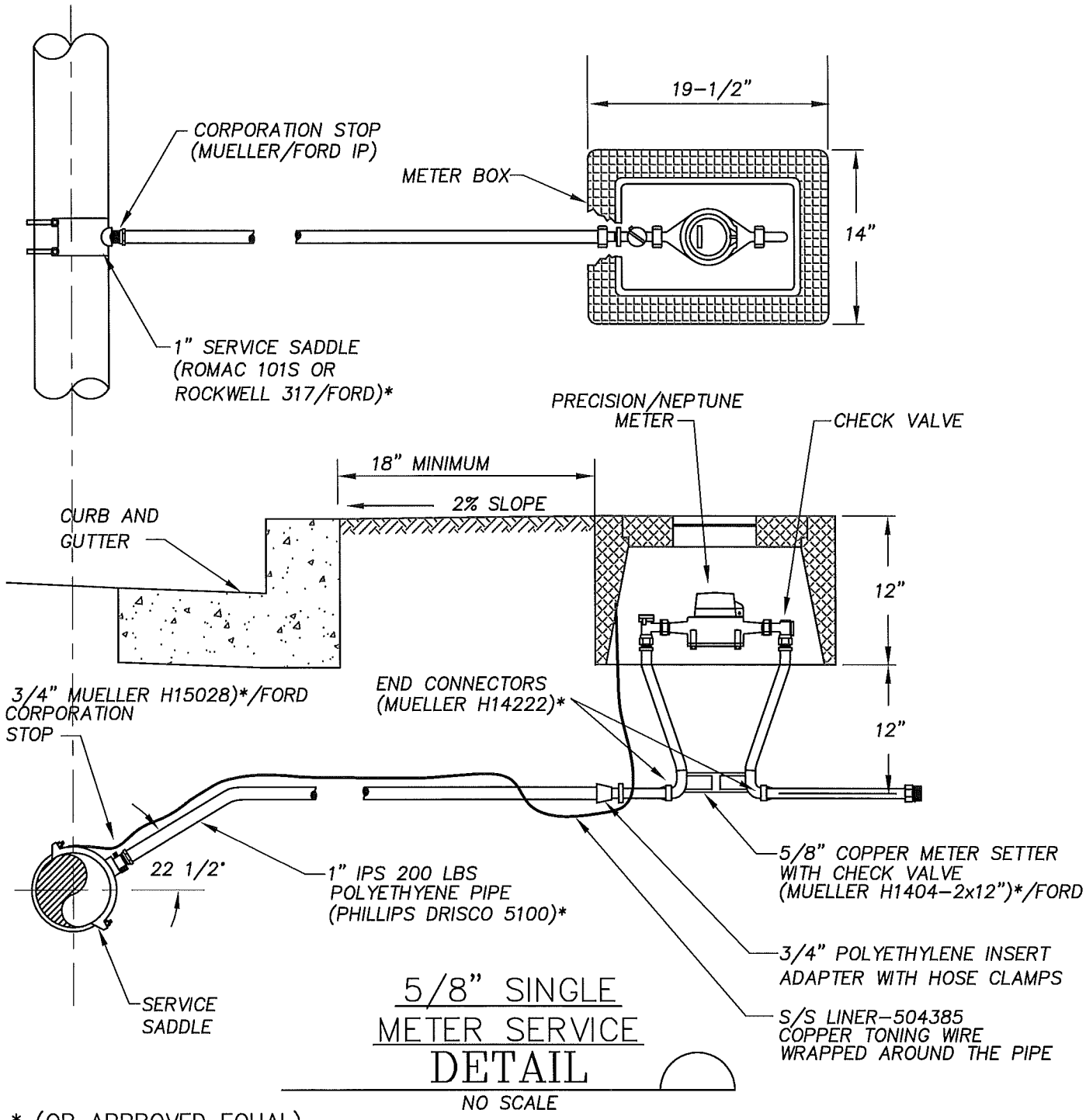
1. DEAD END MAIN EXTENSIONS OVER 50' SHALL BE 8" MINIMUM.
2. USE PORT 5" STORZ, MVO 5–1/4", WITH ALL OPERATING NUTS THE SAME SIZE.
3. AN UNOBSTRUCTED THREE FOOT MINIMUM WORKING AREA RADIUS SHALL BE PROVIDED AROUND ALL HYDRANTS.

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:

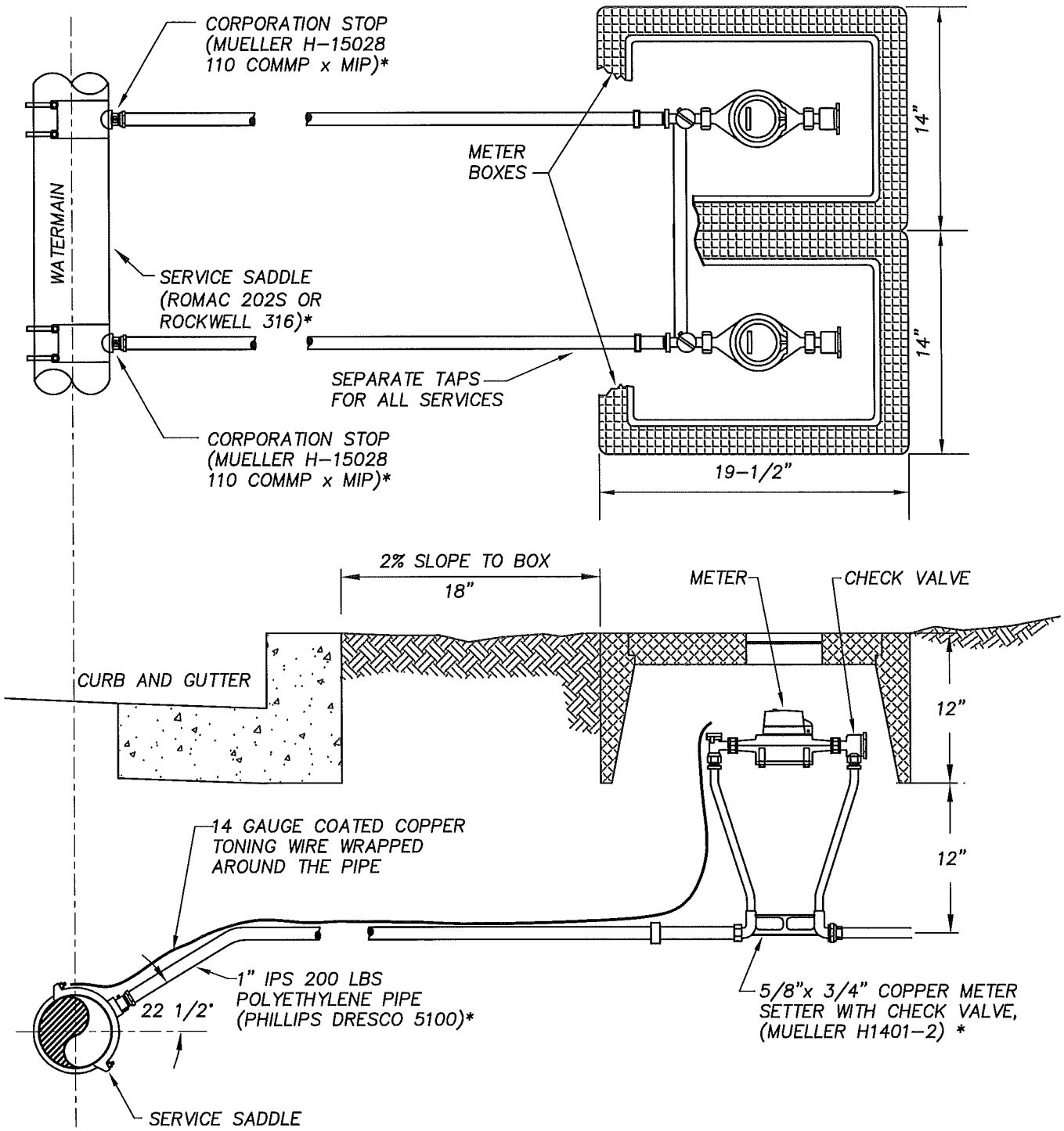
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL MUELLER 110 COMPRESSION FITTINGS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

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:

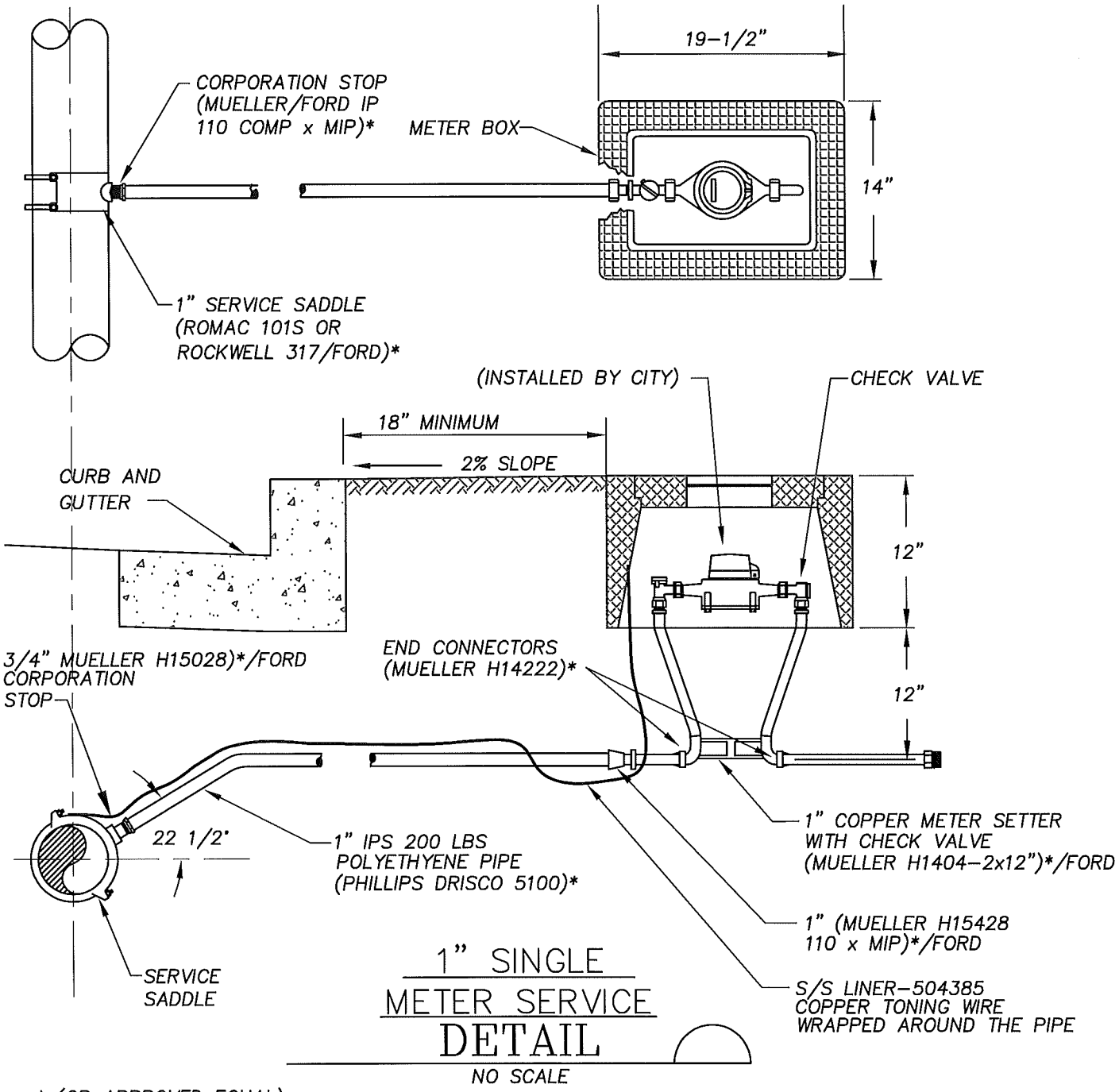
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL COMPRESSION FITTINGS
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

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:

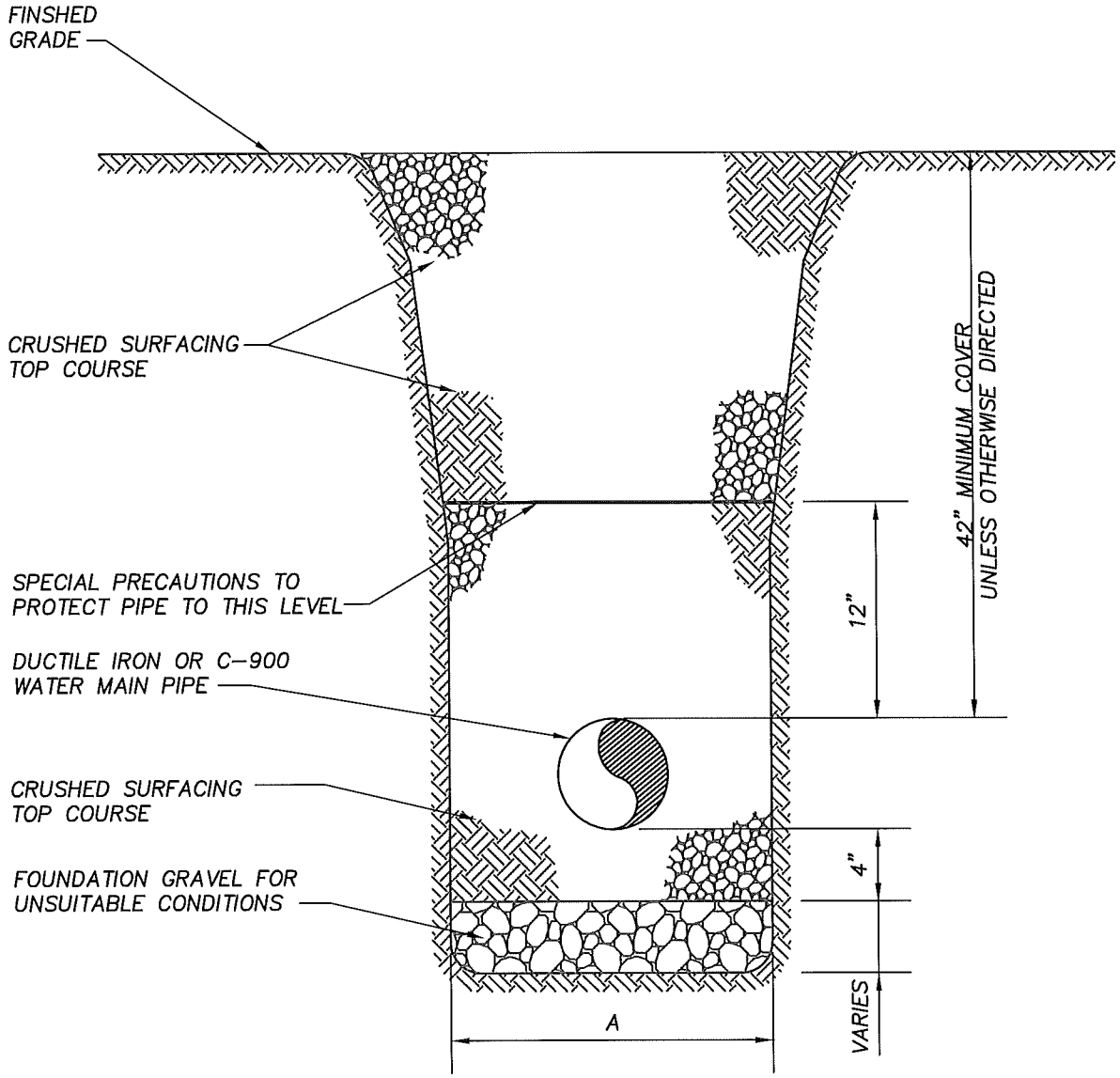
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL MUELLER 110 COMPRESSION FITTINGS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

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

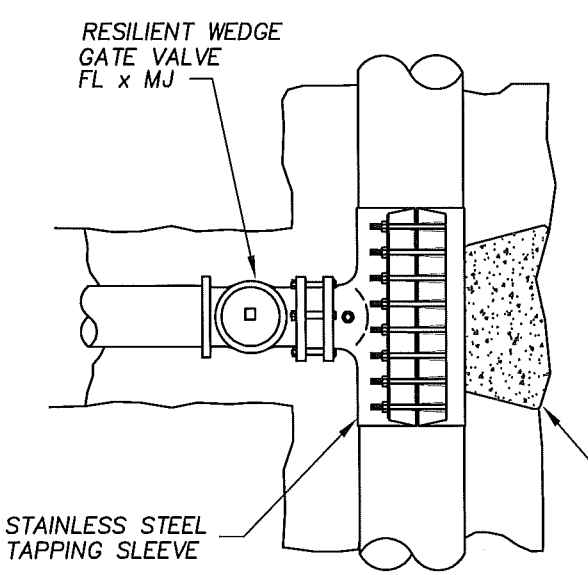
PIPE SIZE	A	PIPE TYPE
6"	24"	C-900
8"	30"	OR
10" & 12"	36"	DUCTILE
16" & 18"	42"	DUCTILE ONLY

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

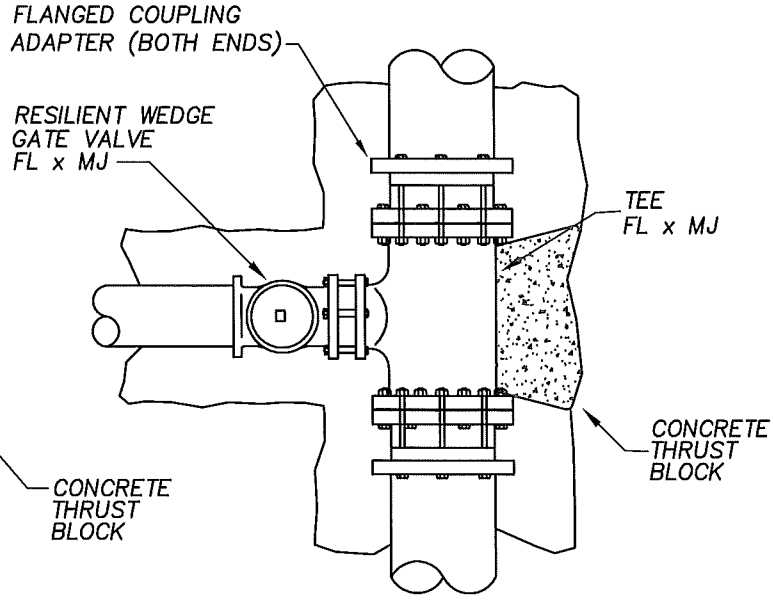
DUCTILE IRON WATER MAIN TRENCH SECTION

APPROVED BY CITY ENGINEER _____ DATE: _____

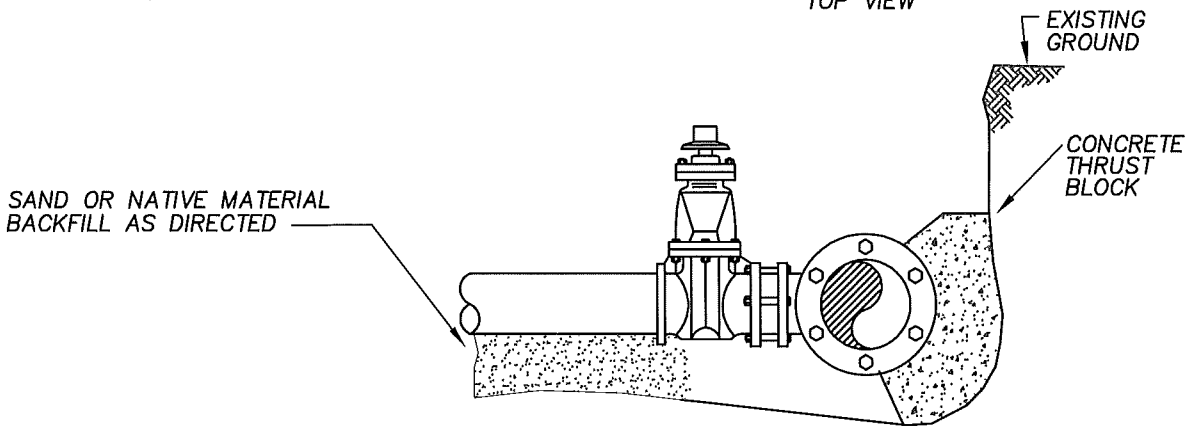
REF	DWN	CKD	DATE	FILE
	TWK	TJL	12/2/04	FIG 4-07



LIVE TAP



CUT–IN–TEE
TOP VIEW



CUT–IN–TEE
SIDE VIEW

CONNECTION TO EXISTING MAIN DETAIL

NO SCALE

NOTES:

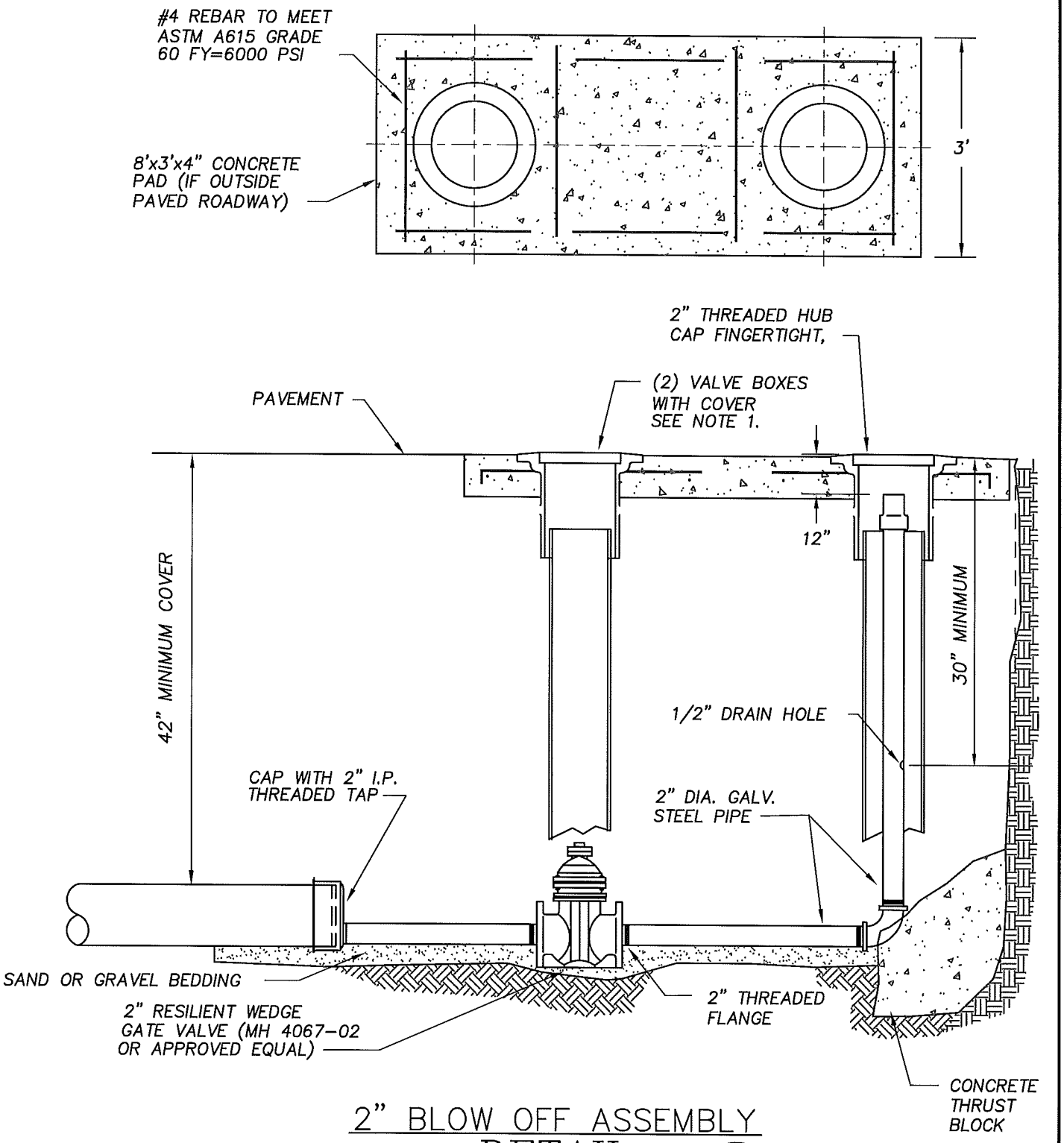
1. *SUPPORT VALVE AND SLEEVE CONTINUOUSLY THROUGH INSTALLATION.*
2. *11 MIL PLASTIC OR CONSTRUCTION FABRIC SHALL BE WRAPPED AROUND PIPE AND FITTINGS BEFORE THRUST BLOCK AND BACKFILL ARE POURED.*

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:

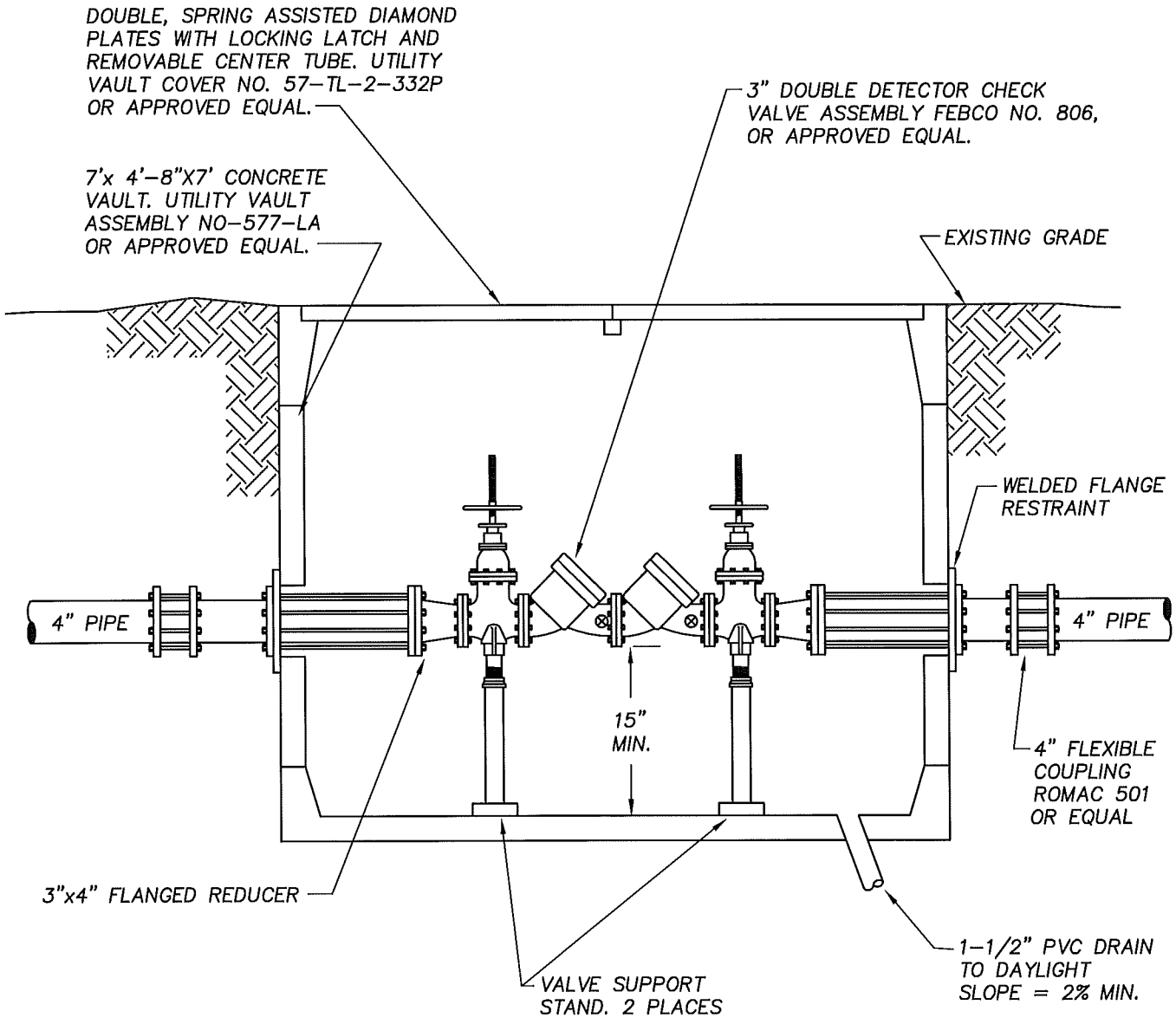
1. ON WATERMAINS WHICH WILL BE EXTENDED IN THE FUTURE, THE VALVE WHICH OPERATES THE BLOWOFF ASSEMBLY SHALL BE THE SAME SIZE AND PROVIDED WITH A CONCRETE THRUST BLOCK.

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

2 " BLOW-OFF ASSEMBLY

APPROVED BY CITY ENGINEER _____ DATE: _____

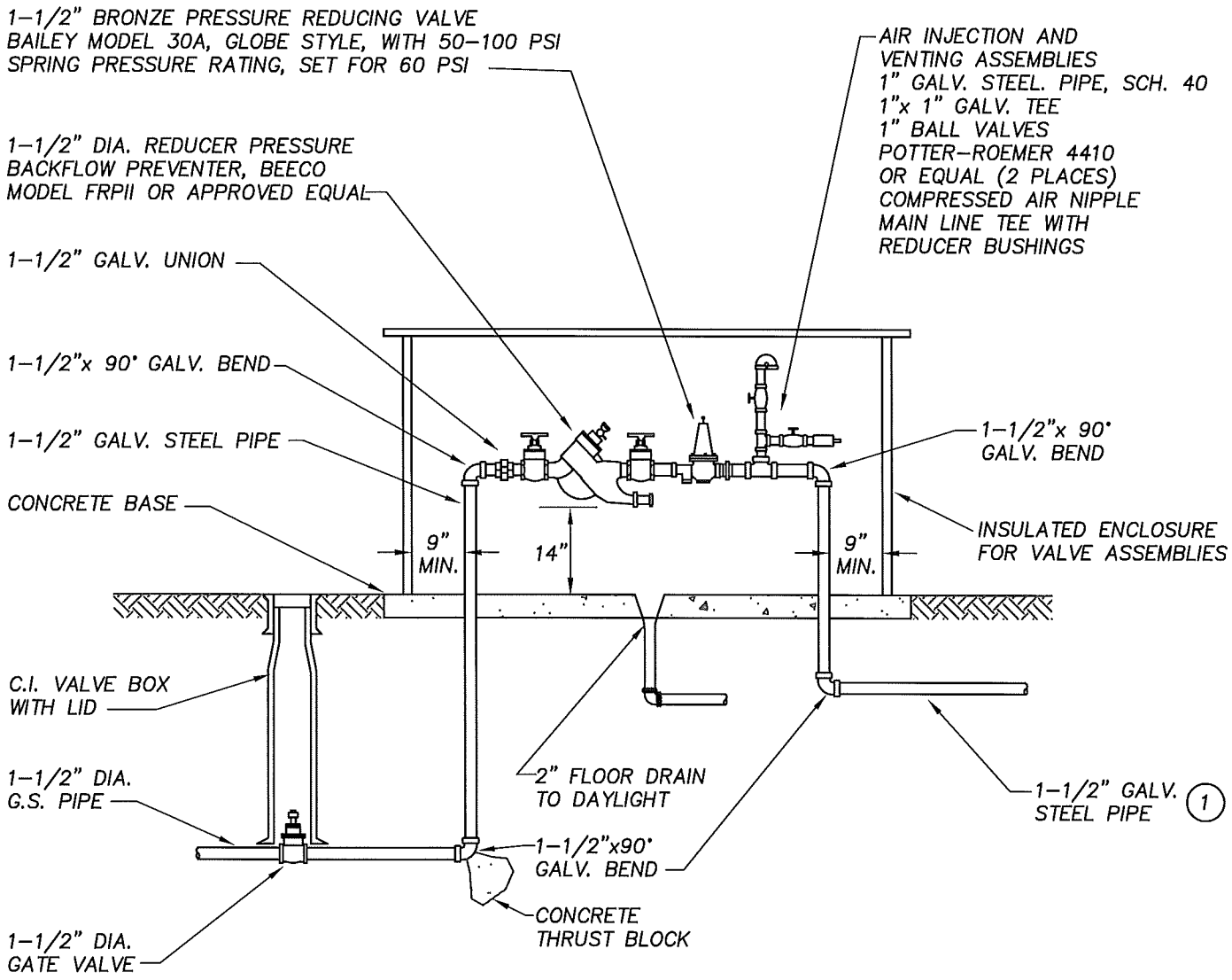
REF	DWN	CKD	DATE	FILE
	TDW	TJL	12/2/04	FIG 4-10



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 TDW	CKD TJL	DATE 07/17/00	FILE 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

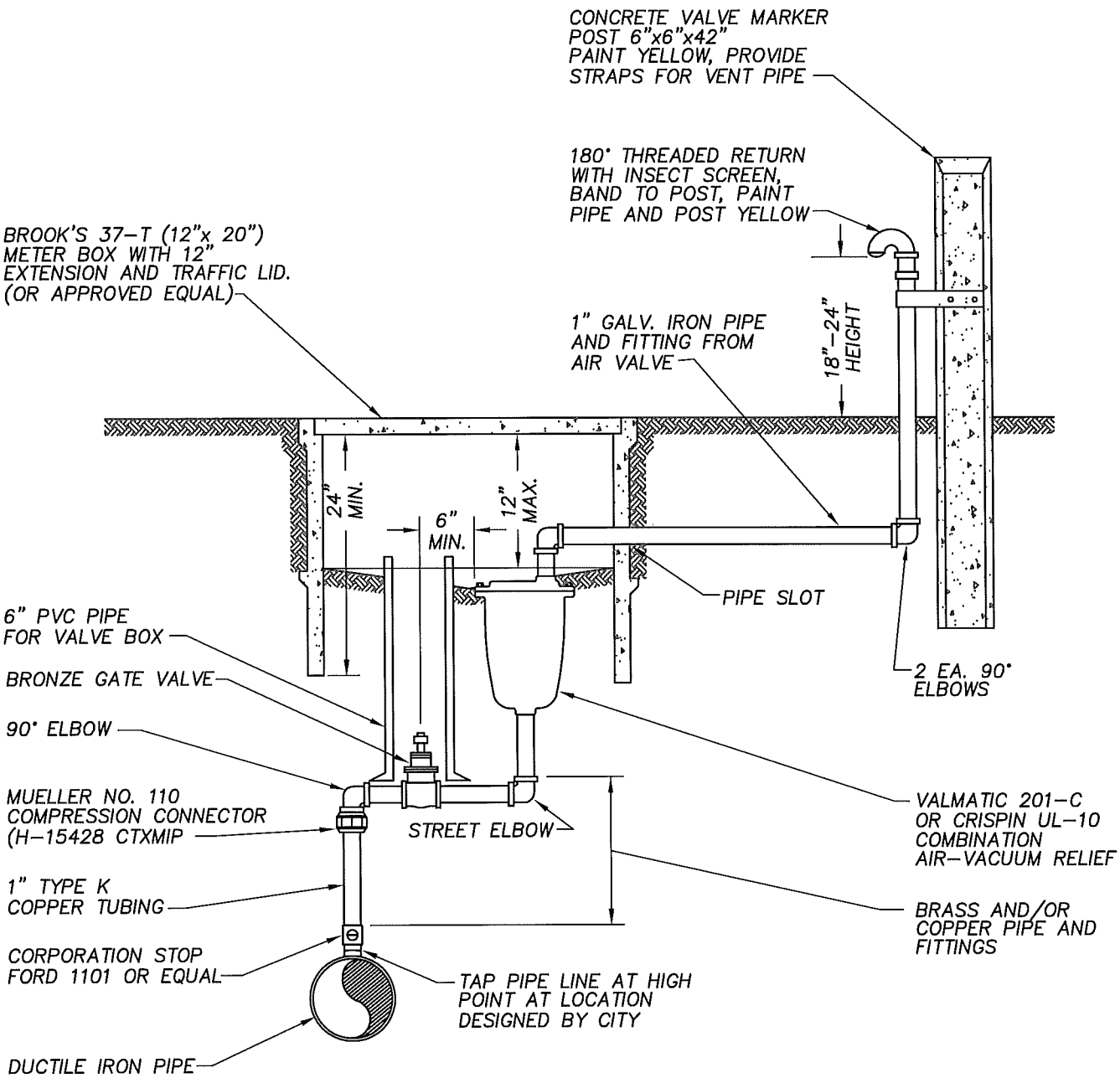
(1) MAINTAIN LEVEL PIPE TO END OR PROVIDE AIR-VAC VALVE AT ANY HIGH POINTS AND DRAIN VALVE AT ANY LOW POINTS

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

REDUCE PRESSURE BACKFLOW PREVENTER

APPROVED BY
CITY ENGINEER _____ DATE: _____

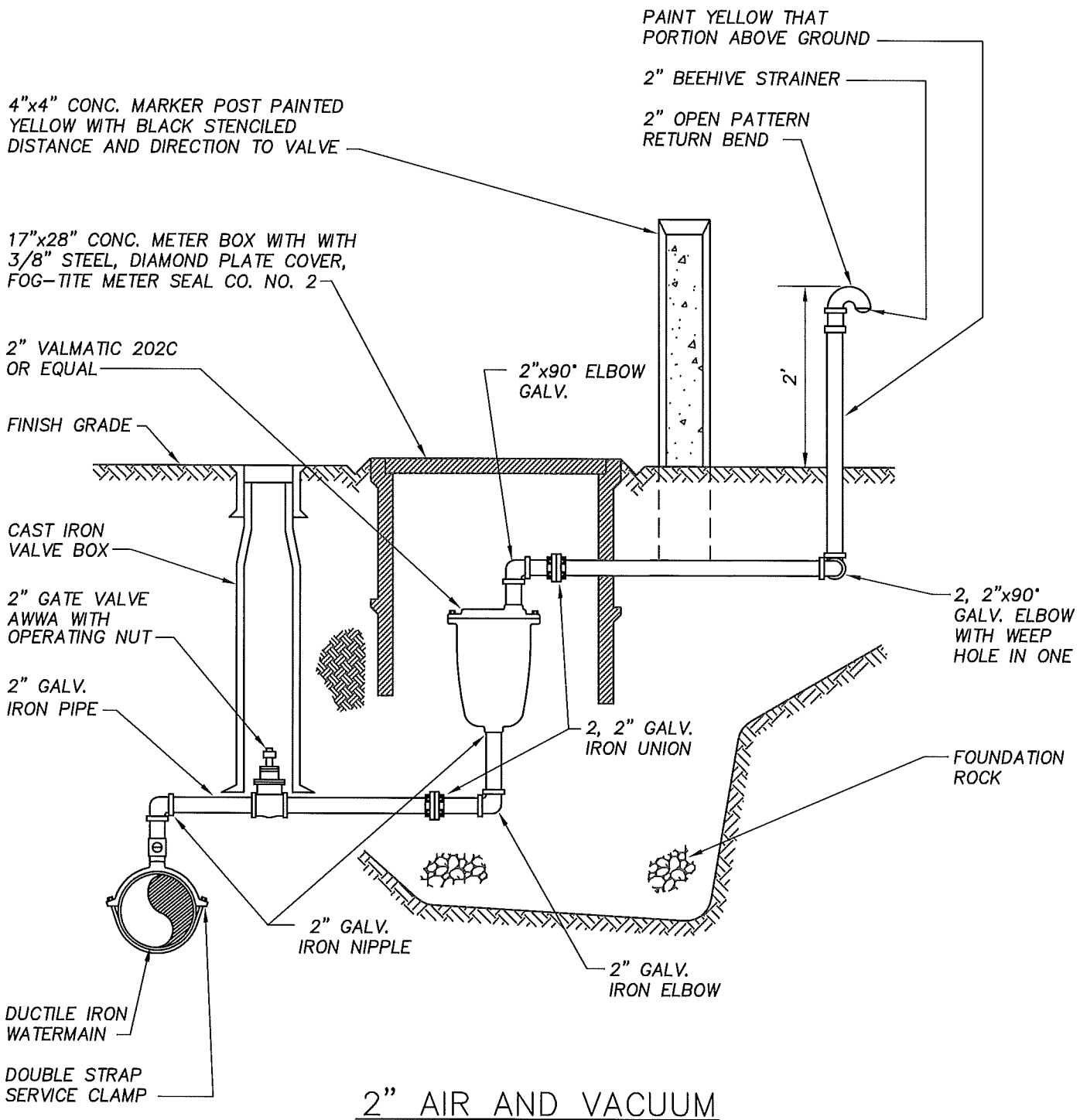
REF	DWN	CKD	DATE	FILE
	T.W.K.	TJL	07/18/00	FIG 4-16



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	CKD	DATE	FILE
	TWK	TJL	11/21/01	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

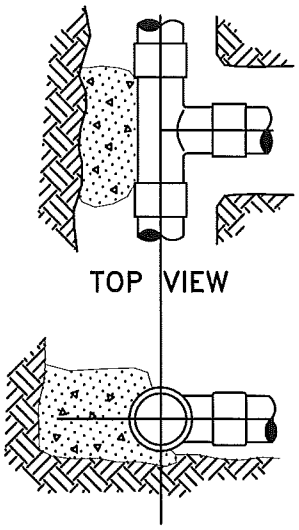
SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

CITY OF FIRCREST
DEPARTMENT OF PUBLIC WORKS

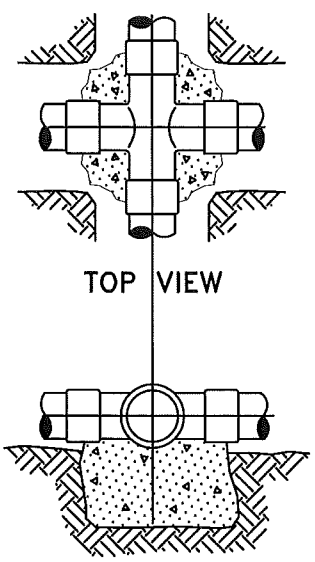
THRUST LOADS

APPROVED BY CITY ENGINEER _____ DATE: _____

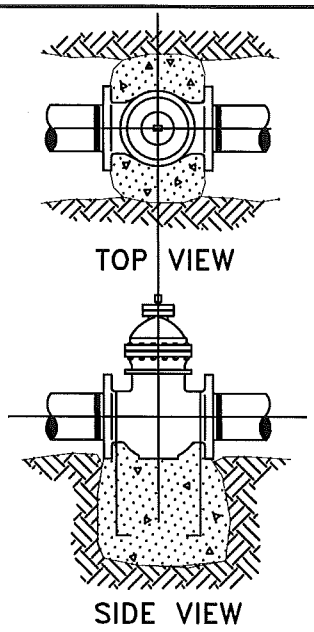
REF	DWN	CKD	DATE	FILE
	TDW	TJL	07/19/00	FIG 4-19



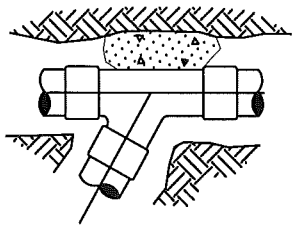
TEE



CROSS

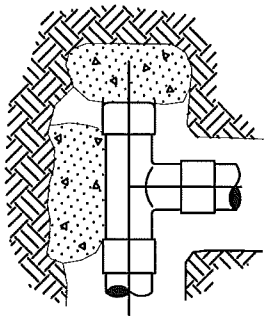


GATE VALVE

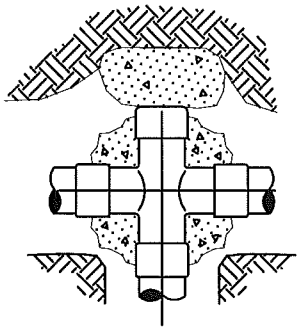


WYE

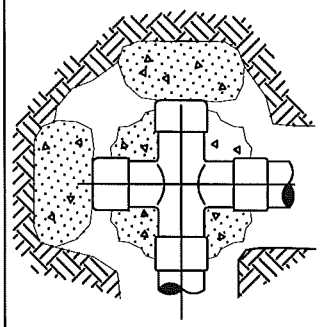
HORIZ. BEND



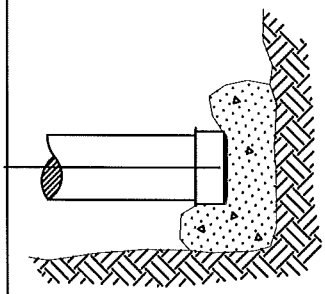
TEE WITH PLUG



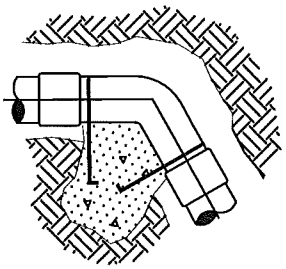
CROSS WITH PLUG



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 NOTES (WATERMAIN INSTALLATION)

1. ALL WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH CITY OF FIRCREST REQUIREMENTS AND PUBLIC WORKS STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF 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 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" WATERMAINS WILL BE PVC C-905 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 EMPLOYEES ONLY.

5. FIRE HYDRANTS SHALL BE DRESSER M AND 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 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. (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 GAGE 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 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 1000 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 BE TESTED PRIOR TO ACCEPTANCE OF THE PIPE SYSTEM. A WRITTEN NOTICE FROM THE CONTRACTOR TO THE CITY TWO (2) DAYS PRIOR TO THE TEST IS REQUIRED.

8. THE CONTRACTOR WILL PROVIDE TRAFFIC CONTROL PLAN(S) AS REQUIRED IN ACCORDANCE WITH MUTCD.

9. ALL WATER MAINS 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 UNDERGROUND LOCATE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATIONS.

12. THE CITY WILL BE GIVEN 10 WORKING DAYS' NOTICE PRIOR TO SCHEDULING A SHUTDOWN. THE CITY OF FIRCREST WATER SECTION OR CITY INSPECTOR WILL PERFORM THE SHUTDOWN. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS WILL BE EXPOSED BY CONTRACTOR AND FITTINGS VERIFIED 2 WORKING DAYS PRIOR TO SCHEDULING CITY CREWS TO DISTRIBUTE SHUT-DOWN NOTICES. THE CITY WILL NOTIFY CUSTOMERS INVOLVED OR AFFECTED OF THE WATER SERVICE INTERRUPTION 48 HOURS IN ADVANCE.

13. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED TO CITY STANDARDS BY THE CONTRACTOR PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR WILL MAKE THE NECESSARYP ROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.

14. AT ANY WATER MAIN TAP TO EXISTING CITY MAINS WHERE THE CONTRACTOR ENCOUNTERS A COUPLING OR EXISTING ASSEMBLIES, THE CONTRACTOR WILL PROVIDE A MINIMUM OF 18 INCHES OF CLEARANCE FROM COUPLING OR ASSEMBLIES TO EDGE OF TAPPING SLEEVE.

CHAPTER EIGHT (Improvement Program)

A. Capital Improvements for 6 Years

The proposed capital and non-capital improvements for the 6 year planning horizon are summarized below (estimated costs include engineering services):

Priority	Project Description	Project Cost (2014 $)
1	Install air gaps or soft starts at each well site	$80,000
2	Install fluoride monitors at each well site	$50,000
3	Install 1,000 LF 8” watermain on Golden Gate Avenue, from Princeton Street to Columbia Street	$40,000
4	Install 1,150 LF 8” watermain on Farallone Avenue, from Princeton Street to Columbia Street	$45,000
5	Install 950 LF 12” watermain on Summit Avenue, from Princeton Street to Columbia Street	$287,500
6	Recoat exterior of the “High Tank” reservoir	$250,000
7	Install 750 LF 8” watermain on Ramsdell Avenue, from Tot Lot to Pasadena Avenue	$60,000
8	Install 700 LF on Farallone Avenue, from Stanford Street to Golden Gate Avenue	$45,000
9	Install 1,150 LF 8” watermain on Eldorado Avenue, from Princeton Street to Columbia Street	$45,000

B. Capital Improvements for 20 Years

The proposed capital and non-capital improvements for the 20-year planning horizon are summarized below:

8” and 12” Watermain in areas that are deficient in fire flow as funds are available.

Facilities map

A map locating the various wells and storage facilities for the Fircrest Water System is provided in Appendix A of this plan.

CHAPTER NINE (Financial Plan)

A. Summary of Past Income and Expenses

Attached at the end of this chapter is a copy of the 2014 Water Fund Budget identifying the past three years budget (2011-2013) as well as the budget for 2014.

B. Balanced Operating Budget

The City of Fircrest intends to obtain all revenue required to pay for all system expenses and capital improvements costs through the collection of the bi-monthly water fees and budget allotments designated by the City Council. Attached at the end of this chapter is a copy of the 2014 Water Fund Budget. Any monetary requirement beyond the revenue obtained from the annual water fees will be withdrawn from cash reserves.

The source of funding for replacing and repairing system components during an emergency may come from multiple sources. In the event that a well or reservoir is damaged, the funding for the repairs (if a relatively minor expense) would come out of the City of Fircrest cash reserves or additional budget allotted by the City Council. If the well or reservoir is severely damaged and requires major repair or replacement, all wells and reservoirs are insured and funds would be received by the insurance company. If the insurance company is delayed in dispersing the funds to the City of Fircrest and the repairs or replacement was required immediately, funds are available in the cash reserve to cover the most expensive component of the water system. The funds would then be deposited back into the cash reserve when the insurance money is received.

The City of Fircrest does have significant cash reserves. The revenues that are received from the monthly water fees are will be required to be increased in the near future so that deposits to the cash reserves will be made each year. It should also be noted that the City of Fircrest can borrow money from their other utility budgets, which is not shown in this water plan because the other utility budgets are kept separate from the water system. All lot owners utilizing other city utilities within the City of Fircrest service area boundaries receive a separate bills for those utilities, regardless if they are hooked up to the water system.

The City of Fircrest maintains a significant line of credit that can also be used in case of emergencies. The City of Fircrest would only consider using the line of credit available to them if expenses were expected to deplete all insurance revenue and cash reserves available to them at the time of the emergency.

C. Demonstration of Revenue and Cash Flow Stability

The attached 2014 Water Fund budget demonstrates that the fund is currently solvent, however, the ending fund balance is anticipated to decrease without an increase in water rates. The Financial Viability Worksheets show two potential water rate increases that would provide additional funding for capital improvements since it can be seen in the budget that the Water Revenue is only slightly higher than the Water Expenses for 2014. Upon request, the City can

provide past budgets to demonstrate cash flow stability (to save space and a lot of paper, past budgets have not been provided).

D. Rate Structure

D1. Existing water rates are summarized below:

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

Pavement Potholing: $25/sf pavement restoration

	Meter Size	Meter Eq.	GFC	Connection Fee
	5/8”	1.0	$4,000	$1,800
General Facilities	1”	2.5	$6,800	$1,870
Charge &	1.5”	5.0	$12,977	$2,050
Connection Fees	2”	8.0	$21,200	$2,575
	3”	16.0	$40,000	125% labor & Materials
	4”	25.0	$66,665	125% labor & Materials

All users will pay the monthly flat rate fee whether water is used or not. Once a water service is provided to a particular location, the water service will continue until the service is physically removed from the system.

D2. Future Water Rates

Future water rates are recommended by a system evaluation conducted by the City of Fircrest Department of Public Works. The recommendation is then brought to the City Council for approval. The annual water fees are determined based on the anticipated operating costs, capital improvements costs and cash reserve requirements. These rates are expected to increase to pay for water system improvements through the six-year operating budget period.

SIX YEAR OPERATING BUDGET FOR:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1

LINE #	BUDGET HEADING	YEAR 2014	YEAR 2015	YEAR 2016	YEAR 2017	YEAR 2018	YEAR 2019
1	REVENUES						
2	Water Rates	$822,500	$822,500	$822,500	$822,500	$822,500	$822,500
3	Fees and Service	$28,300	$20,300	$20,300	$20,300	$20,300	$20,300
4	Other Revenue	$71,030	$71,740	$72,458	$73,182	$73,914	$74,653
5	TOTAL REVENUES (sum 2 - 4):	$921,830	$914,540	$915,258	$915,982	$916,714	$917,453
6	EXPENSES						
7	Operation and Maintenance Expenses						
8	Salaries and other Benefits	$157,310	$165,176	$173,434	$182,106	$191,211	$200,772
9	Power and Other Utilities	$62,000	$63,860	$65,776	$67,749	$69,782	$71,875
10	Chemical and Treatment	$4,200	$4,326	$4,456	$4,589	$4,727	$4,869
11	Monitoring	$8,500	$8,755	$9,018	$9,288	$9,567	$9,854
12	Materials, Supplies and Parts	$32,375	$32,699	$33,026	$33,356	$33,690	$34,026
13	Transportation Expenses	$10,191	$10,293	$10,396	$10,500	$10,605	$10,711
14	Miscellaneous Expenses	$23,320	$23,553	$23,789	$24,027	$24,267	$24,510
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$297,896	$308,661	$319,894	$331,615	$343,848	$356,616
16	General and Administrative Expenses						
17	Salaries and Benefits	$199,975	$209,974	$220,472	$231,496	$243,071	$255,224
18	Office Supplies and Postage	$7,350	$7,424	$7,498	$7,573	$7,648	$7,725
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,075	$13,206	$13,338	$13,471	$13,606	$13,742
20	Legal and Accounting	$133,204	$134,536	$135,881	$137,240	$138,613	$139,999
21	Engineering and Professional Services	$30,000	$30,900	$31,827	$32,782	$33,765	$34,778
22	Fees (including land rental)	$24,575	$24,821	$25,069	$25,320	$25,573	$25,829
23	Miscellaneous Expenses (e.g., Training)	$2,500	$2,525	$2,550	$2,576	$2,602	$2,628
24	Total General and Administrative Expenses (sum 17 - 23)	$410,679	$423,385	$436,636	$450,457	$464,877	$479,924
25	Depreciation expense (If Applicable)						
26	TOTAL EXPENSES (15+24+25)	$708,575	$732,046	$756,529	$782,072	$808,725	$836,541
27	Taxes (Property, B&O, Income)	$107,164	$108,771	$110,403	$112,059	$113,740	$115,446
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170	$54,170	$54,170	$54,170	$54,170	$54,170
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$325,020	$270,850	$216,680	$162,510	$108,340	$54,170
30	Capital Improvements Program Expenditures						
31	New CIP Facilities (incl. capital engineering)	$70,000	$72,000	$12,000	$12,000	$2,000	$2,000
32	Renewal & Replacements Facilities	$40,000	$45,000	$287,500	$250,000	$60,000	$90,000
33	Safe Drinking Water Act Facilities	$0					
34	Non-Facility Costs (conservation program etc.)	Included in Administration and General Expenses					
35	Capital Sources						
36	Loan/Bonds Funds	$0					
37	Grants	$0					
38	Special Charges	$0					
39	Withdrawal from Existing Reserves	(see line 44)					
40	Net CIP (31+32+33+34)-(36+37+38+39)	$110,000	$117,000	$299,500	$262,000	$62,000	$92,000
41	Operating Cash Reserve						
42	Minimum Balance [1/8 * (line 15 + line 24)]	$88,572	$91,506	$94,566	$97,759	$101,091	$104,568
43	Annual Installment	The annual installment is equal to the budget surplus.					
44	Running Balance ($790,000 Beginning Balance)	$790,000	$731,921	$634,474	$329,129	$34,810	($87,112)
45	Emergency Reserve						
46	Minimum Balance (Cost of Most Vulnerable Facility)	$787,680	Cummulative Reserve				
47	Annual Installment						
48	Running Balance (May be Alternative Financing)						
49	Replacement Reserve (May be Alternative Financing)	Replacement Reserves are included in the operating cash reserve.					
50	Target Balance (System Replacement Cost)						
51	Annual Installment						
52	Running Balance						
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$979,909	$1,011,988	$1,220,602	$1,210,302	$1,038,635	$1,098,157
54	BUDGET SURPLUS (DEFICIT) (5-53)	($58,079)	($97,447)	($305,345)	($294,319)	($121,921)	($180,704)

SIX YEAR OPERATING BUDGET FOR:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1 - With Rate Increase of $2/mo base and $0.004/cf incremental

LINE #	BUDGET HEADING	YEAR 2014	YEAR 2015	YEAR 2016	YEAR 2017	YEAR 2018	YEAR 2019
1	REVENUES						
2	Water Rates	$870,000	$925,000	$925,000	$925,000	$925,000	$925,000
3	Fees and Service	$28,300	$20,300	$20,300	$20,300	$20,300	$20,300
4	Other Revenue	$71,030	$71,740	$72,458	$73,182	$73,914	$74,653
5	TOTAL REVENUES (sum 2 - 4):	$969,330	$1,017,040	$1,017,758	$1,018,482	$1,019,214	$1,019,953
6	EXPENSES						
7	Operation and Maintenance Expenses						
8	Salaries and other Benefits	$157,310	$165,176	$173,434	$182,106	$191,211	$200,772
9	Power and Other Utilities	$62,000	$63,860	$65,776	$67,749	$69,782	$71,875
10	Chemical and Treatment	$4,200	$4,326	$4,456	$4,589	$4,727	$4,869
11	Monitoring	$8,500	$8,755	$9,018	$9,288	$9,567	$9,854
12	Materials, Supplies and Parts	$32,375	$32,699	$33,026	$33,356	$33,690	$34,026
13	Transportation Expenses	$10,191	$10,293	$10,396	$10,500	$10,605	$10,711
14	Miscellaneous Expenses	$23,320	$23,553	$23,789	$24,027	$24,267	$24,510
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$297,896	$308,661	$319,894	$331,615	$343,848	$356,616
16	General and Administrative Expenses						
17	Salaries and Benefits	$199,975	$209,974	$220,472	$231,496	$243,071	$255,224
18	Office Supplies and Postage	$7,350	$7,424	$7,498	$7,573	$7,648	$7,725
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,075	$13,206	$13,338	$13,471	$13,606	$13,742
20	Legal and Accounting	$133,204	$134,536	$135,881	$137,240	$138,613	$139,999
21	Engineering and Professional Services	$30,000	$30,900	$31,827	$32,782	$33,765	$34,778
22	Fees (including land rental)	$24,575	$24,821	$25,069	$25,320	$25,573	$25,829
23	Miscellaneous Expenses (e.g., Training)	$2,500	$2,525	$2,550	$2,576	$2,602	$2,628
24	Total General and Administrative Expenses (sum 17 - 23)	$410,679	$423,385	$436,636	$450,457	$464,877	$479,924
25	Depreciation expense (If Applicable)						
26	TOTAL EXPENSES (15+24+25)	$708,575	$732,046	$756,529	$782,072	$808,725	$836,541
27	Taxes (Property, B&O, Income)	$107,164	$108,771	$110,403	$112,059	$113,740	$115,446
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170	$54,170	$54,170	$54,170	$54,170	$54,170
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$325,020	$270,850	$216,680	$162,510	$108,340	$54,170
30	Capital Improvements Program Expenditures						
31	New CIP Facilities (incl. capital engineering)	$70,000	$72,000	$12,000	$12,000	$2,000	$2,000
32	Renewal & Replacements Facilities	$40,000	$45,000	$287,500	$250,000	$60,000	$90,000
33	Safe Drinking Water Act Facilities	$0					
34	Non-Facility Costs (conservation program etc.)	Included in Administration and General Expenses					
35	Capital Sources						
36	Loan/Bonds Funds	$0					
37	Grants	$0					
38	Special Charges	$0					
39	Withdrawal from Existing Reserves	(see line 44)					
40	Net CIP (31+32+33+34)-(36+37+38+39)	$110,000	$117,000	$299,500	$262,000	$62,000	$92,000
41	Operating Cash Reserve						
42	Minimum Balance [1/8 * (line 15 + line 24)]	$88,572	$91,506	$94,566	$97,759	$101,091	$104,568
43	Annual Installment	The annual installment is equal to the budget surplus.					
44	Running Balance ($790,000 Beginning Balance)	$790,000	$779,421	$784,474	$581,629	$389,810	$370,388
45	Emergency Reserve						
46	Minimum Balance (Cost of Most Vulnerable Facility)	$787,680	Cummulative Reserve				
47	Annual Installment						
48	Running Balance (May be Alternative Financing)						
49	Replacement Reserve (May be Alternative Financing)	Replacement Reserves are included in the operating cash reserve.					
50	Target Balance (System Replacement Cost)						
51	Annual Installment						
52	Running Balance						
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$979,909	$1,011,988	$1,220,602	$1,210,302	$1,038,635	$1,098,157
54	BUDGET SURPLUS (DEFICIT) (5-53)	($10,579)	$5,053	($202,845)	($191,819)	($19,421)	($78,204)

SIX YEAR OPERATING BUDGET FOR:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1 - With Rate Increase of $3/mo base and $0.006/cf incremental

LINE #	BUDGET HEADING	YEAR 2014	YEAR 2015	YEAR 2016	YEAR 2017	YEAR 2018	YEAR 2019
1	REVENUES						
2	Water Rates	$900,000	$980,000	$980,000	$980,000	$980,000	$980,000
3	Fees and Service	$28,300	$20,300	$20,300	$20,300	$20,300	$20,300
4	Other Revenue	$71,030	$71,740	$72,458	$73,182	$73,914	$74,653
5	TOTAL REVENUES (sum 2 - 4):	$999,330	$1,072,040	$1,072,758	$1,073,482	$1,074,214	$1,074,953
6	EXPENSES						
7	Operation and Maintenance Expenses						
8	Salaries and other Benefits	$157,310	$165,176	$173,434	$182,106	$191,211	$200,772
9	Power and Other Utilities	$62,000	$63,860	$65,776	$67,749	$69,782	$71,875
10	Chemical and Treatment	$4,200	$4,326	$4,456	$4,589	$4,727	$4,869
11	Monitoring	$8,500	$8,755	$9,018	$9,288	$9,567	$9,854
12	Materials, Supplies and Parts	$32,375	$32,699	$33,026	$33,356	$33,690	$34,026
13	Transportation Expenses	$10,191	$10,293	$10,396	$10,500	$10,605	$10,711
14	Miscellaneous Expenses	$23,320	$23,553	$23,789	$24,027	$24,267	$24,510
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$297,896	$308,661	$319,894	$331,615	$343,848	$356,616
16	General and Administrative Expenses						
17	Salaries and Benefits	$199,975	$209,974	$220,472	$231,496	$243,071	$255,224
18	Office Supplies and Postage	$7,350	$7,424	$7,498	$7,573	$7,648	$7,725
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,075	$13,206	$13,338	$13,471	$13,606	$13,742
20	Legal and Accounting	$133,204	$134,536	$135,881	$137,240	$138,613	$139,999
21	Engineering and Professional Services	$30,000	$30,900	$31,827	$32,782	$33,765	$34,778
22	Fees (including land rental)	$24,575	$24,821	$25,069	$25,320	$25,573	$25,829
23	Miscellaneous Expenses (e.g., Training)	$2,500	$2,525	$2,550	$2,576	$2,602	$2,628
24	Total General and Administrative Expenses (sum 17 - 23)	$410,679	$423,385	$436,636	$450,457	$464,877	$479,924
25	Depreciation expense (If Applicable)						
26	TOTAL EXPENSES (15+24+25)	$708,575	$732,046	$756,529	$782,072	$808,725	$836,541
27	Taxes (Property, B&O, Income)	$107,164	$108,771	$110,403	$112,059	$113,740	$115,446
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170	$54,170	$54,170	$54,170	$54,170	$54,170
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$325,020	$270,850	$216,680	$162,510	$108,340	$54,170
30	Capital Improvements Program Expenditures						
31	New CIP Facilities (incl. capital engineering)	$70,000	$72,000	$12,000	$12,000	$2,000	$2,000
32	Renewal & Replacements Facilities	$40,000	$45,000	$287,500	$250,000	$60,000	$90,000
33	Safe Drinking Water Act Facilities	$0					
34	Non-Facility Costs (conservation program etc.)	Included in Administration and General Expenses					
35	Capital Sources						
36	Loan/Bonds Funds	$0					
37	Grants	$0					
38	Special Charges	$0					
39	Withdrawal from Existing Reserves	(see line 44)					
40	Net CIP (31+32+33+34)-(36+37+38+39)	$110,000	$117,000	$299,500	$262,000	$62,000	$92,000
41	Operating Cash Reserve						
42	Minimum Balance [1/8 * (line 15 + line 24)]	$88,572	$91,506	$94,566	$97,759	$101,091	$104,568
43	Annual Installment	The annual installment is equal to the budget surplus.					
44	Running Balance ($790,000 Beginning Balance)	$790,000	$809,421	$869,474	$721,629	$584,810	$620,388
45	Emergency Reserve						
46	Minimum Balance (Cost of Most Vulnerable Facility)	$787,680	Cummulative Reserve				
47	Annual Installment						
48	Running Balance (May be Alternative Financing)						
49	Replacement Reserve (May be Alternative Financing)	Replacement Reserves are included in the operating cash reserve.					
50	Target Balance (System Replacement Cost)						
51	Annual Installment						
52	Running Balance						
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$979,909	$1,011,988	$1,220,602	$1,210,302	$1,038,635	$1,098,157
54	BUDGET SURPLUS (DEFICIT) (5-53)	$19,421	$60,053	($147,845)	($136,819)	$35,579	($23,204)

BUDGET TO ACTUAL WORKSHEET:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1A

LINE #	BUDGET HEADING	Budget Year 2014	Actual Year 2014	Surplus/(Deficit)
1	REVENUES			
2	Water rates	$822,500		
3	Fees and Service	$28,300		
4	Other Revenue	$71,030		
5	TOTAL REVENUES (sum 2 - 4):	$921,830		
6	EXPENSES			
7	Operation and Maintenance Expenses			
8	Salaries and other Benefits	$157,310		
9	Power and Other Utilities	$62,000		
10	Chemical and Treatment	$4,200		
11	Monitoring	$8,500		
12	Materials, Supplies and Parts	$32,375		
13	Transportation Expenses	$10,191		
14	Miscellaneous Expenses	$23,320		
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$297,896		
16	General and Administrative Expenses			
17	Salaries and Benefits	$199,975		
18	Office Supplies and Postage	$7,350		
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,075		
20	Legal and Accounting	$133,204		
21	Engineering and Professional Services	$30,000		
22	Fees	$24,575		
23	Miscellaneous Expenses (e.g., Training)	$2,500		
24	Total General and Administrative Expenses (sum 17 - 23)	$410,679		
25	Depreciation expense (If Applicable)			
26	TOTAL EXPENSES (15+24+25)	$708,575		
27	Taxes (Property, B&O, Income)	$107,164		
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170		
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$325,020		
30	Capital Improvements Program Expenditures			
31	New CIP Facilities	$70,000		
32	Renewal & Replacements Facilities	$40,000		
33	Safe Drinking Water Act Facilities	$0		
34	Non-Facility Costs (conservation program etc.)	Included in Administration and General Expenses		
35	Capital Sources			
36	Loan/Bonds Funds	$0		
37	Grants	$0		
38	Special Charges	$0		
39	Withdrawal from Existing Reserves	$0		
40	Net CIP (31+32+33+34)-(36+37+38+39)	$110,000		
41	Operating Cash Reserve			
42	Minimum Balance [1/8 * (line 15 + line 24)]	$88,572		
43	Annual Installment	The annual installment is equal to the budget surplus.		
44	Running Balance	$790,000		
45	Emergency Reserve			
46	Minimum Balance (Cost of Most Vulnerable Facility)	$787,680		
47	Annual Installment			
48	Running Balance (May be Alternative Financing)			
49	Replacement Reserve (May be Alternative Financing)	Replacement Reserves are included in the operating cash reserve.		
50	Target Balance (System Replacement Cost)			
51	Annual Installment			
52	Running Balance			
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$979,909		
54	BUDGET SURPLUS (DEFICIT) (5-53)	($58,079)		

BUDGET TO ACTUAL WORKSHEET:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1A

LINE #	BUDGET HEADING	Budget Year 2015	Actual Year 2015	Surplus/(Deficit)
1	REVENUES			
2	Water rates	$822,500		
3	Fees and Service	$20,300		
4	Other Revenue	$0		
5	TOTAL REVENUES (sum 2 - 4):	$842,800		
6	EXPENSES			
7	Operation and Maintenance Expenses			
8	Salaries and other Benefits	$165,176		
9	Power and Other Utilities	$63,860		
10	Chemical and Treatment	$4,326		
11	Monitoring	$8,755		
12	Materials, Supplies and Parts	$32,699		
13	Transportation Expenses	$10,293		
14	Miscellaneous Expenses	$23,553		
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$308,662		
16	General and Administrative Expenses			
17	Salaries and Benefits	$209,974		
18	Office Supplies and Postage	$7,424		
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,206		
20	Legal and Accounting	$134,536		
21	Engineering and Professional Services	$30,900		
22	Fees	$24,821		
23	Miscellaneous Expenses (e.g., Training)	$2,525		
24	Total General and Administrative Expenses (sum 17 - 23)	$423,385		
25	Depreciation expense (If Applicable)			
26	TOTAL EXPENSES (15+24+25)	$732,047		
27	Taxes (Property, B&O, Income)	$108,771		
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170		
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$270,850		
30	Capital Improvements Program Expenditures			
31	New CIP Facilities	$72,000		
32	Renewal & Replacements Facilities	$45,000		
33	Safe Drinking Water Act Facilities	$0		
34	Non-Facility Costs (conservation program etc.)			
35	Capital Sources			
36	Loan/Bonds Funds	$0		
37	Grants	$0		
38	Special Charges	$0		
39	Withdrawal from Existing Reserves	$0		
40	Net CIP (31+32+33+34)-(36+37+38+39)	$117,000		
41	Operating Cash Reserve			
42	Minimum Balance [1/8 * (line 15 + line 24)]	$91,506		
43	Annual Installment			
44	Running Balance	$731,921		
45	Emergency Reserve			
46	Minimum Balance (Cost of Most Vulnerable Facility)	Cummulative Reserve		
47	Annual Installment			
48	Running Balance (May be Alternative Financing)			
49	Replacement Reserve (May be Alternative Financing)			
50	Target Balance (System Replacement Cost)			
51	Annual Installment			
52	Running Balance			
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$1,011,988		
54	BUDGET SURPLUS (DEFICIT) (5-53)	($169,188)		

BUDGET TO ACTUAL WORKSHEET:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1A

LINE #	BUDGET HEADING	Budget Year 2016	Actual Year 2016	Surplus/(Deficit)
1	REVENUES			
2	Water rates	$822,500		
3	Fees and Service	$20,300		
4	Other Revenue	$72,458		
5	TOTAL REVENUES (sum 2 - 4):	$915,258		
6	EXPENSES			
7	Operation and Maintenance Expenses			
8	Salaries and other Benefits	$173,434		
9	Power and Other Utilities	$65,776		
10	Chemical and Treatment	$4,456		
11	Monitoring	$9,018		
12	Materials, Supplies and Parts	$33,026		
13	Transportation Expenses	$10,396		
14	Miscellaneous Expenses	$23,789		
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$319,895		
16	General and Administrative Expenses			
17	Salaries and Benefits	$220,472		
18	Office Supplies and Postage	$7,498		
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,338		
20	Legal and Accounting	$135,881		
21	Engineering and Professional Services	$31,827		
22	Fees	$25,069		
23	Miscellaneous Expenses (e.g., Training)	$2,550		
24	Total General and Administrative Expenses (sum 17 - 23)	$436,635		
25	Depreciation expense (If Applicable)			
26	TOTAL EXPENSES (15+24+25)	$756,530		
27	Taxes (Property, B&O, Income)	$110,403		
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170		
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$216,680		
30	Capital Improvements Program Expenditures			
31	New CIP Facilities	$12,000		
32	Renewal & Replacements Facilities	$287,500		
33	Safe Drinking Water Act Facilities	$0		
34	Non-Facility Costs (conservation program etc.)			
35	Capital Sources			
36	Loan/Bonds Funds	$0		
37	Grants	$0		
38	Special Charges	$0		
39	Withdrawal from Existing Reserves	$0		
40	Net CIP (31+32+33+34)-(36+37+38+39)	$299,500		
41	Operating Cash Reserve			
42	Minimum Balance [1/8 * (line 15 + line 24)]	$94,566		
43	Annual Installment			
44	Running Balance	$634,474		
45	Emergency Reserve			
46	Minimum Balance (Cost of Most Vulnerable Facility)			
47	Annual Installment			
48	Running Balance (May be Alternative Financing)			
49	Replacement Reserve (May be Alternative Financing)			
50	Target Balance (System Replacement Cost)			
51	Annual Installment			
52	Running Balance			
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$1,220,603		
54	BUDGET SURPLUS (DEFICIT) (5-53)	($305,345)		

BUDGET TO ACTUAL WORKSHEET:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1A

LINE #	BUDGET HEADING	Budget Year 2017	Actual Year 2017	Surplus/(Deficit)
1	REVENUES			
2	Water rates	$822,500		
3	Fees and Service	$20,300		
4	Other Revenue	$73,182		
5	TOTAL REVENUES (sum 2 - 4):	$915,982		
6	EXPENSES			
7	Operation and Maintenance Expenses			
8	Salaries and other Benefits	$182,106		
9	Power and Other Utilities	$67,749		
10	Chemical and Treatment	$4,589		
11	Monitoring	$9,288		
12	Materials, Supplies and Parts	$33,356		
13	Transportation Expenses	$10,500		
14	Miscellaneous Expenses	$24,027		
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$331,615		
16	General and Administrative Expenses			
17	Salaries and Benefits	$231,496		
18	Office Supplies and Postage	$7,573		
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,471		
20	Legal and Accounting	$137,240		
21	Engineering and Professional Services	$32,782		
22	Fees	$25,320		
23	Miscellaneous Expenses (e.g., Training)	$2,576		
24	Total General and Administrative Expenses (sum 17 - 23)	$450,458		
25	Depreciation expense (If Applicable)			
26	TOTAL EXPENSES (15+24+25)	$782,073		
27	Taxes (Property, B&O, Income)	$112,059		
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170		
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$162,510		
30	Capital Improvements Program Expenditures			
31	New CIP Facilities	$12,000		
32	Renewal & Replacements Facilities	$250,000		
33	Safe Drinking Water Act Facilities	$0		
34	Non-Facility Costs (conservation program etc.)			
35	Capital Sources			
36	Loan/Bonds Funds	$0		
37	Grants	$0		
38	Special Charges	$0		
39	Withdrawal from Existing Reserves	$0		
40	Net CIP (31+32+33+34)-(36+37+38+39)	$262,000		
41	Operating Cash Reserve			
42	Minimum Balance [1/8 * (line 15 + line 24)]	$97,759		
43	Annual Installment			
44	Running Balance	$329,129		
45	Emergency Reserve			
46	Minimum Balance (Cost of Most Vulnerable Facility)			
47	Annual Installment			
48	Running Balance (May be Alternative Financing)			
49	Replacement Reserve (May be Alternative Financing)			
50	Target Balance (System Replacement Cost)			
51	Annual Installment			
52	Running Balance			
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$1,210,302		
54	BUDGET SURPLUS (DEFICIT) (5-53)	($294,320)		

BUDGET TO ACTUAL WORKSHEET:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1A

LINE #	BUDGET HEADING	Budget Year 2018	Actual Year 2018	Surplus/(Deficit)
1	REVENUES			
2	Water rates	$822,500		
3	Fees and Service	$20,300		
4	Other Revenue	$73,914		
5	TOTAL REVENUES (sum 2 - 4):	$916,714		
6	EXPENSES			
7	Operation and Maintenance Expenses			
8	Salaries and other Benefits	$191,211		
9	Power and Other Utilities	$69,782		
10	Chemical and Treatment	$4,727		
11	Monitoring	$9,567		
12	Materials, Supplies and Parts	$33,690		
13	Transportation Expenses	$10,605		
14	Miscellaneous Expenses	$24,267		
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$343,849		
16	General and Administrative Expenses			
17	Salaries and Benefits	$243,071		
18	Office Supplies and Postage	$7,648		
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,606		
20	Legal and Accounting	$138,613		
21	Engineering and Professional Services	$33,765		
22	Fees	$25,573		
23	Miscellaneous Expenses (e.g., Training)	$2,602		
24	Total General and Administrative Expenses (sum 17 - 23)	$464,878		
25	Depreciation expense (If Applicable)			
26	TOTAL EXPENSES (15+24+25)	$808,727		
27	Taxes (Property, B&O, Income)	$113,740		
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170		
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$108,340		
30	Capital Improvements Program Expenditures			
31	New CIP Facilities	$2,000		
32	Renewal & Replacements Facilities	$60,000		
33	Safe Drinking Water Act Facilities	$0		
34	Non-Facility Costs (conservation program etc.)			
35	Capital Sources			
36	Loan/Bonds Funds	$0		
37	Grants	$0		
38	Special Charges	$0		
39	Withdrawal from Existing Reserves	$0		
40	Net CIP (31+32+33+34)-(36+37+38+39)	$62,000		
41	Operating Cash Reserve			
42	Minimum Balance [1/8 * (line 15 + line 24)]	$101,091		
43	Annual Installment			
44	Running Balance	$34,810		
45	Emergency Reserve			
46	Minimum Balance (Cost of Most Vulnerable Facility)			
47	Annual Installment			
48	Running Balance (May be Alternative Financing)			
49	Replacement Reserve (May be Alternative Financing)			
50	Target Balance (System Replacement Cost)			
51	Annual Installment			
52	Running Balance			
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$1,038,637		
54	BUDGET SURPLUS (DEFICIT) (5-53)	($121,923)		

BUDGET TO ACTUAL WORKSHEET:

Date: 1/15/2014

Prepared by: TJL

Worksheet #1A

LINE #	BUDGET HEADING	Budget Year 2019	Actual Year 2019	Surplus/(Deficit)
1	REVENUES			
2	Water rates	$822,500		
3	Fees and Service	$20,300		
4	Other Revenue	$74,653		
5	TOTAL REVENUES (sum 2 - 4):	$917,453		
6	EXPENSES			
7	Operation and Maintenance Expenses			
8	Salaries and other Benefits	$200,772		
9	Power and Other Utilities	$71,875		
10	Chemical and Treatment	$4,869		
11	Monitoring	$9,854		
12	Materials, Supplies and Parts	$34,026		
13	Transportation Expenses	$10,711		
14	Miscellaneous Expenses	$24,510		
15	Total Operation and Maintenance Expenses (sum 8 - 14)	$356,617		
16	General and Administrative Expenses			
17	Salaries and Benefits	$255,224		
18	Office Supplies and Postage	$7,725		
19	Insurance - Vehicles, Liability, Workers' Compensation	$13,742		
20	Legal and Accounting	$139,999		
21	Engineering and Professional Services	$34,778		
22	Fees	$25,829		
23	Miscellaneous Expenses (e.g., Training)	$2,628		
24	Total General and Administrative Expenses (sum 17 - 23)	$479,925		
25	Depreciation expense (If Applicable)			
26	TOTAL EXPENSES (15+24+25)	$836,542		
27	Taxes (Property, B&O, Income)	$115,446		
28	Annual Debt Payments - Loans/Bonds (principal and interest)	$54,170		
29	Total Outstanding Debt - Loans/Bonds (principal and interest)	$54,170		
30	Capital Improvements Program Expenditures			
31	New CIP Facilities	$2,000		
32	Renewal & Replacements Facilities	$90,000		
33	Safe Drinking Water Act Facilities	$0		
34	Non-Facility Costs (conservation program etc.)			
35	Capital Sources			
36	Loan/Bonds Funds	$0		
37	Grants	$0		
38	Special Charges	$0		
39	Withdrawal from Existing Reserves	$0		
40	Net CIP (31+32+33+34)-(36+37+38+39)	$92,000		
41	Operating Cash Reserve			
42	Minimum Balance [1/8 * (line 15 + line 24)]	$104,568		
43	Annual Installment			
44	Running Balance	($87,112)		
45	Emergency Reserve			
46	Minimum Balance (Cost of Most Vulnerable Facility)			
47	Annual Installment			
48	Running Balance (May be Alternative Financing)			
49	Replacement Reserve (May be Alternative Financing)			
50	Target Balance (System Replacement Cost)			
51	Annual Installment			
52	Running Balance			
53	TOTAL REVENUE REQUIRED (26+27+28+40+43+47+51)	$1,098,158		
54	BUDGET SURPLUS (DEFICIT) (5-53)	($180,705)		

OPERATING CASH RESERVE DISCLOSURE FORM:

Worksheet #3

Type of Account:

X bank checking/savings _____ escrow account _____ trustee account

X other (specify) State Investment Pool

Name of bank or institution: Columbia Bank

EMERGENCY RESERVE DISCLOSURE FORM:

Worksheet #4

Type of Account:

_____ bank checking/savings _____ escrow account _____ trustee account

_____ other (specify) _____

Name of bank or institution: _____

OR

Type of commitment

_____ surety bond _____ letter of credit _____ guarantor

_____ other (specify) _____

Name of bank or name and relationship of guarantor: _____

_____

FINANCIAL VIABILITY TEST SUMMARY:

Date: 9/15/2000

Worksheet #5

Prepared by: TJL

LINE #	BUDGET HEADING	Budget Year 1	Budget Year 6	Basis for Calculation
TEST #1	Do you have a budget in place, and are rates			
	sufficient to cover expenses?			
1	REVENUES			
2	Water rates	$822,500	$822,500	From Worksheet 1, Line 2
3	Other Revenue	$99,330	$94,953	From Worksheet 1, Lines 3+4
4	TOTAL REVENUE (sum 2 - 3):	$921,830	$917,453	Should = Line 5 of Worksheet 1
5	EXPENSES			
6	Total O&M, A&G, and Depreciation Expenses	$708,575	$836,541	From Worksheet 1, Line 26
7	Taxes (Property, B&O)	$107,164	$115,446	From Worksheet 1, Line 27
8	Debt Service Payments	$54,170	$54,170	From Worksheet 1, Line 28
9	Net CIP From Rates	$110,000	$92,000	From Worksheet 1, Line 40
10	Operating Cash Reserve (Increase)	$0	$0	From Worksheet 1, Line 43
11	Emergency Reserve (Increase)	$0	$0	From Worksheet 1, Line 47
12	Replacement Reserve (Voluntary Increase)	$0	$0	From Worksheet 1, Line 51
13	TOTAL REVENUE REQUIRED (sum 6-12)	$979,909	$1,098,157	Should = Line 53 of Worksheet 1
14	Required Water Revenue (Line 13-Line3)	$880,579	$1,003,204	Total Expenses Less Other Revenue
15	Is Line 4 >= Line 13	No	No	Yes/No; If No, Go Back & Raise
				Rates or Reduce Expenses
TEST #2	Is the Operating Cash Reserve equal to or greater			
	than [(O&M + G&A budget subtotal x 45)365]?			
16	Current Operating Reserve (beginning of year)	$790,000	($87,112)	From Worksheet 1, Line 44
17	Plus: Budgeted Increase (Line 10)	$0	$0	
18	Total Operating Cash Res. Funds (Line 16+17)(end of year)	$790,000	($87,112)	
19	Required Operating Cash Reserve (Line 6 x 0.125)	$88,572	$104,568	From Worksheet 1, Line 42
20	Is Line 18 >= Line 19	Yes	No	Yes/No; If No, Continue to Budget
				Annual Increases in Budget
TEST #3	Is the Emergency Reserve equal to or greater than			
	the cost of the most vulnerable facility?			
21	Current Emergency Reserve (beginning of year)	$0	$0	From Worksheet 1, Line 48, or
				Separate Emer. Reserve (Alt. Fin.)
22	Plus: Budgeted Increase (Line 11)	$0	$0	From Worksheet 1, Line 47
23	Total Emergency Res. Funds (Line 21+22)(end of year)	$790,000	($87,112)	From Worksheet 1, Line 48
24	Cost of most vulnerable facility	$787,680	$787,680	From Worksheet 1, Line 46
25	Is Line 23 => Line 24	Yes	No	For Budget Year 6, Yes/No; If No,
				Increase Annual Budget
TEST #4	Household Income Index; Is 1.5 percent of Median			
	Household Income => Cost/ERU?			
26	Median Household Income (Appendix E)	$63,798	$63,798	
27	Median Household Income x 0.015	$957	$957	
28	Cost/ERU (Line 14/Line31)	$311	$353	
29	Is Line 27 => Line 28	Yes	Yes	Yes/No; If No, DOH suggests system
				explore restructuring option or revise
				Improvement Implementation Schedule
	Customer Data			
30	Median Household Income	$63,798	$63,798	From Appendix E
31	Total Number of Equivalent Residential Units	2830	2842	From Your Customer Records/WSP
32	(ERU) Method			

FINANCIAL VIABILITY TEST SUMMARY:

Date: 9/15/2000

Prepared by: TJL

Worksheet #5 - With Rate Increase of $2/mo base and $0.004/cf incremental

LINE #	BUDGET HEADING	Budget Year 1	Budget Year 6	Basis for Calculation
TEST #1	Do you have a budget in place, and are rates			
	sufficient to cover expenses?			
1	REVENUES			
2	Water rates	$870,000	$925,000	From Worksheet 1, Line 2
3	Other Revenue	$99,330	$94,953	From Worksheet 1, Lines 3+4
4	TOTAL REVENUE (sum 2 - 3):	$969,330	$1,019,953	Should = Line 5 of Worksheet 1
5	EXPENSES			
6	Total O&M, A&G, and Depreciation Expenses	$708,575	$836,541	From Worksheet 1, Line 26
7	Taxes (Property, B&O)	$107,164	$115,446	From Worksheet 1, Line 27
8	Debt Service Payments	$54,170	$54,170	From Worksheet 1, Line 28
9	Net CIP From Rates	$110,000	$92,000	From Worksheet 1, Line 40
10	Operating Cash Reserve (Increase)	$0	$0	From Worksheet 1, Line 43
11	Emergency Reserve (Increase)	$0	$0	From Worksheet 1, Line 47
12	Replacement Reserve (Voluntary Increase)	$0	$0	From Worksheet 1, Line 51
13	TOTAL REVENUE REQUIRED (sum 6-12)	$979,909	$1,098,157	Should = Line 53 of Worksheet 1
14	Required Water Revenue (Line 13-Line3)	$880,579	$1,003,204	Total Expenses Less Other Revenue
15	Is Line 4 >= Line 13	No	No	Yes/No; If No, Go Back & Raise
				Rates or Reduce Expenses
TEST #2	Is the Operating Cash Reserve equal to or greater			
	than [(O&M + G&A budget subtotal x 45)365]?			
16	Current Operating Reserve (beginning of year)	$790,000	$370,388	From Worksheet 1, Line 44
17	Plus: Budgeted Increase (Line 10)	$0	$0	
18	Total Operating Cash Res. Funds (Line 16+17)(end of year)	$790,000	$370,388	
19	Required Operating Cash Reserve (Line 6 x 0.125)	$88,572	$104,568	From Worksheet 1, Line 42
20	Is Line 18 >= Line 19	Yes	Yes	Yes/No; If No, Continue to Budget
				Annual Increases in Budget
TEST #3	Is the Emergency Reserve equal to or greater than			
	the cost of the most vulnerable facility?			
21	Current Emergency Reserve (beginning of year)	$0	$0	From Worksheet 1, Line 48, or
				Separate Emer. Reserve (Alt. Fin.)
22	Plus: Budgeted Increase (Line 11)	$0	$0	From Worksheet 1, Line 47
23	Total Emergency Res. Funds (Line 21+22)(end of year)	$790,000	$370,388	From Worksheet 1, Line 48
24	Cost of most vulnerable facility	$787,680	$787,680	From Worksheet 1, Line 46
25	Is Line 23 => Line 24	Yes	No	For Budget Year 6, Yes/No; If No,
				Increase Annual Budget
TEST #4	Household Income Index; Is 1.5 percent of Median			
	Household Income => Cost/ERU?			
26	Median Household Income (Appendix E)	$63,798	$63,798	
27	Median Household Income x 0.015	$957	$957	
28	Cost/ERU (Line 14/Line31)	$311	$353	
29	Is Line 27 => Line 28	Yes	Yes	Yes/No; If No, DOH suggests system
				explore restructuring option or revise
				Improvement Implementation Schedule
	Customer Data			
30	Median Household Income	$63,798	$63,798	From Appendix E
31	Total Number of Equivalent Residential Units	2830	2842	From Your Customer Records/WSP
32	(ERU) Method			

FINANCIAL VIABILITY TEST SUMMARY:

Date: 9/15/2000

Prepared by: TJL

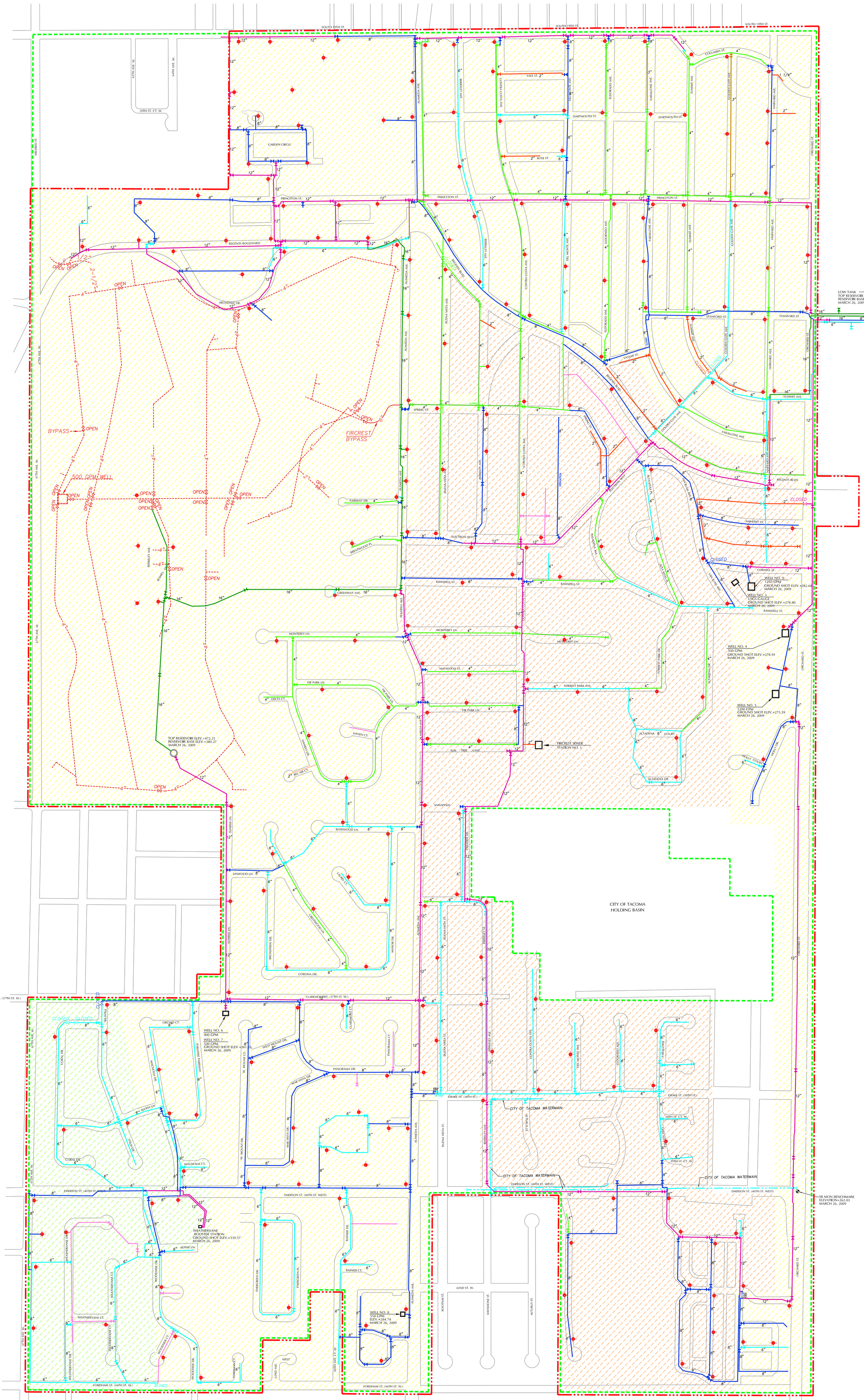
Worksheet #5 - With Rate Increase of $3/mo base and $0.006/cf incremental

LINE #	BUDGET HEADING	Budget Year 1	Budget Year 6	Basis for Calculation
TEST #1	Do you have a budget in place, and are rates			
	sufficient to cover expenses?			
1	REVENUES			
2	Water rates	$900,000	$980,000	From Worksheet 1, Line 2
3	Other Revenue	$99,330	$94,953	From Worksheet 1, Lines 3+4
4	TOTAL REVENUE (sum 2 - 3):	$999,330	$1,074,953	Should = Line 5 of Worksheet 1
5	EXPENSES			
6	Total O&M, A&G, and Depreciation Expenses	$708,575	$836,541	From Worksheet 1, Line 26
7	Taxes (Property, B&O)	$107,164	$115,446	From Worksheet 1, Line 27
8	Debt Service Payments	$54,170	$54,170	From Worksheet 1, Line 28
9	Net CIP From Rates	$110,000	$92,000	From Worksheet 1, Line 40
10	Operating Cash Reserve (Increase)	$0	$0	From Worksheet 1, Line 43
11	Emergency Reserve (Increase)	$0	$0	From Worksheet 1, Line 47
12	Replacement Reserve (Voluntary Increase)	$0	$0	From Worksheet 1, Line 51
13	TOTAL REVENUE REQUIRED (sum 6-12)	$979,909	$1,098,157	Should = Line 53 of Worksheet 1
14	Required Water Revenue (Line 13-Line3)	$880,579	$1,003,204	Total Expenses Less Other Revenue
15	Is Line 4 >= Line 13	Yes	Yes	Yes/No; If No, Go Back & Raise
				Rates or Reduce Expenses
TEST #2	Is the Operating Cash Reserve equal to or greater			
	than [(O&M + G&A budget subtotal x 45)365]?			
16	Current Operating Reserve (beginning of year)	$790,000	$620,388	From Worksheet 1, Line 44
17	Plus: Budgeted Increase (Line 10)	$0	$0	
18	Total Operating Cash Res. Funds (Line 16+17)(end of year)	$790,000	$620,388	
19	Required Operating Cash Reserve (Line 6 x 0.125)	$88,572	$104,568	From Worksheet 1, Line 42
20	Is Line 18 >= Line 19	Yes	Yes	Yes/No; If No, Continue to Budget
				Annual Increases in Budget
TEST #3	Is the Emergency Reserve equal to or greater than			
	the cost of the most vulnerable facility?			
21	Current Emergency Reserve (beginning of year)	$0	$0	From Worksheet 1, Line 48, or
				Separate Emer. Reserve (Alt. Fin.)
22	Plus: Budgeted Increase (Line 11)	$0	$0	From Worksheet 1, Line 47
23	Total Emergency Res. Funds (Line 21+22)(end of year)	$790,000	$620,388	From Worksheet 1, Line 48
24	Cost of most vulnerable facility	$787,680	$787,680	From Worksheet 1, Line 46
25	Is Line 23 => Line 24	Yes	No	For Budget Year 6, Yes/No; If No,
				Increase Annual Budget
TEST #4	Household Income Index; Is 1.5 percent of Median			
	Household Income => Cost/ERU?			
26	Median Household Income (Appendix E)	$63,798	$63,798	
27	Median Household Income x 0.015	$957	$957	
28	Cost/ERU (Line 14/Line31)	$311	$353	
29	Is Line 27 => Line 28	Yes	Yes	Yes/No; If No, DOH suggests system
				explore restructuring option or revise
				Improvement Implementation Schedule
	Customer Data			
30	Median Household Income	$63,798	$63,798	From Appendix E
31	Total Number of Equivalent Residential Units	2830	2842	From Your Customer Records/WSP
32	(ERU) Method			

APPENDIX A

Service Area Maps

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

SCALE: 1"=200 FEET
0 100 200 400

VERTICAL DATUM
SURFACE BRASSIE BENCKMARK
C/L EMERSON ST. AND ORCHARD ST.
ELEV.= 262.03, NGVD 29

LEGEND:
- 2 INCH
- 3 INCH
- 4 INCH
- 6 INCH
- 8 INCH
- 12 INCH
- 16 INCH
- UNKNOWN
- CITY OF TACOMA WATER
- FIRCREST CITY LIMITS
- EX. SERVICE AREA, RETAIL AREA, & FUTURE SERVICE AREA
- HIGH PRESSURE ZONE
- LOW PRESSURE ZONE
- BOOSTED PRESSURE ZONE
- HYDRANT
- VALVE
- BLOWOFF
- PRESSURE REDUCING VALVE

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

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Approved By

T.J.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

00400/06 Water/Water 2013 Basemap.dwg

SHT 1 OF 1