Water System Master Plan

City of East Palo Alto

Respectfully Submitted by:

Integrated Resource Management, LLC

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List of Abbreviations

ADD	Average Day Demand
AF	Acre-feet
AL	Action Level
CDPH	California Department of Public Health
CIP	Capital Improvement Projects
ccf	100 cubic feet
CCR	Consumer Confidence Report
CDPH	California Department of Public Health
DWR	Department of Water Resources
DWSAP	Drinking Water Source Assessment and Protection
FFD	Fire Flow Demands
ft	Feet
gpd	Gallons per Day
gpm	Gallons per Minute
LF	Linear Feet
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MG	Million Gallons
MGD	Million Gallons per Day
mg/L	Milligrams per Liter
PDD	Peak Day Demand
PHD	Peak Hour Demand
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
RBD	Ravenswood Business Development
SDWA	Safe Drinking Water Act
SFPUC	San Francisco Public Utilities Commission
SWRCB	State Water Resources Control Board
µg/L	Micrograms per Liter
USEPA	United States Environmental Protection Agency

1.0 EXECUTIVE SUMMARY

1.1 Background

American Water Services Company operates the City of East Palo Alto's water system via an operating agreement with the City. The City of East Palo Alto serves approximately 30,000 people in the city and a small section in the City of Menlo Park.

1.2 Water Supply

The existing water supply provided by the San Francisco Public Utilities Commission (SFPUC) through the regional Hetch Hetchy system is adequate to meet current demands. Presently, the water system is completely dependant on the Hetch Hetchy system for potable water. The City of East Palo Alto fluctuates around the 1.96 MGD Supply Assurance from SFPUC. In the future, SFPUC may not be able to meet the demands of the City of East Palo Alto., which are expected to increase by 63% over the next 20 years, mainly due to the Ravenswood Business District. To meet future demands and provide service during times of drought and emergencies, the City of East Palo Alto needs to explore other water sources.

The City also owns a groundwater well at Gloria Way and Bay Road (Gloria Bay Well), which is used exclusively for non-potable purposes (e.g. street cleaning and construction) because of the groundwater's high iron and manganese concentrations.

The City of East Palo Alto should install an iron and manganese treatment system for the Gloria Bay groundwater well, including an emergency backup power system. This will assist in the current demands that fluctuate around the SFPUC Supply Assurance. Construction of additional groundwater wells will also be needed, increasing water supply reliability by at least 1,000 gpm to meet future demands over the next 20 years.

Although the City of East Palo Alto maintains interties with the Palo Alto Mutual Water Company and the O'Connor Tract Mutual Water Company, these connections serve only as emergency supplies for the two mutual water companies; the emergency interties are not bidirectional and cannot provide water to the City water system. The City of East Palo Alto should commence negotiations for emergency interties with the City of Palo Alto and the City of Menlo Park. The proposed interties with the neighboring municipal water systems would ensure the City of East Palo Alto could meet the demands if SFPUC were to issue a reduction in supply order or if power outages or other water supply disruptions were to occur. Water quality analysis should be conducted on the systems that are supplied by groundwater in order to evaluate the impacts on compatibility with the Hetch Hetchy supply.

1.3 Water Distribution System

The existing water distribution system is a network of 1½- to 12-inch diameter pipes. There are three supply turnouts with the SFPUC for supply as well as two emergency interties that may serve water only to the two mutual water companies. The water system has nearly 300 fire hydrants. Treated water comes from the Hetch Hetchy Aqueduct at pressures ranging from 105 to 140 psi. The water supply turnouts are located on the aqueduct near its location at Willow Road, O'Brien Drive and University Avenue. Pressure-regulating valves at each water supply turnout reduce the pressure in the water distribution system. The valves are set to the following pressures: 70 psi at Willow Road, 75 psi at O'Brien Drive, and 75 psi at University Avenue.

The minimum standard pipeline diameter for the water distribution system should be eight inches. Presently, the water system has nearly 90,000 linear feet of six-inch pipelines. Upgrades to these pipelines are planned in accordance with long-term budget projections. As part of upgrading the water distribution system, and to account for future system demands, pipelines will need to be replaced with larger-diameter pipes to maintain adequate system pressures. In addition, upgrading all pipe sizes will increase the available fire flow to the water system.

Proposed pipeline replacements have been divided into five groups based upon the disparity between necessary fire flows, current fire flow availability, and size of pipe. The total pipeline replacement program includes approximately 201,000 LF of pipeline at a total estimated cost of $32,100,000.

1.4 Water Storage

The City of East Palo Alto relies solely on the Hetch Hetchy water system for storage; there are no storage facilities located within the City's own water system. To meet water system demands, it is estimated the City would need 4.2 MG of capacity for system equalization, fire flow, and emergency storage. Due to the area's topography, the system will need booster station facilities to boost water into the distribution system from the storage facility. The Ravenswood Business District is planning to construct a 1.8 MG water storage tank to provide system equalization, fire flow, and emergency storage to provide for the growth from the development.

1.5 Funding Sources

Funding for water projects can come from a wide variety of sources. Utility rate charges are the most straightforward ways of increasing revenue. Highly flexible, they can be structured to uniformly spread cost among water users or to charge users in proportion to the water they use. Another option is the use of system development fees, which are designed to recover at least part of project costs. System development fees are governed by Impact Fee Nexus Requirements, established by AB 1600. These mandate that the governing agency defend the need for and use of such fees.

In addition to these direct funding sources, a number of financing options at both the state and federal levels are available to fund water system projects. Within California, the Department of Water Resources (DWR) California Department of Public Health (CDPH), and State Water Resources Control Board (SWRCB) oversee the vast majority of disbursements for public water systems. Funding from federal agencies and acts, such as the American Reinvestment and Recovery act of 2009, tends to be funneled through these state agencies.

Programs likely to be applicable to EPA's aims include SWRCB's Water Recycling Funding Program and both DWR's Local Groundwater Assistance program and Integrated Regional Water Management Program. These agencies also offer revolving funds designed to finance water projects. Nevertheless, as grant programs vary widely in their application dates and restrictions on types of projects, consulting the appropriate departmental website is advised.

At the time of this report, the City of East Palo Alto has already secured some funding sources. Five grants have been appropriated which total $3,034,500 with a match of $2,482,272. The City is utilizing one appropriation which leaves $2,928,400 with a match of $2,395,463 to be awarded. The total remaining project cost is $5,517,272.

The City of East Palo Alto (City) needs to determine how these funds will be used, request Congress revise the appropriation language so all funds can be applied for through a single, consolidated application (if appropriate), and submit the project work plan and grant application to US EPA. If the language cannot be satisfactorily changed such that one application is sufficient, the City should submit separate work plans and grant applications for each of the separate appropriations. Requesting Congress revise the existing appropriation language to a broad purpose such as “water infrastructure improvements” would provide flexibility and consistency for the City.

Though some funding has been secured, there nevertheless remain opportunities to increase the amount.

2.0 INTRODUCTION

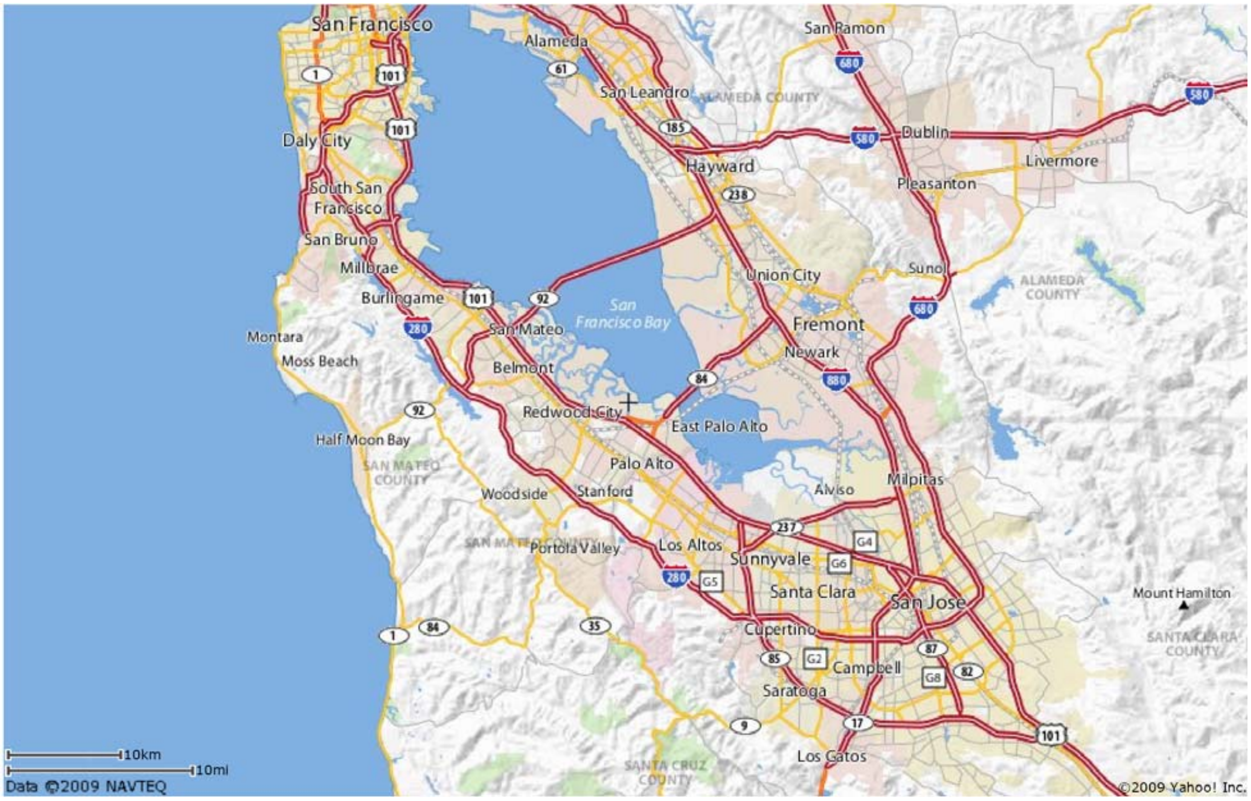
2.1 Background

The City of East Palo Alto is located in the southeast corner of San Mateo County along the southwestern shore of San Francisco Bay's South Bay (see Figure 2-1). The City of East Palo Alto, including areas to both the west and east of Highway 101, is bound on the north by the City of Menlo Park, on the west by the City of Palo Alto, on the east by the San Francisco Bay, and on the south by sloughs leading to San Francisquito Creek and the San Francisco Bay.

Founded in 1849, East Palo Alto was part of unincorporated San Mateo County for most of its history and did not have an official boundary until its incorporation in 1983 (after failed attempts in 1966, '78, and '81 to annex all or portions of East Palo Alto into Menlo Park and Palo Alto). As a result, distinct neighborhoods have grown to have their own identity, including University Village, Palo Alto Gardens, Woodland Place, Palo Alto Park, Bayshore Park, etc. The City of East Palo Alto is sometimes mistakenly thought to be part of the City of Palo Alto, although the two cities reside in different counties and have always been separate entities.

The City of East Palo Alto water system is subject to an operating agreement between the City of East Palo Alto and American Water Services Company. The City of East Palo Alto's public water system (PWS ID No. 4110024) is operated by the City of East Palo Alto's Department of Public Works. A major portion of the City of East Palo Alto's water system was once operated by the County of San Mateo under the identity of East Palo Alto County Waterworks District. The City of East Palo Alto assumed operation of the water distribution system from San Mateo County in 2001. Currently, American Water Services Company manages the distribution, operation, and maintenance of the municipal water system on behalf of, and under contract with, the City of East Palo Alto. This Water System Master Plan has been developed with the input and cooperation of both the City of East Palo Alto and American Water Services Company.

Figure 2-1 City of East Palo Alto Location



(Source: Yahoo.com; http://maps.yahoo.com)

2.2 Scope of Work

The primary objective of the City of East Palo Alto 2009 Water System Master Plan is to identify and present capital improvements required to upgrade the existing distribution system to meet the current water demand and to expand the distribution system to meet demand associated with future development, specifically the Ravenswood Business Development (RBD). Further, the Plan serves as a guide for long-range planning for improvements to ensure the community has a reliable water supply going forward. The 2009 Water System Master Plan documents the conditions under which the City of East Palo Alto was operating in 2008.

Generally, the Scope of Services addresses the following areas:

- Identification of current and future water demand
- Assessment of the adequacy of existing supply sources to meet current and future demands
- Identification of additional supply sources to meet expected demands
- Calibration and update of the water distribution system model
- Evaluation of the water distribution system capability to provide adequate operating pressures and reliable service to the community

- Identification of necessary improvements to correct deficiencies
- Preparation of a Capital Improvement Program

2.3 Report Organization

The Water System Master Plan provides a comprehensive assessment of the water supply service and issues confronting the City of East Palo Alto. The Water System Master Plan is intended to assist City of East Palo Alto staff in making strategic and facility planning decisions.

The City of East Palo Alto Water System Master Plan is organized as follows:

- Chapter 1 provides an executive summary to the Water System Master Plan.
- Chapter 2 introduces the Water System Master Plan.
- Chapter 3 describes the existing water supply sources and the current demands.
- Chapter 4 reviews the various water quality requirements.
- Chapter 5 identifies potential water supply sources.
- Chapter 6 presents the results of a computer modeling of the distribution system.
- Chapter 7 recommends Capital Improvement Projects.

3.0 WATER SUPPLY AND DEMANDS

3.1 Water Supply

The City of East Palo Alto supplies water to residential, commercial, and industrial customers over approximately two and a half square miles, incorporating most of the City of East Palo Alto and a small section of the City of Menlo Park east of Highway 101. The City of East Palo Alto receives all potable water from the City and County of San Francisco's regional system, operated by the San Francisco Public Utilities Commission (SFPUC). The City of East Palo Alto water system currently receives all of its potable water through three turnouts off the SFPUC Bay Division Pipelines (BDPLs) 1 and 2.

The City of East Palo Alto owns and operates one groundwater well located at the intersection of Gloria Way and Bay Road, thus named the Gloria Bay Well. The groundwater well is currently used for non-potable purposes (e.g. street cleaning and construction).

While there are two emergency water system connections equipped with pressure-reducing valves to serve the Palo Alto Park Mutual Water Company and the O'Connor Tract Mutual Water Company, they are not bidirectional and cannot provide water to the City of East Palo Alto.

3.1.1 San Francisco Public Utilities Commission

The SFPUC water supply is predominantly from the Sierra Nevada; delivered through the Hetch Hetchy aqueducts. The SFPUC water supply also includes treated water produced from local watersheds and facilities in Alameda and San Mateo Counties.

The City of East Palo Alto is one of 27 local agencies that are wholesale water customers of the SFPUC, served under terms of a Water Supply Agreement together with individual Water Supply Contracts.

The United States Congress granted the City and County of San Francisco the rights to develop Hetch Hetchy Water and Power Project on Tuolumne River through the Raker Act of 1913. The Hetch Hetchy Reservoir, located in Yosemite National Park, provides approximately 85% of the SFPUC's total water needs. Spring snowmelt runs down the Tuolumne River and fills Hetch Hetchy, the largest reservoir in the SFPUC system. Two other reservoirs are located in the Hetch Hetchy system: Eleanor Reservoir, which collects water from Eleanor Creek, and the Cherry Reservoir, fed by the Cherry River. Water collected at Cherry and Eleanor Reservoirs is utilized only as a backup supply, primarily during drought situations.

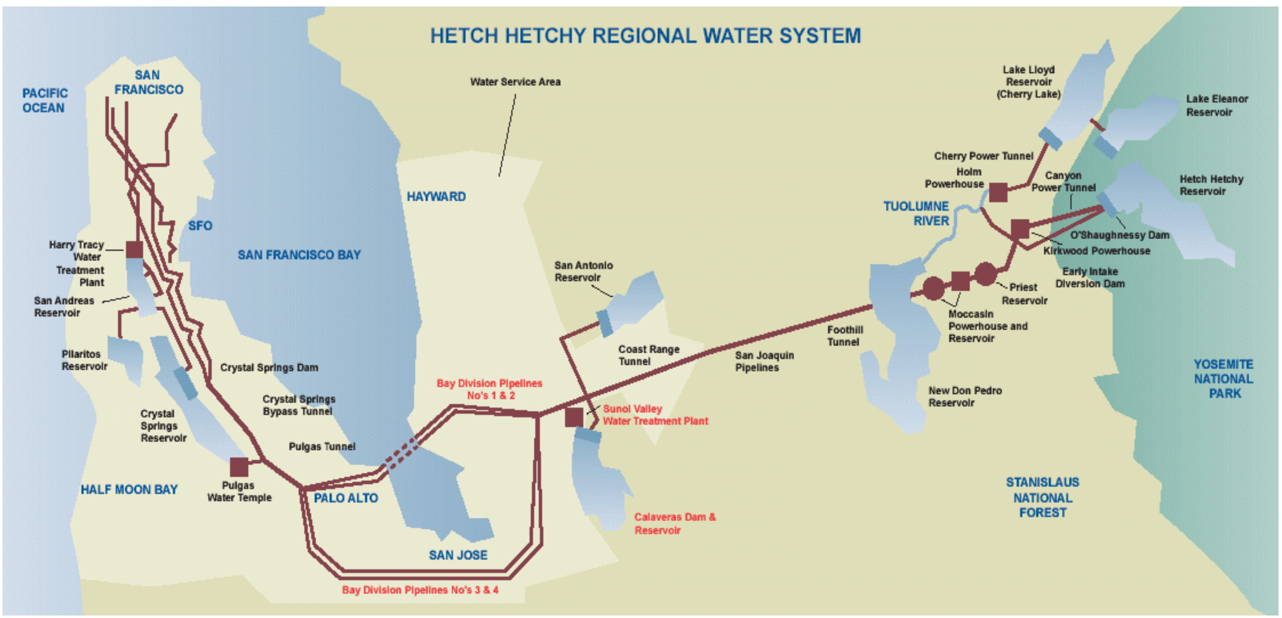
The Hetch Hetchy water supply meets all federal and state criteria for watershed protection, disinfection treatment, bacteriological quality, and operational standards. As a result, the United States Environmental Protection Agency (USEPA) and California Department of Health Services (CDHS) granted the Hetch Hetchy water source a filtration exemption. This exemption is contingent upon the Hetch Hetchy water quality continuing to meet all regulatory criteria.

The Alameda watershed, located in Alameda and Santa Clara Counties, contributes surface water supplies captured and stored in two reservoirs, Calaveras and San Antonio. The Sunol Filter Galleries near the Town of Sunol are groundwater sources supplying less than 1% of the water supply. These local water sources and groundwater from the Sunol Filter Galleries are treated and filtered before delivery.

The amount of imported water available to the SFPUC retail and wholesale customers is constrained by hydrology, physical facilities, and the institutional parameters that allocate the water supply of the Tuolumne River. Due to these constraints, the SFPUC is very dependent on reservoir storage to ensure its water supplies.

The SFPUC serves its retail and wholesale water demands by combining local Bay Area water production and imported water from Hetch Hetchy. In practice, the local watershed facilities are operated to capture local runoff.

Figure 3-1 Hetch Hetchy Regional Water System



3.1.1.1 Water Supply Agreement

The relationship between SFPUC and its wholesale customers is largely defined by the Water Supply Agreement (Agreement) executed in 2009 (Appendix 1). The Agreement replaces the Settlement Agreement and Master Water Sales Contract executed in 1984. The Agreement describes the rate-making methodology used by the City in setting water rates for its wholesale customers, and it addresses water supply and water shortages for the regional water system. The Agreement has a term of 25 years and expires on June 30, 2034.

In terms of water supply, the SFPUC's Agreement provides 184 million gallons per day (expressed on an annual average basis) as a "Supply Assurance" to the SFPUC's wholesale customers. The amount is subject to reduction in the event of drought, water shortage, emergencies, or by malfunctioning or rehabilitation of facilities in the Regional Water System. The Agreement does not guarantee that San Francisco will meet peak daily or hourly customer demands when their annual usage exceeds the Supply Assurance. The SFPUC's wholesale customers have agreed to allocate of the 184 MGD Supply Assurance amongst themselves, with each entity's share set forth in Attachment C of the Agreement. This Supply Assurance survives the termination of the Agreement in 2034.

The City of East Palo Alto has a supply assurance of 957,539 ccf per day, or 1.963 MGD.

In order to define operations in drought years, the Interim Water Shortage Allocation Plan (IWSAP) between the SFPUC and its wholesale customers was adopted in 2000, updated in 2009, and included in the Agreement.

3.1.1.2 Interim Water Shortage Allocation Plan

The SFPUC can meet the demands of its retail and wholesale customers in years of average and above-average precipitation. During periods of water shortage, the Agreement allows the SFPUC to reduce water deliveries to wholesale customers. Under the Agreement, reductions to wholesale customers are to be based on each agency's proportional purchases of water from the SFPUC during the year immediately preceding the shortage, unless this formula is supplanted by a water conservation plan agreed to by all parties.

The formula's reliance on preceding-year purchase amounts discourages SFPUC's wholesale customers from reducing purchases from SFPUC during periods of normal water supply through demand management programs or development of alternative supplies. To overcome this problem and ensure greater access to its own water supply, SFPUC and its wholesale customers adopted an Interim Water Shortage Allocation Plan (IWSAP) in 2000 (updated in 2009) and included it in the Agreement.

The IWSAP has two components. The Tier 1 component of the IWSAP establishes distribution rates between San Francisco and the wholesale customer agencies collectively based on the degree of water shortage. Tier 1 rates apply to system-wide shortages up to 20%. Table 3-1 sets out these Tier 1 reduction rates:

Table 3-1 Interim Water Shortage Allocation Plan Tier 1 Reduction Rates

Level of System-Wide Reduction in Water Use Required	Share of Available Water	
	SFPUC Share	Suburban Purchasers Share
5% or less	35.5%	64.5%
6% through 10%	36.0%	64.0%
11% through 15%	37.0%	63.0%
16% through 20%	37.5%	62.5%

The Tier 2 component of the IWSAP allocates the collective wholesale customer share among each of the 27 wholesale customers. The Tier 2 does not have a specific allocation reduction for each of the wholesale customers, but instead lays out how parties shall proceed in the event of a system-wide shortage greater than 20%. There are several actions SFPUC and the wholesale customers take to implement Tier 2. The first action is to meet and discuss whether a change to the Tier 1 water allocation needs to be enacted in order to mitigate undue hardships that might be experienced by the wholesale or retail customers. Second, Tier 1 water allocations, or modifications thereto, are to be adopted by mutual consent of SFPUC and the Wholesale Customers. If a Tier 1 allocation can not be mutually agreed upon within 30 days, SFPUC can determine the Tier 2 reduction based on Section 3.11(C) of the Agreement, unless a Tier 2 allocation methodology agreed to by the Wholesale Customers be used to apportion the water to be made available to them collectively, in lieu of the provisions of Section 3.11(C) of the Agreement.

The IWSAP allows for voluntary transfers of shortage allocations between SFPUC and any wholesale customer and between wholesale customer agencies themselves. Also, water “banked” by a wholesale customer, through greater reductions in usage than required, may also be transferred.

3.1.2 Emergency Interties

The City of East Palo Alto maintains two interties, one with the Palo Alto Park Mutual Water Company and one with the O’Connor Tract Mutual Water Company. These interties are equipped with a pressure-reducing valve (PRV) and serve only the two companies. The emergency interties cannot provide service to the City of East Palo Alto.

3.1.3 Gloria Bay Well

In 1981, the East Palo Alto County Water District installed the Gloria Bay Well at the corner of Gloria Way and Bay Road in order to supplement the Hetch Hetchy supply. Shortly after the groundwater well’s activation, residents complained of a strange odor emanating from the water and claimed it made the water undrinkable. The water was found to be safe to drink, passing the California Department of Public Health state drinking water standards at the time, though not meeting the Department’s aesthetic standards for odor. Officials were uncertain whether the odor was caused by the well water’s contact with chlorinated San Francisco water (the SFPUC now uses chloramines instead of chlorine to treat its drinking water) or the specific mineral content of the well water itself. The well ceased production in 1989 and was officially taken out of domestic service in July 1999.

A pump test conducted in 2003 shows the groundwater well has the capacity to produce 350 gallons per minute (gpm). Well inspections completed at the same time determined that the screen perforations were located in the intervals from 259 to 282 feet and from 319.5 to 325.5 feet below ground surface. The casing is 12-inch, spiral-seam steel.

The groundwater well is currently utilized on a limited, part-time basis for non-domestic purposes. The water from the groundwater well serves the City of East Palo’s street cleaning, construction dust-control, and sewer-line flushing programs. The well’s discharge line is not connected to the distribution system.

If the City of East Palo Alto is able to reintroduce groundwater into its water supply in the future, the groundwater will need to be treated.

3.2 Water Demands

3.2.1 Historical Water Use

The City of East Palo Alto currently supplies water service to 4,163 metered customers and to the City of Menlo Park. All potable water is delivered from the SFPUC water system. Table 3-2 summarizes the historical water use by service classification during the period of 1999-00 to 2007-08.

Table 3-2 Historical Water Use (ccf)

Water year	Residential/ Multi-Family	Commercial/ Industrial	Other	Unaccounted	Menlo Park	Total
99-00	678,341	127,287	106,527	84,735	--	996,890
00-01	711,794	134,663	115,426	83,642	--	1,045,525
01-02	612,600	109,719	192,010	80,000	--	994,329
02-03	740,136	120,331	53,121	76,915	--	990,503
03-04	735,601	161,415	36,184	139,923	--	1,073,123
04-05	681,901	40,953	28,662	0*	64,787	816,303
05-06	672,672	153,878	22,601	134,413	55,822	1,039,386
06-07	772,926	205,943	24,180	-26,175	60,653	1,037,527
07-08	774,219	143,118	23,323	55,927	59,237	1,055,824
08-09	655,590	198,590	21,007	62,858	52,199	990,244

included in other data provided from BAWSCA

The total annual water production during the analysis periods ranged from 816,303 to 1,073,123 ccf. The total production increased about 5% from 1999 to 2008.

The total water delivery to the water customers in the service area, as measured by water meters, is typically less than the total water production (or delivered from SFPUC). Unaccounted water usage is always present in a water system and can result from many factors, such as unidentified leaks in a pipe network, periodic fire-hydrant flushing, firefighting, unauthorized use, inaccurate and nonfunctioning meters, etc. Table 3-2 shows the water loss (unaccounted) during the last ten years. In modeling, unaccounted usage must be added to the system demands so that total water supplied will equal total demand. The overall water loss for the past ten years is estimated to be about 7.0% with current losses at 5.3% for the system.

Additionally, the City of East Palo Alto provides water for street sweeping and construction from the Gloria Bay Well. Table 3-3 summarizes the water provided from 2003-04 to 2008-09.

Table 3-3 Historical Gloria Bay Water Use (ccf)

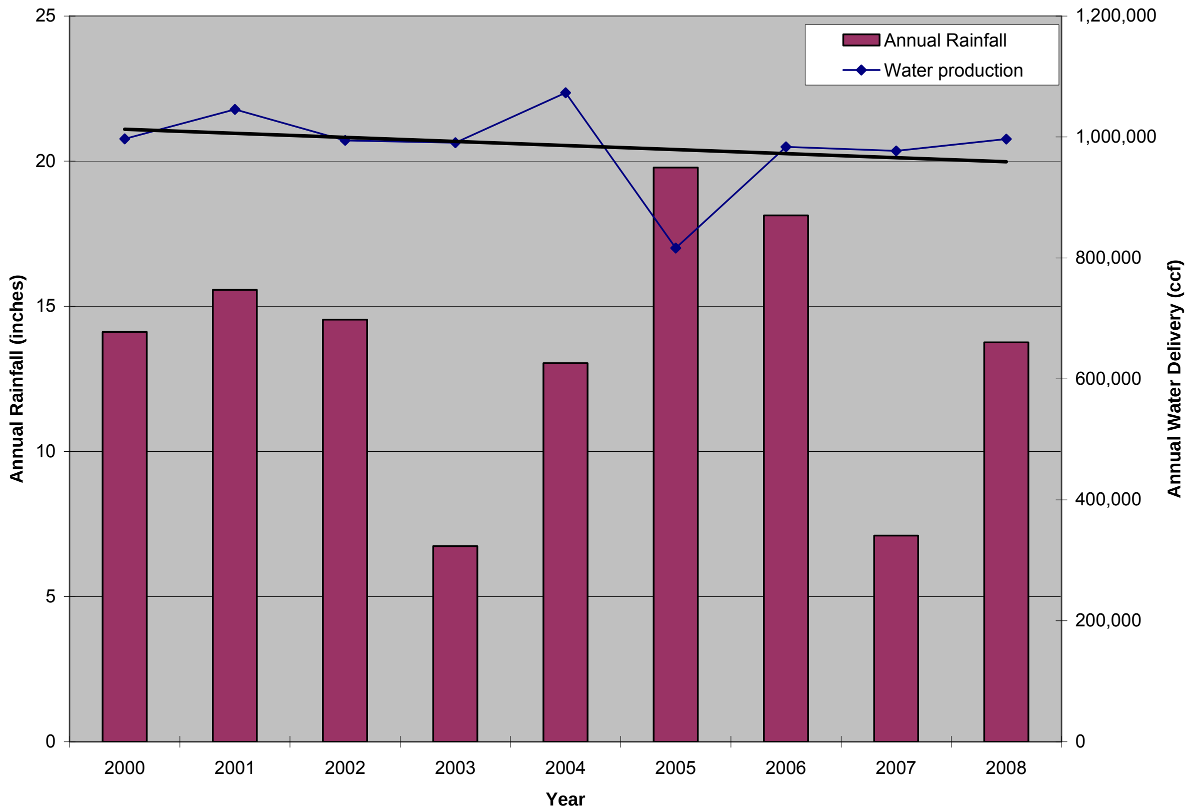
Water year	Gloria Bay Well
03-04	4,837
04-05	2,566
05-06	881
06-07	1,322
07-08	7,761
08-09	584

3.2.2 Climate

The San Francisco Bay Area has a Mediterranean climate, characterized by dry, warm summers and mild winters. The area receives most of its rainfall between November and June, and its warmest temperatures occur in September and October. The average annual rainfall for the City of East Palo Alto is about 14 inches. Daily summer temperatures vary from 68 to 85°F, while winter temperatures rarely descend below freezing.

Figure 3-2 shows historical annual water production by the City of East Palo Alto and annual rainfall over the last nine years (2000-08). As seen in the trend line, data show that the historical water demand in the last nine years had some fluctuation from the expected water demand. This fluctuation may be influenced by climatic conditions; as shown in Figure 3-2, there is a general inverse correlation between rainfall and water demand. Predictably, when the weather is dry and hot, water demand increases. During wet, cool years, water demand decreases, reflecting lower water outdoor usage. For example, 2003 and 2004 were dry years, and water demand was higher than expected; on the other hand, 2005 and 2006 were wet years, and water demand was lower than expected.

Figure 3-2 Historical Annual Water Deliveries and Rainfall



Notes: ***Rainfall year 2000 correlates to water delivery year 1999/2000***
Year 2005 to 2008 water production does not include deliveries to Menlo Park
(Rainfall source: Western Regional Climate Center, Palo Alto station)

3.2.3 Population Forecasts

Population in the City of East Palo Alto water service area is anticipated to increase from approximately 29,690 people in 2008 to an estimated 36,000 people by 2030, according to Bay Area Water Supply and Conservation Agency.

Figure 3-4 shows historical population data in the City of East Palo Alto water service area provided by BAWSCA. The population in the water service area in 2008 was 29,690.

Population in the water service area during the ten-year period from 1999 to 2008 grew by 10%.

Table 3-4 Estimated and Projected Change in Population

Fiscal year	East Palo Alto Service Area
99-00	27,300
00-01	28,000
01-02	28,500
02-03	31,200
03-04	31,500
04-05	31,500
05-06	25,696
06-07	29,690
07-08	29,690
08-09	30,000
10-11	30,000
20-21	33,000
30-31	36,000

Source: Bay Area Water Supply and Conservation Agency

In addition to the historical population data for the service area provided by BAWSCA, the following 1990 and 2000 population data and housing unit data were obtained from the United States Census Bureau for the entire city:

1990 Census population: 23,451; occupied housing units: 6,953; occupancy rate per unit: 3.4

2000 Census population: 29,506; occupied housing units: 6,976; occupancy rate per unit: 4.2

Based on the Census population data in 1990 and 2000, the population growth during the ten-year period from 1990 to 2000 was approximately 606 people per year.

3.2.4 Per Capita Water Use

BAWSCA computes the per capita rate for all the SFPUC member agencies. Over the last ten years, the City of East Palo Alto has had the lowest or was among the lowest three for residential per capita use among the BAWSCA member agencies. For the 2007-08 water year, the most recent year for which data are available, the residential per capita water use for the City of East Palo Alto was estimated to be 53 gallons per person per day, and the estimated gross per capita water demand was 69 gallons per day. The following table (3-5) lists the City of East Palo Alto's residential and gross per capita use and its rank among the BAWSCA member agencies.

Table 3-5 Per Capita Water Use (gpd)

Water Year	Residential	Rank*	Gross	Rank*
99-00	51	Lowest	75	2nd Lowest
00-01	52	2nd Lowest	77	2nd Lowest
01-02	44	Lowest	71	Lowest
02-03	49	Lowest	65	Lowest
03-04	48	Lowest	70	Lowest
04-05	54	Lowest	60	Lowest
05-06	54	2nd Lowest	74	2nd Lowest
06-07	53	3rd Lowest	67	2nd Lowest
07-08	53	3rd Lowest	69	Lowest

***** rank among BAWSCA member agencies***

3.2.5 Future Water Demand

The majority of the City of East Palo Alto is built out. Demand projections were based solely on the Ravenswood Business District (RBD). The RBD includes development for commercial, industrial, and residential uses. Based on the estimated 1,200 residential units and the occupancy rate of 4.2 persons per occupied housing unit, it is assumed that the majority of the new population growth will be within the RBD development. Potential for population growth outside the RBD development is small. Therefore, the impact to the water system and the model are insignificant compared to the future demands of larger developments expected as part of the redevelopment effort within RBD.

The RBD is expected to use 1,698 ccf per day. This equates to a 63% increase over the current, 08/09, and average usage. The RBD is expected to be built out in 2025. Table 3-6 shows the projected water demands that need to be supplied by the City of East Palo Alto.

Table 3-6 Projected Water Demand (ccf)

Fiscal Year	2008/09 (Current)	2010	2015	2020	2025	2030
Average Day Demand	990,224	990,224	1,188,293	1,386,312	1,610,012	1,610,012

4.0 WATER QUALITY

The City of East Palo Alto entered into a Water Supply Agreement that specifies SFPUC shall deliver to the City of East Palo Alto treated water that complies with primary maximum contaminant levels and treatment technique standards. Water shall be introduced at the regulatory entry points designated in the San Francisco Regional Water System Domestic Water Supply Permit (currently Permit No. 02-04-04P3810001) issued by the California Department of Public Health (CDPH).

The Hetch Hetchy Reservoir water meets all federal and state criteria for watershed protection, disinfection treatment, bacteriological quality, and operations. As a result, it qualifies for a United States Environmental Protection Agency (USEPA) filtration exemption. In other words, water from Hetch Hetchy does not require filtration treatment to ensure its safety. This exemption is contingent upon the Hetch Hetchy water continuing to meet the state criteria, which the City of East Palo Alto is confident will happen.

The following are water quality standards the City of East Palo Alto and the SFPUC are required to meet. Additionally, if the City of East Palo Alto were to find additional sources of water, the City would have to meet the standards itself, without relying on the SFPUC.

4.1 Water System Vulnerability

4.1.1 Drinking Water Source Assessment and Protection (DWSAP) Program

CDPH is the lead agency for developing and implementing the DWSAP. The DWSAP has two primary elements, Drinking Water Source Assessment and Source Protection. The City of East Palo Alto is not required to complete a source water assessment as all of the supply comes from SFPUC.

4.1.2 Bioterrorism ACT

On June 12, 2002 the United States Congress passed Public Law 107-188, the "Public Health Security and Bioterrorism Preparedness and Response Act of 2002" (Bioterrorism Act). The Bioterrorism Act requires public water systems serving populations greater than 3,300 to perform a Vulnerability Assessment and, within the following six months, to submit a completed or updated Emergency Response Plan.

Vulnerability Assessment

The Vulnerability Assessment is required to detail the water system's vulnerability to terrorist attacks or other intentional acts intended to disrupt the reliable and safe supply of drinking water. The Vulnerability Assessment includes a review of:

- Pipes and constructed conveyances
- Physical barriers
- Collection, pre-treatment, treatment, storage, and distribution facilities
- Electronic, computer, and other automated systems
- Use, storage, and handling of various chemicals

- Operation and maintenance of the water system

American Water Services Company has completed a Vulnerability Assessment. Although there are no federal or state requirements beyond completion and submittal of the report, the Vulnerability Assessment should be maintained as a confidential, working document. Further, American Water Services Company and/or the City should implement on an appropriate timescale all Vulnerability Assessment recommendations that are technically and financially feasible. The American Water Services Company and the City of East Palo should keep the document up-to-date as water system security upgrades are implemented. Water utility managers should review the Vulnerability Assessment periodically to ensure the water system operates at an acceptable level of security risk.

Emergency Response Plan

The Emergency Response Plan is required to identify responses to activities, or the results of activities, associated with undesirable events identified in the Vulnerability Assessment. The Emergency Response Plan includes plans, procedures, and identification of staff and equipment to respond to or significantly mitigate the consequences of such events. Federal guidelines state that the Emergency Response Plan must contain action plans for at least the following four events:

- Water system contamination
- Structural damage / physical attack
- Cyber attack on supervisory control and data acquisition or operational computer system
- Hazardous chemical release from water system facilities

American Water Services Company has already completed an Emergency Response Plan. The Plan should be submitted to the regulatory agency for certification. A copy should be provided to the City of East Palo Alto. American Water Services Company should continue to revise and update their Emergency Response Plan to reflect any operational or system changes. In addition, all water system employees should be trained in accordance with the Emergency Response Plan. At a minimum, all employees should annually review the Emergency Response Plan.

4.1.3 National Pollutant Discharge Elimination System (NPDES) Permits

The USEPA maintains several databases at Envirofacts Data Warehouse (http://www.epa.gov/enviro/). One of the databases, the Permit Compliance System (PCS), provides information on companies that have been issued permits to discharge wastewater. The database contains information on when a permit was issued and expires, how much the company is permitted to discharge, and the actual monitoring data showing what has been discharged.

A search in the PCS database indicates that in the City of East Palo Alto in San Mateo County, California, there are currently no companies that hold an NPDES permit for wastewater discharge.

4.2 Drinking Water Quality Monitoring and Reporting

4.2.1 State Drinking Water Quality and Monitoring Regulations

The State of California requires all public water systems (PWS) to monitor their potable water sources for chemical, biological, and radiological contaminants. Testing for these categories of constituents, including SOCs, VOCs, IOCs, and radionuclides, is required at each source. Distribution systems must also be monitored for bacteriological constituents (total and fecal coliforms), disinfection residuals (chlorine), disinfection byproducts (total trihalomethanes and haloacetic acids), lead, and copper.

Primary Maximum Contaminant Levels

Primary Maximum Contaminant Levels (MCLs) have been established for constituents with known health effects provided that USEPA has evaluated the technical and economical impacts of setting an MCL. The USEPA provides a list of regulated constituents and current MCLs (http://www.epa.gov/ogwdw/contaminants/index.html) adopted by the State of California. All public water systems are required to monitor these constituents at their raw water sources at frequencies set forth by the State.

The City of East Palo Alto relies on SFPUC to test the Hetch Hetchy system for these contaminants. Additionally, the City of East Palo Alto tests for bacteriological constituents within its own distribution system. The water quality analysis results for samples collected in 2009 and the routine distribution system sampling results indicate the City of East Palo Alto complies with all the primary MCLs.

Secondary MCLs

Secondary MCLs have been established for certain constituents without known health effects, but for which there are aesthetic concerns such as color, taste, or odor. The USEPA provides a list of the constituents with the current secondary MCLs (http://www.epa.gov/ogwdw/contaminants/index.html) adopted by the State of California. Currently, constituents with secondary MCLs must be tested for at least once every three years at all groundwater sources.

Iron and manganese are common metallic elements found in the earth's crust which are chemically similar and cause similar problems. When exposed to air, iron and manganese sediments oxidize and change from colorless, dissolved forms to colored, solid forms. Excessive amounts of these sediments are responsible for staining and may even plug water pipes. Iron and manganese can also affect the flavor and color of food and water. Finally, nonpathogenic bacteria, which feed on iron and manganese in water, form slime in toilet tanks and can clog water systems.

The City of East Palo Alto relies on SFPUC to monitor these contaminants in the Hetch Hetchy system.

The water quality from the Gloria Bay Well contained consistently high levels of iron and manganese. If the City of East Palo Alto is to reinstate this well into the domestic system, the water will need to be treated for iron and manganese because of their effects on taste and odor.

4.2.2 Federal UCMR 2

USEPA published the second cycle of the Unregulated Contaminant Monitoring Regulation (UCMR 2) on January 4, 2007. UCMR 2 includes “Assessment Monitoring” for ten unregulated contaminants and “Screening Survey” for 15 unregulated contaminants. All PWSs serving more than 10,000 people and selected systems serving less than 10,000 people are required to conduct Assessment Monitoring. In addition, PWSs serving more than 100,000 people and selected systems serving less than 100,000 people are required to conduct the Screening Survey. SFPUC completed four quarters of monitoring of 25 contaminants as required under the USEPA second Unregulated Contaminant Monitoring regulation. None of the 25 contaminants were found in the water.

It has been confirmed by the UCMR 2 Coordinator at USEPA that the City of East Palo Alto is not required to conduct any further UCMR 2 monitoring.

4.2.3 Disinfectant and Disinfection Byproduct Rule (D/DBPR)

<u>Stage 1 D/DBPR</u>

During disinfection of drinking water, the disinfectants themselves can react with naturally occurring materials in the water to form unintended byproducts which may pose health risks. Amendments to the SDWA in 1996 require the USEPA to develop rules to reduce disinfection byproducts (DBPs) in drinking water.

USEPA promulgated the Stage 1 D/DBPR on December 16, 1998. The Stage 1 D/DBPR applies to all public water systems with a chemical disinfectant added to the drinking water supply. Stage 1 D/DBPR reduces exposure to three disinfectants and many disinfection byproducts. The rule establishes maximum residual disinfectant level goals (MRDLGs) and maximum residual disinfectant levels (MRDLs) for three chemical disinfectants: chlorine, chloramines, and chlorine dioxide. It also establishes MCLs for the following DBPs: four total trihalomethanes (TTHM), five haloacetic acids (HAA5), chlorite, and bromate. Chlorite is monitored only in systems using chlorine dioxide as a disinfectant, whereas bromate is required to be monitored only in systems using ozone. TTHM and HAA5 monitoring is required for any water system using chlorine as a disinfectant.

Under the Stage 1 D/DBPR, the MCL for TTHM is 0.080 milligrams per liter (mg/L) and the MCL for HAA5 is 0.060 mg/L. Compliance is measured by the running annual average of the quarterly results taken from all of the sampling locations.

Test results from SFPUC and from locations within the City of East Palo Alto’s service area show that the there are no high-level DBPs in the water distribution system.

Stage 2 D/DBPR

USEPA published the final Stage 2 D/DBPR on January 4, 2006 and the final rule became effective on March 6, 2006. The Stage 2 D/DBPR applies to all public water systems with a chemical disinfectant added to the drinking water supply. The Stage 2 D/DBPR strengthens public health protection for customers of systems that deliver disinfected water by requiring such systems to meet maximum contaminant levels as an average at each compliance monitoring location (instead of as a system-wide average as in previous rules) for two groups of DBPs, TTHM and HAA5. The rule targets systems with the greatest risk and builds incrementally on existing rules. This regulation will reduce DBP exposure and related health risks, and it should provide more equitable public health protection.

The major difference between Stage 1 and Stage 2 D/DBP Rules is the compliance calculation of TTHM and HAA5. Stage 1 D/DBPR compliance is based on a system-wide running annual average (RAA), while Stage 2 D/DBPR is based on running annual average at each location, called the locational running annual average (LRAA). Under the Stage 2 D/DBPR, the MCLs for TTHM and HAA5 remain the same as the Stage 1 D/DBPR.

4.2.4 Radionuclide Rule

USEPA promulgated the final drinking water standard for radionuclides on December 7, 2000. The final rule includes the MCLs and monitoring requirements for gross alpha, radium-226, radium-228, uranium, and beta/photon emitters**.** The final rule became effective on December 8, 2003. The State was required to adopt or issue a radionuclide rule no less stringent than the final federal rule.

Under the radionuclide rule, radium-226 and radium-228 must be analyzed and reported separately, in addition to gross alpha and uranium analysis. An initial round of four consecutive quarterly samples was required to be completed by December 31, 2007. The MCL for gross alpha remains 15 picocuries per liter (pCi/l) and the MCL for radium-226 and radium-228 remains as 5 pCi/l, as the sum of the two constituents. The MCL for uranium is 20 pCi/l. Subsequent gross alpha, radium-226, radium-228, and uranium monitoring frequencies are based on the initial round of analysis results. If the results are below the detection limit for the purpose of reporting (DLR), the monitoring requirement is one sample every nine years. If the results are below one half the MCL but above the DLR, the monitoring requirement is one sample every six years. If the results are above one half the MCL but below the MCL, the monitoring requirement is one sample every three years. If the results are over the MCL, the sources have to be monitored quarterly until the running annual average is below the MCL, or the owner must provide treatment at the State’s discretion.

Based on the water quality analysis results for radionuclides from SFPUC, the water supplied to the City of East Palo Alto does not have high levels of any such radionuclides.

4.2.5 Arsenic Rule

On January 22, 2000, USEPA published the final Arsenic Rule revising the current MCL from 0.050 mg/L to 0.010 mg/L (or ten parts per billion). The revised MCL became effective January 2006. The SFPUC has reported a non-detected result for arsenic concentration. Samples for inorganic analysis were collected at the Gloria Bay Well in 2003. The analysis results indicate the well had an arsenic level of 1.4 parts per billion, which is below the new arsenic MCL.

4.2.6 Groundwater Rule

On October 12, 2006, USEPA promulgated the final Groundwater Rule (GWR) to reduce the risk of fecal contamination in public water systems. The GWR applies to all public water systems that use groundwater as the source of drinking water supply. Currently, the City of East Palo Alto does not use groundwater for potable purposes.

The GWR addresses microbiological contamination risks in drinking water through a risk targeting approach. The four major components of the GWR are described below:

I. Periodic Sanitary Survey

Under the GWR, states are required to conduct a sanitary survey for each public water system that uses groundwater. The survey requires evaluation of eight critical elements and identification of significant deficiencies therein: 1) source; 2) treatment; 3) distribution system; 4) finished water storage; 5) pumps, pump facilities, and controls; 6) monitoring, reporting, and data verification; 7) system management and operation; and 8) operator compliance with state requirements. States must complete the initial survey for most of the water systems by December 31, 2012 and update the survey every three years thereafter. For water systems that meet certain performance criteria, however, states may complete the initial survey by December 31, 2014 and update the survey every five years thereafter. The performance criteria are met if the system in question: 1) provides 4-log treatment of viruses before or at the first customer for all its groundwater sources; 2) has outstanding performance record as defined by the states; and 3) has no history of total coliform MCL or monitoring violations under the Total Coliform Rule (TCR).

The USEPA has developed guidelines to help states and water systems to carry out sanitary surveys and identify significant deficiencies that could affect the quality of drinking water.

II. Source Water Monitoring

For water systems that do not achieve at least 4-log of viruses inactivation or removal, triggered monitoring is required if any sample collected during the routine sampling under the TCR has a positive total coliform result. Subsequently, the water system is required to take one sample at each groundwater source and test it for a fecal indicator (E. Coli, enterococci or coliphage) within 24 hours of receiving the positive total coliform result. If any fecal indicator is detected, the system is required to take five more repeat samples and test for a fecal indicator within 24 hours. If one or more of the five repeat samples test positive for any fecal indicator, corrective action is required. The compliance date for triggered monitoring and associated corrective action was December 1, 2009.

As a complement to triggered monitoring, the GWR allows states to require water systems that do not provide at least 4-log virus inactivation or removal to conduct source water assessment monitoring at any time to help identify high-risk systems. USEPA recommends that the following risk factors be considered by states in targeting high-risk systems: 1) high population density combined with on-site wastewater treatment systems; 2) aquifers with restricted geographic extent, 3) aquifers with thin karst, fractured bedrock and gravel; 4) shallow unconfined aquifer; 5) aquifers with thin or absent soil cover; and 5) groundwater wells previously identified as having fecal contamination.

III. Corrective Actions

Corrective Actions are required for any water systems with a significant deficiency identified during the sanitary survey or fecal matter is detected and confirmed at a source. The water system must implement one or more of the following corrective actions: 1) correct all significant deficiencies, 2) eliminate the source of contamination, 3) provide an alternative source of water, and/or 4) provide treatment which reliably achieves 4-log virus inactivation or removal. The water system must complete the corrective action(s) within 120 days of a significant deficiency identified or a fecal indicator detected positive.

The most common and economic method to provide a 4-log virus inactivation is chlorination. To achieve inactivation, a certain CT (chlorine residual concentration in mg/L × contact time in minutes) value is required, which is based on water temperature and pH. For example, at 15^{o}C and a pH-level between 6 and 9, a CT of 4 mg-min/L is required to achieve 4-log virus inactivation. Therefore, if a water system has 1 mg/L of chlorine residual at the first customer and the contact time between the point of application and the first customer is 4 minutes, the CT value is 4 mg-min/L (1 mg/L × 4 min).

VI. Compliance Monitoring

If a water system already treats groundwater to achieve at least 4-log virus inactivation or removal, GWR requires regular compliance monitoring to ensure that the treatment technology installed is reliable. For systems that use chlorine as a disinfectant and serve more than 3,300 people, continuous residual-chlorine monitoring is required. The water system must maintain the state-determined residual-chlorine level at all times. If the residual chlorine falls below the required level, the system must restore the residual chlorine to an appropriate level within four hours. If the continuous residual-chlorine monitor fails, the water system is required to take a grab sample every four hours, and the operator has 14 days to resume continuous monitoring. These regulations took effect on December 1, 2009.

Current Status of City of East Palo Alto

The City of East Palo Alto uses groundwater only for non-potable use. If the City were to use the Gloria Bay Well or acquire additional wells for potable use, the City would need to follow the Groundwater Rule.

4.2.7 Lead and Copper Rule

On January 12, 2000, USEPA revised the Lead and Copper Rule, previously adopted on December 11, 1995. The revised rules clarify the lead and copper requirements, but do not substantially modify them.

PWSs must monitor lead and copper levels at a number of residential taps based on the population served. The required number of lead and copper samples may be reduced depending on past results. Compliance is based on the 90th percentile concentration for all samples collected. The action level (AL) for lead is 0.015 mg/L and for copper is 1.3 mg/L.

Based on the 2008 Consumer Confidence Reports, the 90th percentile concentrations of lead and copper in samples collected in the water system are below ALs.

4.3 Public Notification of Drinking Water Quality

4.3.1 Consumer Confidence Reports

In 1996, Congress amended the Safe Drinking Water Act (SDWA), adding a requirement that water systems report water quality to their customers. The finalized rule, called the Consumer Confidence Report (CCR) Rule, was published in the Federal Register on August 19, 1998 and requires every community water system to prepare an annual CCR on the quality of water delivered by the systems and deliver the CCR to its customers by July 1 of each year.

Every CCR must contain the following: 1) water system information, including the name and phone number of a contact person, information on public participation opportunities, a Spanish-language section on important content, and information for other non-English speaking populations; 2) water source identification and the results of the source water vulnerability assessment; 3) summary of data on detected regulated and unregulated contaminants, including possible source(s) of each contaminant, and whether the water system received any violations; and 4) educational information on nitrate, arsenic, lead, radon, and Cryptosporidium, if applicable.

5.0 FUTURE WATER SUPPLY

5.1 Water Supply

The City of East Palo Alto water system draws its entire supply from the Hetch Hetchy Aqueduct, which is owned and operated by the San Francisco Public Utilities Commission. The City of East Palo Alto's individual Supply Assurance from SFPUC is 1.96 MGD (or approximately 2,128 acre-feet per year). A water supply well is located at the corner of Gloria Way and Bay Road and is capable of supplying approximately 350 gallons per minute. Shortly after the construction of the well, it was taken offline due to taste and odor issues and is now used exclusively for non-potable purposes.

The City of East Palo Alto has a supply assurance from SFPUC of 1.96 MGD. In 2007-08, the City used 2.04 MGD. Currently, SFPUC can meet the demands of the City, but SFPUC may not be able to meet the City's future demand. The City's demand is expected to increase by 63% over the next 20 years. The City of East Palo Alto needs look to other sources to meet future demands and provide service during times of drought and emergencies.

5.2 Groundwater

The City of East Palo Alto is located over the Santa Clara Valley Groundwater Basin, San Mateo Subbasin. This groundwater basin is not adjudicated or otherwise regulated, and has not been identified or projected to be in overdraft by the California Department of Water Resources.

The City of East Palo Alto currently does not use local groundwater for drinking water purposes. The City of East Palo Alto has less than a four-hour supply of water in storage, yet there is access to groundwater resources within the city. The City of East Palo Alto is able to and has in the past drawn groundwater out of this basin, mostly through its Gloria Bay Well. This groundwater, however, has high levels of total dissolved solids, chloride, iron, and manganese. The City ceased using the well water for drinking purposes in 1989 and completely removed the facility from domestic service in 1999. Other groundwater is currently used for non-domestic purposes. Table 5-1 summarizes the results of some of the historical water quality testing, as well as water quality testing conducted during the preparation of the *HDR Gloria Way Well Investigation Summary Report, 2004.*

The groundwater resource could provide a secondary source of supply vital to the reliability of the water supply system. During drought conditions, the City of East Palo Alto may not be able to meet their demands. Groundwater production facilities could be used to meet the demands during SFPUC water reductions.

Additionally, groundwater production will be a vital source to the City to meet its future demands. The City's demand is expected to increase by 63% over the next 20 years, primarily for the Ravenswood Business District development. The City will need to develop a 1,000 gpm of groundwater production to meet the future development. The development of this additional source will most likely need iron and manganese treatment to meet water quality standards.

Table 5-1 Gloria Bay Well Water Quality Testing Results

PARAMETER	REPORTING UNIT	TYPICAL LAB DLR	LAB TEST RESULTS Dec 2003	STATE MCL	E Palo Alto or SFPUC ANNUAL AVERAGE 2001-2002	Historic Results 1986	Historic Results 1989	NOTES/COMMENTS
General Mineral / Physical:								
Bicarbonate Alkalinity	mg/L	5.0	200	(a)	66 (13-120)			Slightly elevated for GW
Calcium	mg/L	0.50	57	(a)	18 (4-31)	40	43	1963 WHO limit was 75 mg/L
Carbonate Alkalinity	mg/L	5.0	8.2	(a)				
Chloride	mg/L	100	280	500 (i)	5 (ND - 7)	450	264	Above reccom'd limit of 250
Color	color units	5.0	10	15 (e)	10	20	8	Possibly assocated with Mn
Corrosivity				Non-Corr.				Not tested
Fluoride	mg/L	0.10	0.33	2 (f)	0.2 (0.1-0.2)	0.1	0.9	Sub-optimal for dental
Hydroxide Alkalinity	mg/L	5.0	ND	(a)				
Lab pH	pH Units	2.0	7.95	6.5 to 8.5	9 (8.6 - 9.4)	8.1	7.9	Below SFPUC source.
Lab Turbidity	NTU	0.10	0.50	5 (e)	0.33 (0.20-0.66)	0.92	0.6	
Magnesium	mg/L	0.10	26	(a)				Mid point of typical range
MBAS	mg/L	0.050	ND	0.5 (e)				
Nitrate as NO3	mg/L	5.0	ND	45 (f)		<1	0.2	
Nitrite as NO2	mg/L	5.0	ND	(a)				
Nitrate + Nitrite (as N)	mg/L	2.0 (m)	ND	10 (f)				Not tested
Nitrite as N	mg/L		ND	1 (f)				Not tested
Odor	TON	1.000	ND	3 (e)				Lowest obtainable odor value
Phosphate (PO4)	mg/L			(a)				Not tested
Potassium	mg/L	2.0	ND	(a)				
Sodium	mg/L	0.50	230	(a)	18 (3-22)	220	240.4	20 ppm 1985 EPA guide value
Specfic Conductance (EC at 25C)	umho/cm	1.0	1500	1600 (h)	214 (13-340)	1500	1040	Above recom'd limit of 900
Sulfate (as SO4)	mg/L	5.0	30	500 (i)	17 (0.7-25)	30	36	Well below SMCL
TDS	mg/L	10	840	1000 (g)	114 (ND-190)	1040	800	Above recom'd limit of 500
Total Alkalinity (as CaCO3)	mg/L	5.0	210	(a)	66 (16-120)	210	250	Evidence of sulfate Ca/Mg
Total Hardness (as CaCO3)	mg/L	1.0	250	(a)	66 (11-120)	190	192	Considered "hard" water
Regulated Inorganics (Primary MCL is shown unless otherwise noted):								
Aluminum	ug/L	5.0	5.4	200 (b)				
Antimony	ug/L	1.0	ND	6				
Arsenic	ug/L	1.0	1.4	10 (c)	ND (j) (ND-180)	<10	<2	Relatively low
Asbestos	MFL		< 0.020	7				Results < analytical sensitivity.
Barium	ug/L	2.0	350	1000		<500	280	Elevated; saline environment?
Beryllium	ug/L	1.0	ND	4				
Boron	mg/L	0.10	0.26	1 (d)	ND (j)			>0.75 is problem for crops
Cadmium	ug/L	1.0	ND	5		<5	<10	
Total Chromium	ug/L	5.0	ND	50		<5	<20	
Cyanide	mg/L	0.0050	ND	0.15				
Copper	mg/L	0.010	ND	1 (e), 1.3 (d	0.059	<0.1	<0.01	
Iron	mg/L	0.10	0.14	0.3 (e)	ND (ND-140)	1.0	<0.1	1/2 the current MCL
Lead	ug/L	5.0	ND	15 (d)	ND	<5	<50	
Manganese	mg/L	0.010	0.19	0.05 (e)	NR (k)			4 times the current MCL
Mercury	ug/L	0.20	ND	2		<50	<1	
Nickel	ug/L	1.0	1.4	100				
Selenium	ug/L	1.0	3.1	50		<10	<50	
Silver	ug/L	1.0	ND	100 (e)		<0.02	<0.005	
Thallium	ug/L	1.0	ND	2				
Zinc	mg/L	0.050	ND	5.0 (e)		0.06	<0.01	
Radiological:								
Combined Radium 226 & 228	pCi/L		0.13 (l)	5				
Gross Alpha	pCi/L			15			0.56	
Tritium	pCi/L			20000				
Strontium-90	pCi/L			8				
Gross Beta	pCi/L			50				
Uranium	pCi/L			20				
Radon	pCi/L							
Bacteriological:								
Total Coliform	P/A	1.0	ND	> 1	0.17			
E-Coli	P/A	1.0	ND	A				
Regulated Organic Chemicals:								
VOC's	*Varies*	*Varies*	ND	*Varies*				Results for all T-22 VOC's
SOC's	*Varies*	*Varies*	ND	*Varies*				Results for all T-22 VOC's
MTBE	mg/L			0.005 (e)				
Thiobencarb	mg/L			0.001 (e)				

NOTES:
(a) Not specifically restricted/regulated.
(b) Secondary MCL value is shown. The primary MCL is 1,000 ug/L.
(c) The Federal MCL is currently 10 ug/L. State MCL is not yet established.
(d) Current State Action Level.
(e) Secondary MCL.
(f) Primary MCL
(g) Secondary MCL Upper Limit. Max recom'd is 500 mg/L. Short-Term max MCL is 1,500 mg/L.
(h) Secondary MCL Upper Limit. Max recom'd is 900 mg/L. Short-Term max MCL is 2,200 mg/L.
(i) Secondary MCL Upper Limit. Max recom'd is 250 mg/L. Short-Term max MCL is 600 mg/L.
(j) ND = not detected
(k) NR = not reported
(l) Feb. 2004 data.
(m) Calculated from Lab Data

(Source: HDR 2004, Gloria Way Well Investigation Summary Report)

The groundwater in the City of East Palo Alto will need to be treated to precipitate, coagulate, and filter out the iron, manganese, and arsenic. The most common techniques are coagulation and filtration, sequestration, ion exchange, and oxidation and filtration. There are a number of chemical oxidants and filtration media available that can be used in various combinations. The treatment for manganese would also result a measurable reduction in TDS.

In coagulation and filtration, a treated filtration media, such as manganese greensand or a newer synthetic alternative, is used to convert soluble iron and manganese in water into insoluble complexes, which are then precipitated out of the solution and removed by pressure filtration.

Sequestration involves the addition of sequestering agents such as polyphosphates followed by chlorination (or in some cases sodium silicate followed by chlorination), which keeps dissolved iron and manganese from oxidizing and precipitating out of the solution. This option, however, is only effective for water with less than 1.0 mg/L iron and less than 0.3 mg/L manganese.

Ion exchange involves the use of a conventional ion exchange resin to selectively remove iron, calcium, and magnesium. This solution, however, is limited to applications with relatively small quantities of iron and manganese. If either metal is allowed to oxidize to form insoluble complexes during the process, the resulting solids can clog and foul the ion exchange resin, reducing its efficacy.

Oxidation and filtration via manganese greensand has become the most widely used method for the removal of dissolved iron and manganese in recent years because of its relative ease of operation, low maintenance, low energy requirements, and reliability compared to other options.

Designed to both promote the oxidation and flocculation of dissolved iron and manganese—converting soluble ferrous iron ($Fe2+$) to insoluble ferric iron ($Fe3+$), and dissolved $Mn2+$ to the less soluble $Mn4+$ form—and remove the resulting flocs by filtration, manganese greensand systems rely on particles of the naturally occurring silicate mineral glauconite coated with manganese oxide (MnO) in various valence states.

As the run progresses, the greensand bed is periodically backwashed to remove the collected solids. After the oxidizing power of the bed becomes depleted, it can be restored using either an intermittent or continuous regeneration process using potassium permanganate ($KMnO4$).

The SFPUC has recently converted from chlorine disinfection to disinfection using chloramine. Disinfection at the Gloria Bay site may soon be required and the City may need to install a chloramine disinfection system.

The City of East Palo Alto could construct a 1,000 gpm groundwater well and a 1,000 gpm iron and manganese treatment facility. The treated water could then be blended with Hetch Hetchy surface water in a new storage reservoir.

5.3 Recycled Water Programs

Currently, the use of recycled water within the City of East Palo Alto is very limited. All wastewater from the City is conveyed outside city limits and treated by the wastewater treatment facilities serving the Cities of Palo Alto and Redwood City. These two facilities receive all of the wastewater produced by East Palo Alto. The facilities provide full treatment capacity to prepare recycled water, which is then used in Redwood City and in northern Santa Clara County. No infrastructure is in place to transfer recycled wastewater back into City of East Palo Alto.

The City of East Palo Alto has the capability to install satellite wastewater treatment plants to draw wastewater off the City's sewer lines before discharge outside the municipal boundaries. The City could reuse treated wastewater for irrigation of public parks and facility landscaping. The City of East Palo Alto should continue to study the use of recycled water in areas such as public works projects, dust control, and soils compaction remediation, considering the feasibility of recycled water and dual plumbing in the Ravenswood Business District.

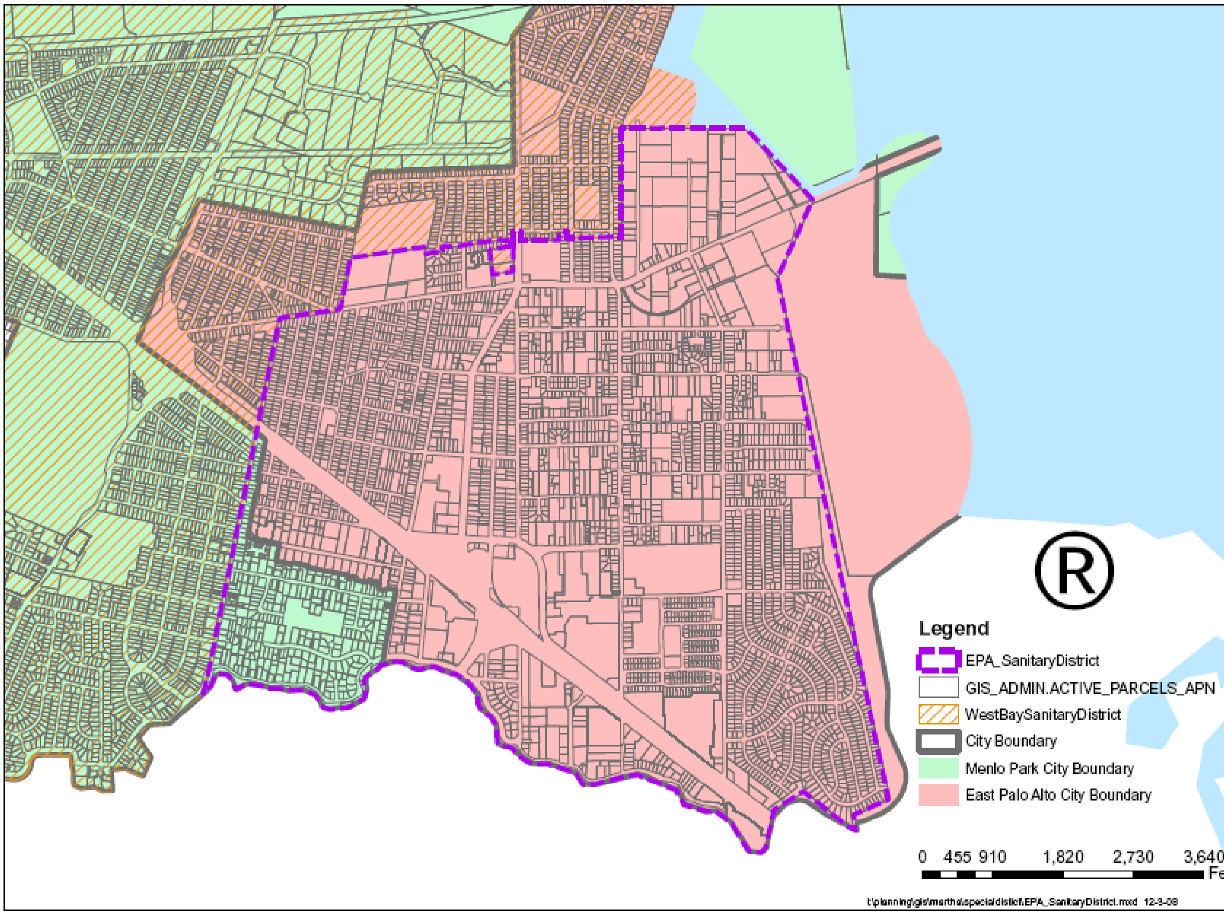
5.3.1 Treated Wastewater

The East Palo Alto Sanitary District (District) serves portions of the Cities of East Palo Alto and Menlo Park, an area of approximately two square miles. Its collection system is comprised of 30 to 35 miles of gravity sewer mains, ranging from 6-inch to 24-inch diameter pipe. The District has no pump stations. Its service area includes over 6,500 residential and more than 200 commercial, industrial, and institutional connections. Wastewater collected in the District's system is transported to the City of Palo Alto's Regional Water Quality Control Plant (RWQCP). The District has 3.06 MGD (Annual Average) or 7.64% of treatment capacity allotment at the Regional Plant. The RWQCP has a dry-weather capacity of 40 MGD and a wet-weather capacity of 80 MGD. Currently, the District collects 657 million gallons of wastewater per year, or 1.8 MGD, from the City of East Palo Alto service area.

In addition to a small portion of northern East Palo Alto, West Bay Sanitary District (WBSD) serves areas in the cities of Menlo Park, Atherton, Redwood City, and Woodside, and in the unincorporated areas of San Mateo and Santa Clara Counties. All wastewater collected within the district is transported through roughly 207 miles of mainline trunk sewers to the Menlo Park Pumping Station and from there to the South Bayside System Authority Regional Treatment (SBSA) Plant. The district owns and operates this treatment plant in conjunction with the cities of Redwood City, Belmont, and San Carlos through a joint powers authority, the South Bayside System Authority. WBSD has treatment rights of 6.6 MGD of average dry-weather flow and 14.4 MGD of peak wet-weather flow at the SBSA Plant. WBSD service area serves approximately 18,380 residential customers and 625 commercial customers through 6-inch to 54-inch sewer mains. WBSD's average daily flow during dry weather is approximately 4.5 MGD or 68% of their capacity rights; it is not known how much of that flow comes out of East Palo Alto.

Both the Palo Alto Regional Water Quality Control Plant and the South Bayside System Authority Regional Treatment Plant put their entire wastewater streams through primary, secondary, and advanced (tertiary) stages of treatment to meet recycled water standards for unrestricted beneficial reuse per California Code of Regulations, Title 22. Both plants deliver highly treated wastewater for reuse in certain sections of their service area. Neither, however, delivers recycled wastewater back to the City of East Palo Alto water service area. Refer to Appendix 3 for complete service territory for the sanitation districts.

Figure 5-1 Sanitation District Boundaries



(Source: LAFCO 2008: Municipal Service Review Determination East Palo Alto Sanitary District, Draft)

The South Bayside System Authority Recycled Water Project

The South Bayside System Authority's expansion of their recycled water system is almost complete. The system extends south into the Greater Bayfront area and Central Redwood City. Figure 5-2 shows the three recycled water service areas.

The recycled water system will also include offsite recycled water storage reservoirs and pump stations. It is anticipated that the Greater Bayfront and Central Redwood City areas will each require a storage facility and pump station for the efficient operation of the system. Although the specific location and design of these facilities has not yet been determined, the preliminary hydraulic modeling for the system indicates approximate locations for these facilities within each service area. The reservoir/pump station in the Greater Bayfront area is shown near the City's Police Department facility on Maple Street, and the reservoir/pump station in the Central Redwood City area is shown within Red Morton Community Park.

East Palo Alto Sanitary District Recycled Water Project

The East Palo Alto Sanitary District Recycled Water Project (Project) is currently in Phase 3 of the City of Palo Alto Water Reuse Program. Phase 1 and Phase 2 are portions of the project that could directly serve the City of East Palo Alto. Phase 1 serves the Palo Alto Golf Course, Emily Renzel March, Greer Park, and the Regional Water Quality Control Plant (RWQCP). Phase 2 contains a pipeline along Embarcadero just east of Highway 101 and along East Bayshore Road.

The Project would initially serve approximately 800 acre-feet of recycled water per year, mostly in the Stanford Research Park area. The Project will provide recycled water primarily for landscape irrigation; other uses, however such as commercial and light industrial, will also be considered.

As irrigation and other non-potable uses are the first to be cut back during drought, each of these projects could provide customers with a reliable, locally controlled supply to protect landscape value. It will also reduce the level of potable water rationing during drought, since non-potable water demand can continue to be fulfilled with recycled water.

In order to access recycled water, the City of East Palo Alto would have to connect to the South Bayside System Authority or the East Palo Alto Sanitary District recycled water lines. For the South Bayside System Authority, at least four miles of pipe would need to be laid to transport to the city limits of East Palo Alto. The pipe would run from the corner of Maple Street and the Bayshore Freeway to the area located around East Bayshore Road and Laurel Lane. Additional infrastructure would be needed to get the recycled water to the place of use within the city limits.

More feasible would be a connection to the closer of the two recycled water systems, East Palo Alto Sanitary District. This would require the construction of approximately 4,000 feet of pipe from the corner of Embarcadero Road and East Bayshore Road to the area located around East Bayshore Road and Pulgas Avenue.

The City of Palo Alto is open to negotiating a connection to existing recycled-water pipelines. The southwest portion of the East Palo Alto, which includes the City of East Palo Alto Permit Center, Martin Luther King Park, Ravenswood Gateway 101 Park, Edison Brentwood Academy, and the potential Ravenswood Business Development, has the most potential to use the recycled water.

Figure 5-2 EPASD and SBSA Recycled Water Lines

Note: Not all recycled lines are depicted on the map.

5.3.2 Satellite Wastewater Treatment Plants

Satellite wastewater treatment plants or point-of-use facilities collect wastewater from an interceptor or trunk line, treat the water so that it meets appropriate reuse standards, and then release it to nearby customers. Because the plants have such a small physical footprint, certain Conventional Biological Process (CBP) and Membrane Biological Reactors (MBR) generally can be located even in dense urban locations without difficulty. The highly automated systems require relatively little operator oversight and tend to perform reliably.

Conventional Biological Process (CBP)

A decentralized CBP, commonly referred to as a "package plant," utilizes the biological extended aeration principle of operation, which is a variation of the activated sludge treatment process. This system functions by creating an environment with sufficient oxygen levels and agitation to allow for bio-oxidation of the wastes to suitable levels for discharge.

Waste material in domestic wastewater is generally organic (biodegradable) which means that microorganisms can use this matter as their food source. A biological wastewater treatment system makes use of bacteria and other microorganisms to remove up to 90% of the organic matter in the wastewater.

Biological wastewater treatment systems and processes were actually developed by observing nature. As waste entered the stream, the dissolved oxygen content in the water decreased and bacteria populations increased. As the waste moved downstream, the bacteria would eventually consume all of the organic material. Bacterial populations would then decrease, the dissolved oxygen in the stream would be replenished, and the whole process would be repeated at the next wastewater discharge point.

The influent wastewater enters the wastewater treatment package plant by passing through a bar screen for gross solids removal. This step provides for the mechanical reduction of solids prior to aeration. Once the wastewater has entered the aeration chamber, the untreated flow is mixed with an active biomass in a rolling action that takes place the length and width of the chamber in a slow forward progression. This rolling mixing action is the result of air originating from air diffusers located along one side of the bottom of the tank. This insures that adequate mixing is maintained in the tank. The chambers are filleted on each side along the bottom to assure and enhance the rolling motion of the water and to eliminate any “dead zones” in the tank. The oxygen transfer achieved with the diffused air passing through the wastewater coupled with the rolling action provides a sufficient oxygen supply allowing microorganisms to oxidize treatable wastes in to carbon dioxide, water, and stable sludge.

After aeration, the wastewater flows to the clarifier that typically has a hopper bottom configuration. The wastewater clarifiers are sized to provide the required retention time based on an average twenty-four hour design flow. During the settling period, solids settle on the bottom of the clarifier. Airlift pumps with adjustable pumping capabilities are used to return these solids, as activated sludge, to the aeration chamber to maintain the maximum efficiency of the biological process. When necessary, excess sludge is wasted to an aerated sludge digestion tank for additional treatment and reduction. A skimmer airlift pump is used to return floatable solids and scum to the aeration chamber for further processing.

The treated water flows from the clarifier to a disinfection chamber for treatment via chlorination or ultra-violet (UV) disinfection prior to discharge to complete the treatment process. Tertiary filters may also be used where a higher quality of effluent is required.

Membrane Biological Reactors (MBR)

The MBR process combines an aerobic biological process with an immersed membrane system. Cost-effective and reliable, this separation technology is suited for a wide range of municipal and industrial wastewater applications. MBR systems can also provide advanced nitrogen and phosphorus removal to meet the most stringent effluent requirements.

There are many equipment variations, configurations, and options that can be used with MBR systems, all of which are designed to provide the necessary treatment for each wastewater or water reuse project. The equipment selected depends on effluent requirements, power consumption, operation and maintenance requirements, need for future expansion, and initial capital costs.

Within the MBR process, the biological process and membrane operating systems are located in separate tanks to optimize performance of the overall process and to simplify operation and maintenance. This unique combination eliminates the need for clarifiers, return sludge pumping, polishing effluent filters, and maintenance normally associated with a conventional clarification process.

By eliminating clarifiers, the biological process can be designed and operated for high-rate wastewater treatment rather than sludge settleability. The biological system can also be operated at much higher mixed liquor suspended solids (MLSS) concentrations (8,000 to 16,000 mg/L). This results in a more efficient biological process that increases solids-retention time, reduces sludge yield, and improves reactor efficiency for nitrification and denitrification.

High MLSS levels also mean that the plants can operate with shorter hydraulic retention times, allowing smaller reactor basins than with conventional treatment. Space requirements of the plant can be up to 50% of those with a conventional biological process.

Operation of the MBR treatment process is easily automated and can be controlled with a microprocessor such as that in a membrane monitoring system, which continuously monitors and records operational parameters. A highly automated design helps operators meet stringent environmental requirements.

A satellite wastewater treatment plant in the City of East Palo Alto has the potential to create up to 50,000 GPD of usable water, offsetting that amount of water currently being imported and purchased from Hetch Hetchy by the San Francisco Public Utilities Commission. Each system can reduce the City of East Palo Alto's dependence on the imported water supply by as much as 2.5%. The footprint for a satellite wastewater treatment plant in the City of East Palo Alto would be approximately 20,000 square feet. This would include all required infrastructure and pumping equipment required to distribute the water to consumers.

While the capital investment would be significant, approximately three million dollars, the operating cost would be approximately $1.00 per thousand gallons, significantly less than the cost of water delivered form the SFPUC.

5.4 Stormwater Capture

Stormwater capture and reuse has the potential to become a valuable method of supplementing an area's water supply. As restrictions on water use and the cost of potable water continue to rise, it makes sense to explore other options for cheaper, available water. Stormwater can be used as a new source of water for municipalities through the use of a supplemental water source to be pumped and treated through traditional potable water distribution systems or through "purple pipe" recycled water systems, where a secondary water line is installed to distribute water for non-potable uses. This analysis reviews both the availability of stormwater for potential reuse and the feasibility of capturing and storing this stormwater for distribution.

Hydrologically, East Palo Alto is located along the western edge of the San Francisco Bay. The city is bounded on the south by San Francisquito Creek, the northeast by the San Francisco Bay, and the west by Menlo Park.

San Francisquito Creek collects flow from approximately 42 square miles of upstream watershed and drains it to the Bay. However, in the vicinity of East Palo Alto the creek acts as a berm. As a result, it is assumed that the drainage collected north of the stream contains no additional flow from Palo Alto (which is located south of the creek) or from any of the upstream watershed that flows into the creek. Because the city boundary between Menlo Park and East Palo Alto is roughly perpendicular to the gradient, and because the storm drainage systems are unknown, the additional assumption is made that no notable flow enters East Palo Alto from the west. In other words, this analysis assumes that the entire city is a stand alone drainage basin with no upstream tributary impacts.

The City of East Palo Alto sits on a broad plane that slopes towards the Bay, from southwest to northeast. In addition to the creek, the city is divided in its southern portion by the US 101 freeway and in its northern portion by a rail line. The location of these facilities do provide the opportunity to block and divert surface flow; however, the existence of drainage facilities cast doubt on the likelihood to successfully capture and reroute significant flow without notable capital expenditure.

The northern edge of the city fronts the San Francisco Bay. The segment between the urban front and the Bay proper is considered part of the Baylands, an area that lies between the maximum and minimum tidal elevations, including land that is actually touched by tides and land that would be tidal in the absence of any levees, seawalls, or other manufactured structures. The marsh consists entirely of brackish water, in many places saltier than the Pacific Ocean. While this is a natural drainage outlet for stormwater, the water that collects in this area is not suitable for reuse. These areas are also unsuitable places to collect water despite the near-optimal location from a drainage standpoint. Additionally, because deep pits located near the Bay would likely collect groundwater of unsuitable quality, any capture facilities would require a location farther inland if the water is to be reused.

Assuming that inland areas are able to provide feasible locations for stormwater capture, a number of additional challenges exist in capturing, treating, and distributing stormwater in a usable way to the community. Groundwater within the city is largely unusable for potable purposes, so either enhanced treatment would need to be used if the two were to mix, or barriers would have to be installed to prevent groundwater intrusion into storage units within the city. In addition, water use fluctuates considerably from season to season. The rainy season runs from October to April. The dry season, which spans April through October, brings with it the potential for high water use; significant facilities would have to be constructed to store water through this period, as opposed to a more constant inflow/outflow scenario.

Infrastructure costs are also significant, whether anticipated uses are potable or non-potable. The costs of a non-potable system include storage and pumping facilities as well as a separately lined system for delivery. While this would operate under pressure, constructing this system would be prohibitively challenging on a large scale due to the existence of other facilities in the street. A separate system is quite feasible for new developments, but the city is currently built out with the exception of the Ravenswood Business District. As a result, feasible separate systems involve capture facilities for local parks or site-by-site facilities for new infill projects (i.e. cisterns or green roof systems).

Inclusion into the potable water system would involve treatment systems. As capture systems are necessarily located at downstream ends of watersheds, providing heads to maintain similar system pressure will involve significant expense. Treatment systems for the city are located offline (as the city water is provided treated from purveyors). Thus, capture systems would involve the construction of water treatment plants and booster pumps. This is a significant investment that is not anticipated to be feasible.

5.5 Conservation Programs

Many water managers today consider water conservation as effectively a new water supply. The City of East Palo Alto is committed to implementing water conservation programs at the local and regional level. Doing so will make it possible for the City to satisfy water demand, especially during times of water scarcity.

As shown in Section 4.4, the City of East Palo Alto has one of the lowest per-capita usages among agencies that purchase water from SFPUC. The 2007-08 gross per-capita consumption rate of water by East Palo Alto water customers is 69 gpd, one of the lowest in the state. Within the BAWSCA service area in 2007-08, the average residential per-capita consumption rate was 90 gpd and the average gross per-capita consumption was 152 gpd. Of the BAWSCA members, Westborough had the lowest residential per-capita consumption at 48.7 gpd while Purissima Hills had the highest at 334 gpd. In 2008, the City of East Palo Alto had the lowest gross per capita consumption and the third lowest residential consumption per capita of all BAWSCA member agencies.

Nonetheless, East Palo Alto has implemented water conservation programs to encourage further resource conservation.

The City of East Palo Alto has developed conservation measures through their municipal code. The regulations intend to promote reasonable water conservation while maintaining a comfortable standard of living and a healthy economy (Chapters 17.04 and 13.24.330-450—see Appendix 2). The municipal code also carries out certain provisions of the California Water Code as embodied in Article XIV, Section 3 of the State Constitution, which declares that maximum beneficial use of water resources is necessary to prevent the waste or unreasonable use—or method of use—of water. Additionally, the municipal code implements the provisions of the conservation element from the San Mateo County water resource management plan.

Beyond the general water conservation measures found in the City of East Palo Alto's municipal code, the City should consider implementing additional conservation measures.

The SFPUC analyzed the benefit-cost ratios, 30-year average water savings, costs of savings, net utility benefits, and first five year utility costs for each of 32 conservation measures for the City of East Palo Alto. The final results of the SFPUC analysis determined that there were 17 conservation measures East Palo Alto should consider implementing. The conservation measures were split into two groups: 1) conservation measures perceived as a reasonable representation of potentially achievable water savings by 2031, and 2) conservation measures based on the full extent of what appeared cost-effective and implementable.

The conservation measures currently in place range from mandatory metering with commodity rates, including meters on detector checks on private fire services, to strict guidelines on landscape use. The following is a list of conservation measures that were evaluated by SFPUC:

Measures already incorporated in the municipal code:

- **Residential plumbing retrofit** - Provide homeowners, specifically those with pre-1992 homes, with retrofit kits that contain easy-to-install, low-flow showerheads, faucet aerators, and toilet tank retrofit devices.

- **Landscape requirements for new landscaping systems (Turf Limitations/Regulations)** - Enforce existing requirements on use of native or low-water-use plants for landscaping purposes. Proof of compliance would be necessary to obtain a water connection on all new multifamily residential and commercial projects. Non-compliers would face a surcharge on their water bill until they complied.

Group 1:

- **Residential ULF toilet rebate -** Provide a rebate to homeowners to replace an existing high-volume toilet with a new water-efficient toilet.

- **Xeriscape education and training -** Sponsor training for staff of stores where plants and irrigation equipment is sold; educate sales people about the benefits of native (low water use) plants, efficiently irrigated.

- **Require sub-metering on multifamily units -** Require all new multifamily units to provide sub-meters on individual units. To help reduce financial impacts on tenants, regulations would be adopted that specify acceptable methods of metering and billing.

- **Rebate efficient clothes washers -** Provide a rebate to new apartment complexes over a certain size with a common laundry room equipped with efficient washing machines.

- **Require 0.5 gal/flush urinals in new buildings -** Require new buildings be fitted with 0.5 gal/flush or better urinals.

- **City Department water reduction goals -** Provide water reduction goals for metered City and County accounts and offer audits and employee education.

Group 2:

- **Residential water surveys -** Offer indoor and outdoor water surveys to existing single-family and multifamily residential retail customers with high water use; provide customized report to homeowner.

- **Large landscape conservation audits** - Provide free landscape water audits to all public and private irrigators of landscapes larger than one acre with separate irrigation accounts upon request.

- **Commercial water audits** - Provide a free water audit that evaluates ways for the business to save water and money to high water use commercial accounts.

- **Rebates for 6/3 dual flush -** Provide a rebate or voucher for the retrofit of a 6/3 dual flush, 4-liter or equivalent very-low-water-use toilet. Rebate amounts would reflect the incremental purchase cost and would be in the range of $50 to $100 per toilet replaced.

- **Homeowner irrigation classes -** At stores where irrigation equipment is sold or other suitable venues, sponsor classes on selection and installation of efficient equipment (drip irrigation, smart controllers, low volume sprinklers, etc.) and proper planting.

- **Commercial clothes washer rebate -** Offer incentives to apartment and coin-operated laundry managers to retrofit or use efficient clothes washers. The rebate would either go to the manager or the washing machine leasing company.

- **Incentives for retrofitting sub-metering -** Rescind any regulations that prohibit sub-metering of multifamily buildings and encourage sub-metering through water audits, direct mail promotions, and/or incentives to building owners.

- **Require dedicated irrigation meters for new accounts -** Require new accounts with a substantial amount of irrigated landscape have dedicated landscape meters and are charged on a separate rate schedule that recognizes the high peak demand placed on the system by irrigators.

Although these water conservation measures have been evaluated for the City of East Palo Alto, the already low per-capita water use means that there is little potential for water savings in existing homes. Since the City of East Palo Alto is primarily built out, it should focus on conservation measures that apply to redevelopment areas.

5.6 Water Supply Exchanges

Regionally, within the Bay Area Water Supply and Conservation Agency (BAWSCA) and the San Francisco Public Utilities Commission (SFPUC), the increasing expense and environmental impact of building new traditional water supplies (e.g. dams and reservoirs) has motivated innovative use of existing facilities (e.g. conjunctive use of surface and groundwater as well as pump and storage schemes) and increased demand management efforts.

Recent interest in water transfers and exchanges to the City of East Palo Alto and the San Francisco Bay area are being evaluated to achieve economical and relatively equitable allocation of water between users, particularly during water shortages.

The water transfer and exchange concept requires extending water markets to include transfers among water-use contractors and other agencies who may exchange with the City of East Palo Alto (e.g. City of Palo Alto, City of Menlo Park, California Water Company, and the Palo Alto Mutual Water Company) or the San Francisco Public Utility Commission (e.g. state water contractors, federal water contractors, East Bay Municipal Utility District, and Stockton East Municipal Utility District). This entails the involvement of parties with diverse views and would require the use of conveyance and storage systems controlled by other agencies in order to deliver water to the combined areas of demand.

Wholesale Customers are regulated by the Water Supply Agreement as to how and when water may be transferred between Wholesale Customers and with parties not included in the agreement. A Wholesale Customer that has an Individual Supply Guarantee may transfer a portion of it to one or more other Wholesale Customers. Transfers of a portion of an Individual Supply Guarantee must be permanent. The minimum quantity that may be transferred is 100,000 gpd. Transfers of portions of Individual Supply Guarantees are subject to approval by the SFPUC.

Each Wholesale Customer (except for Alameda County Water District and the cities of Milpitas, Mountain View and Sunnyvale) agrees that it will not contract for, purchase or receive, with or without compensation, directly or indirectly, from any person, corporation, governmental agency or other entity, any water for delivery or use within its service area without the prior written consent of SFPUC other than recycled water, water necessary on an emergency and temporary basis, and water in excess of a Wholesale Customer's Individual Supply Guarantee.

The controversies and complexities of effecting water transfers and exchanges under these conditions have previously deterred water managers from pursuing this management option. However, in light of the changing economic and policy environment of water management, the recent experience in other regions of California shows water transfers and exchanges to be valuable components of urban water management that offer planners and managers new choices for enhancing the performance and reliability of their systems.

5.7 O'Connor Tract Mutual Water Company

The O'Connor Tract Mutual Water Company is located on the central-west portion of the City of East Palo Alto. Only a portion of the service territory is located within city limits. The remaining portion is located in Menlo Park. The O'Connor Tract consists of approximately 340 connections, of which many are for multifamily residences. About 35 of these connections are metered.

The distribution system consists of two wells with production capacity of 600 and 800 gpm. The wells are approximately 200 to 250 feet deep and have high manganese content but generally good water quality. Recent correspondence provided by the California Department of Health Services includes a Notice of Violation regarding levels of iron and manganese and provides the Company with specific instructions for weekly testing and monitoring.

The system has one 100,000-gallon storage tank and one pressure tank, which together maintain the pressure within the system. The system is fed by a booster station containing one 10-hp pump and two 20-hp pumps. The booster station pumps into a system which consists of distribution mains between two and eight inches. The system is equipped with one emergency generator sized to run both wells and the booster station during an emergency.

A 6-inch intertie with the City of East Palo exists with a pressure-reducing valve.

5.8 Palo Alto Park Mutual Water Company

The Palo Alto Park Water Company is located on the central-west portion of the City of East Palo Alto. The Palo Alto Mutual Water Company consists of approximately 677 unmetered residential connections, 20 unmetered commercial connections, and two metered residential connections.

The distribution system consists of five wells. The wells range from 70 to 500 feet deep and have generally good water quality other than high iron and manganese levels. The system has one 350,000-gallon storage tank and one 11,500-gallon storage tank. The wells pump into the tank, where the water is blended to lower the iron and manganese before distribution. The system is fed by a 1,200-gpm booster station, which maintains a system pressure of 68 psi. The booster station pumps into a system that consists of 6-inch to 8-inch distribution mains. The system is equipped with one emergency generator able to run the wells and booster station during an emergency.

The construction of one new well, new wellheads on the existing four wells, a new booster station, a new 350,000-gallon storage tank, and installation of fire hydrants every 300 feet were completed in 1994.

A 6-inch intertie with the City of East Palo exists with a pressure reducing valve.

5.9 School District

The Ravenswood School District previously purchased property that contained a groundwater well located at the corner of Clark Avenue and O'Connor Street. The groundwater well has been covered over and is not being used. It is uncertain whether the groundwater well was properly destroyed. The well should be investigated further to determine if it was properly destroyed. If the well was not properly destroyed, this could cause concern for groundwater contamination if the City is to develop additional groundwater sources.

6.0 DISTRIBUTION SYSTEM MODIFICATION AND STORAGE REQUIREMENTS

6.1 Existing Distribution System

The water system draws all of its current water supply through three turnouts off the San Francisco Public Utilities Commission's (SFPUC) Bay Division Pipelines (BDPLs) 1 and 2.

Treated water is supplied from the Hetch Hetchy Aqueduct at pressures ranging from 105 to 140 psi. The turnouts are located on the aqueduct near Willow Road, O'Brien Drive, and University Avenue. Pressure-regulating valves at each turnout reduce the pressure in the distribution system. The pressure-regulating valves are set at the following pressures: 70 psi at Willow Road, 75 psi at O'Brien Drive, and 75 psi at University Avenue.

The existing distribution system is a network of 1½-inch to 12-inch diameter pipes. There are three turnouts with the SFPUC for supply as well as two emergency interties that serve only the two mutual water companies. The system has nearly 300 fire hydrants. The main lines are part of the WaterCAD® model used for the analysis in Section 7. There are also other pipelines, mostly in smaller residential streets that are not part of the model.

There is currently no storage within the City of East Palo Alto's water system. The City relies solely on water from the SFPUC system for the storage necessary for equalization, fire flows, and emergency use.

6.2 Existing Model

To accurately analyze the water distribution system in the City of East Palo Alto, a hydraulic network simulation model was created to represent the system. The results of this hydraulic model were used to assist in long-range master planning, fire-flow studies, short-term project design, and system rehabilitation.

The water distribution system was first put into a hydraulic network simulation model and analyzed in 1992 as part of a previous master plan done for the system prior to being taken over by the City of East Palo Alto. The system was modeled using the WaterCAD® software program and was used as the basis for the hydraulic network simulation model used in this current study, which was also analyzed using the WaterCAD® modeling software program.

<u>Existing WaterCAD® System Model</u>

From the previous hydraulic network simulation model completed using WaterCAD®, there were three base scenarios – average day, max day, and peak day – all of which contained an alternative scenario to model a proposed hotel (which is currently in operation). The max day also contained an alternative scenario with improved projects. The alternative scenarios for the new hotel included an additional water line down Clarke Avenue. Closed in the model were lines P-69 and P-145, which connect to the University Avenue Reservoir and an old well along US 101 and Cooley Avenue, respectively. As these two facilities are not part of the current operations system, these lines remained closed in the model and had no effect on the analysis results.

Most water system models do not contain every pipe in the system and instead focus on the main lines. This is to simplify the model for ease of analysis. The previous model was designed in this manner, including lines in major streets but generally omitting those running along smaller residential streets. This layout was generally maintained during the model update except as necessary to account for a specific update or demand. The accuracy of the model results when used to predict current and future system conditions inherently depends on the level of detail applied to the creation of the model. Further refinement to the model at any future time will allow the City of East Palo Alto to be able to make more informed decisions about the system and to more effectively conduct cost/benefit analyses for capital improvements.

The consideration for necessary capital improvement projects include minor lines not included in the model, as many of them are below the minimum eight-inch-diameter standard size, and are therefore likely to have even greater pressure and fire-flow concerns than the modeled portions of the system.

6.3 Design Criteria

Water utilities, including the City of East Palo Alto, must be able to supply water at highly variable rates. Yearly, monthly, daily, and hourly fluctuations in water use occur, with higher use during dry years and in hot months. Intraday water use typically follows a diurnal pattern, being lowest at night and peaking in the early morning and late afternoon. Water demands that are most important to the hydraulic design and operation of a water distribution system include average day demand, peak day demand, and peak hour demand. Minimum day demand usage is becoming increasingly significant relative to water quality issues in the distribution system.

The term “water demand” is often used interchangeably with “water production” and “water consumption.” Rather than treat them as equivalent, this report defines water demand as the amount of water supplied by SFPUC including unaccounted water. This amount represents the total amount of water that was delivered historically and that which will be needed to serve the future water needs of the City of East Palo Alto.

Average day demand (ADD) is calculated from total annual water use, and it is used primarily as a basis for estimating maximum day and maximum hour demands. The average day demand rate is also used to estimate future revenues and operating costs.

Peak day demand (PDD) is the maximum quantity of water used on any one day of the year. The peak day demand rate is used to size water supply hydraulics, treatment facilities, and pumping stations. The water supply facilities must be adequate to supply water at the maximum day rate.

Peak hour demand (PHD) is the peak rate at which water is required during any one hour of the year. Since minimum distribution system pressures are usually experienced during peak hour, the sizes and locations of distribution facilities are generally determined on the basis of this condition. Peak hour demand is partially met through the use of strategically located system storage. The use of system storage minimizes the required capacity of transmission mains and permits a more uniform and economical operation of the water supply, treatment, and pumping facilities.

Demands

Base Average Day Demands

ADDs were already set up in the previous system model. In addition, the City of East Palo Alto provided monthly billing usage reports for the previous three years (see Appendix 4.1). Comparing these two sets of demands, the previous system model shows an ADD of 1,472 gpm and City billing reports show an ADD of 1,465 gpm. That these numbers are relatively close suggests that the demands being modeled are reasonably accurate. Important to note, the previous model was created in 1992, while the current billing usage reports come from the years 2005-06, 2006-07, and 2007-08. Since 1992, additional services have been added to the water system at different locations within the city. East Palo Alto has also provided bi-monthly water usage reports for the known large users since 1992 which total an ADD of 53.86 gpm (see Appendix 4.2). These additional demands were subtracted from the original ADD used in 1992 in the previous system model, and the demands at each junction in the system model were then re-proportioned to more accurately model the locations of demand. The new additional demands that were added after the existing model was created were then inserted at the appropriate junctions in the system model. The total demand use has remained the same even with the new services, largely because an environmental business, Romic Environmental Technologies Corporation, which was the city's largest water consumer, closed in 2007. During the early 2000s, Romic was using an average of 31,000 gpd with a peak of 41,000 gpd in 2001. This occurred during the time between the previous model and the current model.

Appendix 9.1.1 shows a color-coded representation of the current ADD demands on the system.

Also important to note, the previous model does not show any demand in Menlo Park. Although there are emergency connections, this was neither included in the model nor operating during the calibration events. As this is an unknown variable, it is not part of the modeling but should be taken into consideration for emergency situations.

Peak Day Demands and Peak Hour Demands

The PDD is calculated as the ADD × 1.5 and the PHD is calculated as the ADD × 3.0.

In addition, Appendix 9.2.1 shows a color-coded representation of the current PDD demands on the system, and Appendix 9.3.1 shows a color-coded representation of the current PHD demands on the system.

Fire-Flow Demand

Fire-flow demands (FFDs) were set at each junction in the system to simulate the effects on the system in the event of a fire. Typically, a demand of 1,000 gpm is placed at a junction to imitate the demand associated with a fire flow for a single family dwelling. A demand of 1,500 gpm is used for a fire flow at a junction associated with a multifamily dwelling. Other high-density dwellings such as hotels are given a corresponding fire flow based on the size and density of the dwelling.

In the existing system model, the FFDs were set at each junction as described above. There is a hotel within the East Palo Alto city limits, the Four Seasons Hotel, which was given a FFD of 2,500 gpm. Since the existing FFDs were set appropriately, they remained the same and additional FFDs were added at the junctions with the new services as described in the Base Average Day Demands section. Since each of the new service connections is for multifamily housing (apartments) or commercial properties, a fire-flow demand of 1,500 gpm was added for each at the corresponding junctions.

Calibration

Calibration of the system involved revising the roughness coefficient of the pipes in the model to allow the calculated, modeled flows to match flow observations recorded in the field, which account for buildup and degradation of the pipes over time. The first step in calibrating the system was to perform a field fire-flow test. Once fire-flow test results were obtained from the field, the results were used in a computer software calibration program to perform a calibration analysis on the system model.

Before the field fire-flow test was performed, the locations for the fire hydrant testing to calibrate the model were identified. Selection of the locations was closely coordinated between the design team and East Palo Alto staff based on critical points in the system intended to provide the most reliable data. For the tests to be effective, approximately 10% of the total number of nodes in the system, or 14 fire hydrants, were tested. Also, to get an accurate representation of the system, the hydrants tested were spread out across the entire system. Appendix 5.1 shows the locations of the fire hydrants selected. Following the formulation of the test hydrant locations, the testing date was scheduled and public notification was provided.

Following the public notification, the hydrants selected for the calibration data were tested between 10:00 p.m. on May 20, 2009 and 2:00 a.m. on May 21, 2009. The testing was conducted by field staff, the engineering project manager, the Director of Public Works, and Water Superintendent. All tests were completed successfully and were adequate to provide the necessary data to calibrate the computer model. The pressure gauges at the points of connection turnouts from SFPUC were measured and any variations in the system during the times of the tests were noted. Results from the field fire-flow tests are shown in Appendix 5.2.

The next step in the calibration process was to apply the fire-flow test data obtained in the field to a computer software calibration program to adjust, or “calibrate,” the existing system model. The computer software program used to do the calibration was H2ONet v8.5®. The program works by dividing the water distribution system into several different groups and assigning a new roughness coefficient (a Hazen-Williams “C” value) to each group based on empirical observations. Revising the roughness coefficient of the pipes allows the calculated model flows to match flow observations recorded in the field due to buildup and degradation of the pipes over time. The more refined the groups are, the more accurate the calibration is.

For this calibration, pipes in the model were first broken down into 14 different zones, each associated with a fire-flow test performed in the field. Pipe groups were then divided even further into pipe size and material, so each group within a zone contained a certain pipe size for each pipe material in that zone.

Once the pipes were properly grouped, field data was inserted into the calibration feature. The recorded fire flow at each fire hydrant was inserted into the program at the corresponding node, and the residual pressure was recorded. Results from running the program was a list of new C-values for each pipe were given (see Appendix 5.3).

Because the previous system model was done using WaterCAD®, it was determined that it would be most efficient to continue evaluating the system model with this computer software program. However, the calibration feature in WaterCAD® was not available, so, as mentioned above, the model had to be converted to H2ONet® to run the calibration. Once the system was calibrated, the new pipe C-values were imported to WaterCAD® and the new system model was assumed to be calibrated. Using the fire flow test feature in WaterCAD® to simulate the same test done in the field, the calibration results were verified based on the resulting available fire flows calculated by the software program.

Although most of the computer-simulated fire-flow results were within reasonable accuracy of what was found in the field, verifying the calibration results found that flows at a few nodes in the program yielded much higher than what was recorded in the field. Upon further review of these results, it was found that each of the nodes with higher than expected available fire flows were located directly near one of the three turn-outs in the system.

Each of the turn-outs has a pressure-reducing valve, which limits the pressure and, consequently, the flow into the system as it pulls water from the aqueduct. Pressure testing was done in the field at the same time as the fire flow tests confirming pressures and flows at each of the turn-outs.

The system model in WaterCAD® was set up correctly with pressure-reducing valves at each turn-out based on information observed in the field; however, pressures just downstream of each turn-out during the fire-flow computer analysis showed a much higher pressure than allowed by the settings on the valve. This appears to cause higher than expected flows in the nodes near the turn-outs.

6.3.1 Water Requirements

Stormwater Capture

The quantity of flow available for stormwater reuse is based upon commonly accepted hydrologic methods. Typical rainfall depths for design storms were obtained from the NOAA Atlas 2 web server and include data for the two-year storm and the 100-year storm. The rainfall depths were then put into the catchment runoff yield equation as follows:

$$Y_f = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S) \times P_{24}}$$

The inputs to the equation are based on the 24-hour precipitation for a given storm event and the curve number used for the analysis. The curve number was calculated based on the assumption that the community overlies a combination of type B and type D soils and a mixture of commercial and residential parcels. Based on proportional areas, a composite value was determined and used for this calculation. The yield fraction was then applied to the total rainfall that occurs over a design storm to give total runoff volumes.

The yield function outlined above is generally reasonably accurate for small storms. Determining the yield on an annual basis is considerably more complicated. First, California rainfall patterns generate an average value; however, this average is compiled between years considerably drier or wetter than average. In a dry year, half of the average rainfall is not uncommon, and likewise in a wet year, twice of the average rainfall can occur. Furthermore, often the bulk of the year's precipitation can fall during two to three large storm periods during the months of January and February. For these reasons, determining the capture potential for a one-year or two-year storm is not an unreasonable assumption for estimating capture potential as capturing an entire year's "average" precipitation is a noteworthy challenge that is beyond the scope of this document.

Rainfall depths were obtained from the NOAA Atlas 2. This gives expected runoff values for various storms, and for this discussion, the two-year, 24-hour storm was analyzed. The two-year storm gives a depth of 2.19 inches. A natural divide that bisects the city into northern and southern portions divides the falling rain. The southern portion contains approximately 1,000 acres, and the northern portion contains approximately 1,200 acres. With calculations applied, the runoff potential for a single two-year storm is a combined 150 acre-feet (or approximately 50 million gallons). One could estimate that an annual yield may be five to ten times this amount (based on an annual runoff total of up to 20 inches), which would give a total storage volume of up to 1500 acre feet, or 500 million gallons. Short of a new reservoir that would encompass at least 200 acres of land, the feasibility of storing anywhere near this water does not exist. This strengthens the arguments made in earlier sections that water capture feasibility exists only on a small-scale, case-by-case basis.

Appendix 7 shows some potential small-scale locations of possible reuse. The stormwater can be collected at each of these facilities, namely parks, and reused for irrigation purposes. Depending on the specific water needs at each site and the availability of site area dedicated to recycling, surplus water could be brought to these sites and pumped out for use elsewhere. By utilizing this system, the City would conserve water equal to this reuse volume and therefore need less original source water.

6.3.2 Storage Requirements

The water system currently does not have a storage reservoir, forcing dependence on the SFPUC connections. This is particularly dangerous for a fire situation: a failure of systems beyond East Palo Alto's control could limit the capacity of the system to meet the fire demand. Also any extended failure on the SFPUC facilities would leave the city without water.

6.3.3 Computation of Total Storage Requirements

The sizing guidelines for a reservoir varies, but a common size requirement is the PDD plus fire flow. In this system's case, the maximum fire flow requirement is 4,000 gpm. This is then projected for a four-hour fire for a total of 960,000 gallons. The PDD for the system is 2,208 gpm or 3,179,460 gpd. Therefore the required total size of the reservoir is 4.2 MG. This sizing is based on current needs and does not include future demand increases related to Ravenswood Business District.

As part of the Ravenswood Business District Construction Cost Estimates for Infrastructure report done for the City of East Palo Alto and dated October 31, 2008, a 1.8 MG storage tank will be required for future demands associated with the RBD redevelopment.

FF =	4,000	gpm
PDD =	2,207.96	gpm

FF for 4 hours =	4,000 gal	60 min	4 hr	= 960,000 gallons
	min	1 hr		

PDD =	2,207.96 gal	60 min	24 hr	= 3,179,460 gallons
	min	1 hr	1 day	

Storage = MDD (per day) + FF (4 hour) = 960,000 gal + 3,179,460 gal = **4,139,520 gallons**

6.3.4 Pressure Requirements

The water distribution system must sustain a minimum working pressure of 40 psi during peak-hour demands and 20 psi during times of maximum-day demands with concurrent fire flow. Meeting minimum pressure in the system is only one requirement the system must meet. The water distribution system is also responsible for providing sufficient water flow in times of emergency. As described in Section 6.3, the system must be able to deliver 1,000 gpm of available fire flow to a single-family residence and 1,500 gpm of available fire flow to a multifamily residence. Commercial and industrial sites usually require an available fire flow of around 2,500 gpm, depending on the size and number of occupants in the structure.

Evaluation of the Current System

ADD

Evaluation of the current system shows that during the ADD situation, the current system model maintains a minimum pressure of 40 psi. Results of the system model in Appendix 8.1.2 show a pressure of 61.9 psi at node J-669, which is the lowest pressure within the system.

Analyzing the results of the fire-flow analysis, out of the 122 nodes tested for available fire flow, only 65 met the minimum fire-flow requirement. In other words, only about half of the system would be able to deliver the needed fire flow during the ADD situation. Although this is of concern, the majority of the nodes that did not meet the required flow were within 100 gpm of what was needed. Results of the Fire Flow Analysis are shown in Appendix 8.1.1.

Appendices 9.1.2 and 9.1.3 show a color-coded representation of the results described in this section.

PDD

For the PDD situation, demand in the system increases as expected, which in turn decreases the pressure throughout the system. However, as shown in Appendix 8.2.2, the pressure at J-669 is 60 psi, still well above the required minimum pressure of 40 psi.

Analyzing the results of the fire-flow analysis, only 40 out of the 122 nodes tested for available fire flow met the minimum requirement. This means that over two-thirds of the system would not be able to deliver the needed fire flow during the current PDD situation. This is problematic, considering that nodes not meeting the flow requirements were, on average, delivering about half of the required fire flow. It's also important to note that fires often occur during times of peak water consumption. Results of the fire-flow analysis are shown in Appendix 8.2.1.

Appendices 9.2.2 and 9.2.3 show a color-coded representation of the results described in this section.

PHD

For the PHD situation, demand in the system is at its highest for regular use. In this situation, pressure at J-669 is 50.4 psi – still over the minimum of 40 psi. Calculation results are shown in Appendix 8.3.2. This demonstrates that the current system has the ability to deliver the necessary pressure throughout the system even during peak hour usage.

Typically fire flows are not analyzed for the PHD situation; however, calculations were still performed and are shown in Appendix 8.3.1.

Appendices 9.3.2 and 9.3.3 show a color-coded representation of the results described in this section.

6.3.5 Minimum Pipe Sizes

Minimum pipe size for the water distribution network should be six inches. Normally, it is recommended to have 8-inch lines as the minimum standard size. However, this system has nearly 90,000 linear feet of 6-inch lines, making those increases cost-prohibitive given the proposed budget. As part of upgrading the system to account for future demands, pipes will need to be replaced with larger diameter pipes to maintain adequate pressure under projected future demands. Furthermore, upgrading all pipe sizes will increase available fire flow to the system. As pipes require repair or replacement a minimum diameter pipe of 8-inch should be installed.

6.4 Future System

Future Demands

Ravenswood Business District (RBD)

As part of the Water Master Plan for the City of East Palo Alto, future demands must also be evaluated in order to sufficiently account for growth in the city. As most of the city is already developed, redevelopment will be the primary source of growth, typically converting low-demand, single-family areas into dense areas of business and multifamily residential use. One such example is currently under redevelopment is the Ravenswood Business District.

The Ravenswood Business District (RBD) is a redevelopment district of approximately 146 acres in the northeastern corner of East Palo Alto. Currently the land is used primarily for low-density industrial operations with some commercial and governmental uses and also includes some vacant land and wetland areas. According to the Ravenswood Business District Construction Cost Estimates for Infrastructure report done for the City of East Palo Alto and dated October 31, 2008, the proposed development outlook for underground utilities for the year 2025 assumes 5,000,000 square feet of commercial space, 15,000 square feet of retail, and 1,188 residential units. The report also goes into detail about the assumed water demands and peaking factors that are consistent with those used throughout this Master Plan.

A breakdown of the proposed demands for the RBD can be found in the Appendices of the aforementioned report. These demands were previously modeled in WaterCAD®, and results are given in Appendix 10. The Junction Report tables in this Appendix were used to insert demands at each junction in the WaterCAD® model for the new Master Plan, and an alternative demand was created to model these future demands for the RBD redevelopment.

Appendix 13.1.1 shows a color-coded representation of the current-plus-RBD demands on the system under ADD conditions. Appendix 13.2.1 shows a color-coded representation of the current-plus-RBD demands on the system during PDD. Appendix 13.3.1 shows a color-coded representation of the current-plus-RBD demands on the system at PHD.

EPA Mutual Water Company & O'Connor Tract Mutual Water Company

Two mutual companies exist within the limits of the City of East Palo Alto. Currently the City of East Palo Alto has no storage or redundancy in the system. It appears reasonable to incorporate the two mutual water systems into the City's system for emergency purposes. Doing so would provide a major benefit by supplying an additional water source during emergency situations. The following is an analysis of the system during an emergency situation. Currently the connection with the mutual water companies only serves water from the City of East Palo Alto to the mutual water companies. These emergency connections would be bi-directional to provide emergency service to each utility.

Based on historical usage in the current City of East Palo Alto system, single-family residential services use approximately 0.3 gpm while multifamily services use about 1.0 gpm. The EPA Mutual Water Company's service comprises approximately 568 single-family residences. Using the demand of 0.3 gpm per single-family service, this yields a total demand of approximately 155 gpm for the EAP Mutual Water Company in full. The O'Connor Tract Mutual Water Company comprises approximately 91 single-family residential services and 29 multifamily residential services. This yields a total demand of approximately 53 gpm for the O'Connor Tract Mutual Water Company. See Appendix 11 for relevant data concerning the determination of these flows.

As mentioned, the benefit of installing emergency interties with the two mutual water companies would be the additional water source during emergency conditions. The O'Connor Tract Mutual Water Company consists of two wells, together capable of producing 1,400 gpm. The system also has a 100,000-gallon storage tank fed by a booster station, which is powered by one 10-hp two 20-hp pumps. The EPA Mutual Water Company has two storage tanks with a combined volume of 361,500 gallons and fed by a 1,200-gpm booster station. Each company has a six-inch intertie with the City of East Palo Alto, and each intertie is fitted with a pressure-reducing valve.

Both mutual water companies were added into the system model, reflecting demands and supply sources as outlined above. The system model was then run and calculations analyzed to determine the system's function when connected to the mutual water companies.

Appendix 15.1.1 shows a color-coded representation of the current system with RBD and both Mutual Water Companies' ADD demands on the system. Appendix 15.2.1 shows a color-coded representation of the current system with RBD and both Water Mutual Companies' PDD demands on the system. Appendix 15.3.1 shows a color-coded representation of the current system with RBD and both Mutual Water Companies' PHD demands on the system.

<u>Evaluation of Existing System with Future Ravenswood Business District (RBD)</u>

ADD

Evaluation of the existing system with additional flows from RBD shows that during the ADD situation, the system model maintains a pressure of at least 40 psi. As shown in Appendix 12.1.2, node J-669 in the system model has a pressure of 60.6 psi, which is the lowest pressure within the system.

Analyzing the results of the fire-flow analysis, out of the 122 nodes tested for available fire flow, only 50 met the minimum fire flow requirement. This is just over 40% of the system, indicating that over half of the system would not be able to deliver the needed fire flow during the ADD situation. The nodes not meeting the required flow were on average delivering about half of the required fire flow needed. Results of the fire flow-analysis are shown in Appendix 12.1.1.

Appendices 13.1.2 and 13.1.3 show a color-coded representation of the results described in this section.

PDD

For the PDD situation with additional flows from RBD, the pressure at J-669 is 57.3 psi, as shown in Appendix 12.2.2. This is still well above the required minimum pressure of 40 psi.

Under PDD conditions, none of the 122 nodes tested for available fire flow met the minimum requirement. This indicates that as future build-out occurs in the city and demands increase, the current system will be unable to deliver fire flows as needed during times of peak demand. Results of the fire flow analysis are shown in Appendix 12.2.1.

Appendices 13.2.2 and 13.2.3 show a color-coded representation of the results described in this section.

PHD

For the model including RBD under PHD circumstances, pressure at J-669 is 41.2 psi, which still maintains the minimum requirement of 40 psi. These conditions describe the worst-case scenario, because demand in the system is at its highest. Calculations are shown in Appendix 12.3.2.

Typically, fire flows are not analyzed for the PHD situation; however, calculations were still performed and are shown in Appendix 12.3.1.

Appendices 13.3.2 and 13.3.3 show a color-coded representation of the results described in this section.

Evaluation of Existing System with Future Ravenswood Business District (RBD) and EPA & O'Connor Tract Mutual Water Companies

This section evaluates the effects of utilizing both mutual water systems during an emergency situation. While a certain demand is associated with each mutual water company, each also includes a water source as described above. As the results show, the inclusion of interties in emergency situations greatly improves the system's ability to provide adequate fire flow to much of the city that otherwise could not meet the required demands.

ADD

Evaluation of the existing system with additional flows from RBD and both mutual water companies shows that during the ADD situation, the system model maintains a minimum pressure of at least 40 psi. As visible in Appendix 14.1.2, node J-669 in the system model has a pressure of 68.8 psi, which is the lowest pressure throughout the system.

Out of the 122 nodes tested for available fire flow, 114 nodes met the required fire-flow demand. This is a drastic improvement over even the current system, with 93% of the system meeting fire-flow requirements. These results include additional demands from both RBD and both Mutual Water Companies, which demonstrates that during emergency situations, the City would meet almost all fire flow demands for the ADD situation. Results of the Fire Flow Analysis are shown in Appendix 14.1.1

Appendices 15.1.2 and 15.1.3 show a color-coded representation of the results described in this section.

PDD

For the PDD situation with additional flows from RBD and both mutual water companies, the pressure at J-669 is 65.1 psi, as shown in Appendix 14.2.2. This is well above the required minimum pressure of 40 psi.

Analyzing the results of the fire-flow analysis, out of the 122 nodes tested for available fire flow, 111 nodes met the required fire flow demand. Once again, this is much better than even the ADD situation with the current system; with the additional water sources from the mutuals, over 90% of the system meets fire flow requirements. Results of the fire-flow analysis are shown in Appendix 14.2.1.

Appendices 15.2.2 and 15.2.3 show a color-coded representation of the results described in this section.

PHD

Finally, for the PHD situation that includes both RBD and the mutual water companies, the lowest pressure in the system is 54.5 psi at J-388 which is above the minimum requirement of 40 psi. In the PHD situation for the additional RBD demands only, some areas do not meet pressure requirements. With the additional water sources from the mutual water companies, the pressure remains comfortably above the minimum required and exemplifies the benefits of the additional water sources. Calculations are shown in Appendix 14.3.2.

Typically fire flows are not analyzed for the PHD situation; however, calculations were still performed and are shown in Appendix 14.3.1.

Appendices 15.3.2 and 15.3.3 show a color-coded representation of the results described in this section.

7.0 CAPITAL IMPROVEMENT PROGRAM

Based on the analysis and research in the preceding sections of this report, the following projects are suggested as parts of a Capital Improvement Program (CIP). The list below is prioritized based on need, but they may need to be reordered per funding availability. The costs related to these projects are mostly estimated through Means Costworks 2009 software or, if an item was not available, based on research of similar projects. An additional 20% was added for design fees and 20% for contingency. These numbers are all based on 2009 costs and should therefore be adjusted for future years. Understanding that the City will bid each of these projects, the final numbers could vary greatly depending on factors such as final design parameters, unknown outside costs, new regulations or standards, bidding climate, or fluctuations in material or labor costs.

7.1 Pipeline Replacement Projects

This analysis is based on the current system discussed in Section 6.3 PDD fire-flow analysis. There are additional lines that would not meet standards with the addition of the Ravenswood demands. However, those necessary improvements should be funded from developer fees or redevelopment funds rather than a CIP program. As recommended in the Ravenswood Business District Construction Cost Estimates for Infrastructure report done for the City of East Palo Alto and dated October 31, 2008, water mains serving this area will need to be upsized to be a minimum of twelve-inches.

The following criteria were used to evaluate the pipeline improvements:

1. Improve areas in current system with below standard pressures or fire flows
2. Replace all other lines less than six-inches in diameter with eight-inch pipes
3. Upgrade remaining six-inch lines with eight-inch pipes

The proposed replacements have been split into three groups based on the disparity between necessary fire flow and current fire-flow availability. Lines with greater than 700 gpm difference are in Group I and need upgrades most urgently. Lines in Group II differ by between 500 and 700 gpm. Group III has a less than 500-gpm difference. Groups IV and V are then based on items 2 and 3 above.

Table 7-1 Pipeline Replacement Projects

<u>Group I Streets</u>

Newbridge (Mello - Bay)	1,000	ft of	12"	to	16"
Poplar Ave., Ralmar Ave. (Menalta - Donohoe)	1,550	ft of	6"	to	8"
Donohoe (Ralmar - West Bayshore)	1,850	ft of	6"	to	8"
O'Connor (Clarke - Larkspur)	751	ft of	6"	to	8"
	1,320	ft of	8"	to	12"
University (Woodland - O'Connor)	858	ft of	6"	to	8"
Bell St. (Euclid - Cooley)	780	ft of	8"	to	12"
Demeter St. (Bay - Purdue)	1,550	ft of	6"	to	12"
	990	ft of	10"	to	12"
Runnymeade (Euclid - Cooley)	1,050	ft of	8"	to	12"

Group II Streets

Euclid (Runnymeade - West Bayshore)	2,100	ft of	6"	to	8"
	245	ft of	8"	to	12"
Euclid & Woodland (West Bayshore - University)	2,310	ft of	8"	to	12"
Woodland (University - Clarke)	1,210	ft of	4"	to	8"
	1,440	ft of	10"	to	12"
Clarke Ave. (Woodland - West Bayshore)	730	ft of	10"	to	12"
Clarke Ave. (West Bayshore - Bay)	2,110	ft of	12"	to	16"
	3,060	ft of	8"	to	12"
Newell Rd. (Woodland - West Bayshore)	980	ft of	8"	to	12"
Donohoe (Euclid - Clarke)	2,730	ft of	8"	to	12"
O'Connor (O'Connor - Euclid) *Menlo Park	1,890	ft of	10"	to	12"
O'Connor (Euclid - University)	770	ft of	8"	to	12"
Scofield St. (University - Cooley)	900	ft of	8"	to	12"
University (Donohoe - Bay)	3,460	ft of	8"	to	12"
Cooley Ave. (Woodland - Bay)	5,980	ft of	8"	to	12"
Bell St. (Cooley - Clarke)	1,290	ft of	8"	to	12"
Green St. (Cooley - Clarke)	1,290	ft of	8"	to	12"
Pulgas Ave. (West Bayshore - East Bayshore)	250	ft of	6"	to	12"
Pulgas Ave. (East Bayshore – N. end of street)	8,019	ft of	8"	to	12"
Tara St. (Bay - North end of street)	1,485	ft of	6"	to	12"
Garden St. (Pulgas - Terra-Villa)	1,350	ft of	4"	to	8"
Myrtle St. (Clarke - Pulgas)	1,310	ft of	8"	to	12"
Sage St. (Pulgas - Larkspur)	750	ft of	6"	to	8"
Larkspur (Sage - Gardenia)	1,800	ft of	6"	to	8"
Wisteria Dr. (Sage - Daphne)	4,345	ft of	6"	to	8"
Daphne Way (Wisteria) Loop	2,035	ft of	6"	to	8"
Azalia (Sage - Camellia)	2,950	ft of	6"	to	8"
Camellia Dr. (Pulgas - Larkspur)	3,426	ft of	6"	to	8"
Gardenia (Verbania - Larkspur)	1,940	ft of	6"	to	8"
Jasmine Way (Camellia - Daphne)	1,200	ft of	6"	to	8"
Abelia Way (Camellia - Verbena)	990	ft of	6"	to	8"
Abelia to Daphne (Easement)	250	ft of	6"	to	8"
Verbena Dr. (Abelia - Camellia)	770	ft of	6"	to	8"
East Bayshore (Clark-Pulgas)	1,670	ft of	6"	to	8"
East Bayshore (Clark-Cooley)	2,487	ft of	12"	to	16"

Group III Streets

Bay Road (Westminister - Newbridge)	1,210	ft of	6"	to	8"
	620	ft of	6"	to	8"
Bay Road (Dumbarton - end of street, east)	2,470	ft of	8"	to	12"
	1,300	ft of	10"	to	12"
	2,629	ft of	12"	to	16"
Holland & Bradley (Bay - Menalto)	1,290	ft of	6"	to	8"
East Bayshore (Holland - Menalto)	1,320	ft of	4"	to	8"
East Bayshore (end of line, west - Menalto)	700	ft of	6"	to	8"
Glen Way (Bay - Euclid)	1,250	ft of	10"	to	12"
University (Bay - Hetch Hetchy Aqueduct)	3,780	ft of	8"	to	12"
	75	ft of	12"	to	16"
Gloria Way (Bay - Kavanaugh)	1,500	ft of	8"	to	12"
Illinois (Notre Dame - Bay)	1,550	ft of	12"	to	16"
East of Notre Dame Ave. (Demeter - Pulgas)	620	ft of	10"	to	12"
Weeks (Cooley - Pulgas)	2,620	ft of	8"	to	12"

In addition to these lines above, there are an additional 9,407 LF of less than six-inch diameter lines that should be upgraded to eight-inch pipe. Most of these smaller lines are not part of the model, but models indicate they are substandard for fire flow. This is listed at Group IV below.

Finally, Group V identifies the remaining six-inch lines that should be upgraded to eight-inch lines. This is typical for water systems, but because of the large number of six-inch lines, it is the least priority.

Projected costs for each upgrade include removal of the existing line, replacement with the upgraded size (including typical fittings and valves), excavation and backfill, installation of fire hydrants, establishment of service connections, and paving for a 4' wide trench The estimated cost for each size upgrade is:

Table 7-2 Pipeline Replacement Project Costs Group I

CIP Project	Unit Cost	Quantity	Unit	Cost
6" to 8"	$100	5,009	LF	$500,900
6" to 12"	$134	1,970	LF	$263,980
8" to 12"	$134	3,150	LF	$422,100
10" to 12"	$134	730	LF	$97,820
12" to 16"	$181	1,000	LF	$181,000
Total		**11,859**	**LF**	**$1,465,800**

Table 7-3 Pipeline Replacement Project Costs Group II

CIP Project	Unit Cost	Quantity	Unit	Cost
4” to 8”	$100	2,560	LF	$256,000
6” to 8”	$100	24,226	LF	$2,422,600
6” to 12”	$134	1,735	LF	$232,490
8” to 12”	$134	32,344	LF	$4,334,096
10” to 12”	$134	4,060	LF	$544,040
12” to 16”	$181	4,597	LF	$832,057
Total		**69,522**	**LF**	**$8,621,283**

Table 7-4 Pipeline Replacement Project Costs Group III

CIP Project	Unit Cost	Quantity	Unit	Cost
4” to 8”	$100	1,320	LF	$132,000
6” to 8”	$100	3,820	LF	$382,000
8” to 12”	$134	10,370	LF	$1,389,580
10” to 12”	$134	3,170	LF	$424,780
12” to 16”	$181	4,254	LF	$769,974
Total		**22,934**	**LF**	**$3,098,334**

Table 7-5 Pipeline Replacement Project Costs Group IV

CIP Project	Unit Cost	Quantity	Unit	Cost
<6” to 8”	$100	9,407	LF	$940,700
Total		**9,407**	**LF**	**$940,700**

Table 7-6 Pipeline Replacement Project Costs Group V

CIP Project	Unit Cost	Quantity	Unit	Cost
6” to 8”	$100	87,651	LF	$8,765,100
Total		**87,651**	**LF**	**$8,765,100**

The total estimated construction cost for these projects is $22,891,217.

7.2 Water Replacement Program

Water meters, as they become old, tend to become inaccurate. This project will replace water meters, water meter boxes, and lids as well as 100 large meters. The replacement of meters and meter reading equipment will enhance and upgrade the ability to monitor usage and reduce the time associated with meter reading. The schedule of water meter replacement is outlined in the City's Water System Master Plan and will be completed in phases. This project specifically furthers General Plan Land Use Policy 4.1, to "work closely with local public facilities and services providers to meet community needs." This project would further this policy by improving the City's infrastructure to support the needs of the current and future residents of the City.

The total estimated budget for these projects is $4,000,000. An allowance of $175,000 should also be budgeted for inspection of the meters.

7.3 Maintenance Programs

Common maintenance programs establish a five-year cycle such that every hydrant and valve is maintained at least once during that time period. During the valve maintenance, each valve can is cleaned of any debris and then fully closed and re-opened. This regular cycling of the valves assures that they can be opened and closed if needed for operations or an emergency. During fire-hydrant maintenance, each hydrant is opened both to check the valve and to flush the system. Any repairs necessary, including painting, should be noted so that they can be completed at another time. This check also assures that the fire hydrant will function during a fire event.

Although the cycles are typically five years, there are currently many valves and hydrants in the systems that have not been maintained in this timeframe. It is recommended that the cycle be modified to a two-year period to perform maintenance and repairs on each valve and hydrant. Following that, maintenance can resume on the typical five-year schedule.

There are 908 valves in the system. It should take on average approximately 30 minutes per valve, including travel time, for a two-person crew to clean and cycle the valve. This is a total labor effort, over the two-year period, of 908 labor hours. At $50 per hour per person, the cost amounts to $45,400. During this maintenance, it would be expected that valves will be broken either before or during maintenance. Assuming that 5% of the valves require $8,000 in repair costs per valve (including pavement replacement and the shutdown) adds an additional expense of $368,000.

There are 295 fire hydrants in the system. For each hydrant, it should take approximately 60 minutes to operate the valve, flush the system, and clean the area for a two-person crew. This is a total labor effort, over the two year period, of 590 labor hours. At $50 per hour per person, this costs $29,500. During this maintenance, hydrants may break either before or during the maintenance. A reasonable allowance to repair 10% of the hydrants at $6,000 each (including pavement replacement and the shutdown) adds an additional expense of $180,000.

7.4 Emergency Connections

The system currently does not have any emergency supply connections with other agencies. Developing an emergency connection with another water department would provide additional water sources during an emergency situation. Such a connection would require piping and possibly additional facilities to account for system pressure differences. The scope of this system remains unknown until the needed facilities can be determined. To the south of the City of East Palo Alto is the City of Palo Alto which offers the best prospect for an emergency connection. The City of Menlo Park would also be a possibility. $250,000 per connection is an appropriate budget for the connection system and necessary piping.

Section 7.6 of this report discusses the possible emergency connections with the EPA & O'Connor Tract Mutual Water Companies.

7.5 Storage Projects

As discussed in Sections 6.2.2 and 6.2.3, the system does not have storage, and the estimated volume needed is 4.2 MG.

The most likely location for such storage would be an underground reservoir and pump station. Due to the topography of the city, the storage could be located in one location or in multiple locations. The best option would for the tank(s) to be located under one of the city parks or schools or at another location that does not have structures above it. The facilities would include all necessary piping, the reservoir(s), and the pump station(s) to return the water to the proper system pressure.

The sizing of this tank does not include future needs from the Ravenswood developments, which should pay for either an additional tank or the cost to increase the size of this proposed tank. As part of the Ravenswood Business District Construction Cost Estimates for Infrastructure report done for the City of East Palo Alto and dated October 31, 2008, a 1.8 MG storage tank will be required for future demands associated with the RBD redevelopment.

Until final design can be completed, a detailed cost analysis is not possible. However, based upon similar sized projects, a budget of $5,000,000 should be reasonably accurate. This budget does not include any land acquisition costs, property issues, or geotechnical issues and only includes the costs for the construction of the facility.

7.6 Treatment Facility for Gloria Bay Well

The Gloria Bay Well was constructed in 1981 and is capable of producing 350 gpm of local groundwater, thereby reducing the demand for purchased water. However, although this water accords with California Department of Public Health safety regulations, its iron and manganese levels violate aesthetic and odor standards. Shortly after the construction of the well, the well was taken offline due to taste and odor issues, and is now used exclusively for non-potable purposes. Installation of iron-manganese treatment would provide the opportunity to bring this well back into the system.

In April 2004, a study titled “Gloria Bay Well Investigation Summary Report” was prepared. This report included four alternatives for treatment at Gloria Bay. Further design is necessary to determine which of the options would be best for the water system. Alternative A is Wellhead Treatment and Direct Distribution, Alternative B is Wellhead Treatment and Offsite Blending, Alternative C is Blending of Untreated Well Water at T-Main, and Alternative D is Blending of Untreated Well Water at Tank. These alternatives need to be analyzed further in a design phase, but preliminary budget estimates suggest a cost of $600,000.

7.7 Facilities for Emergency Connections with the Mutual Water Companies

As discussed in Section 6.4, the addition of the Ravenswood Business Development and the emergency connections with the two mutual water companies would change the dynamics of the system slightly. Currently the connection with the mutual water companies only serves water from the City of East Palo Alto to the mutual water companies. These emergency connections would be bi-directional to provide emergency service to each utility. After establishing the connections, some upgrades would be required if there arises a need for long-term use of the mutual water source. This is based on the current system model so that if the other CIP elements on this list were completed, certain other projects would not be necessary; the pipelines below would be a duplicate of some of the pipelines listed in the general pipeline-replacement projects. If, however, they are all necessary, then the following lengths accounts for all such replacements.

East Bayshore (To Menalto Ave)	1035	ft of	6"	to	8"
Donohoe St (Ralmar - Euclid)	1620	ft of	6"	to	8"
O'Connor St (Euclid - University)	770	ft of	8"	to	12"
West Bayshore (Pulgas Ave. - end of line)	362	ft of	8"	to	12"
Pulgas Ave (Myrtle - O'Connor)	880	ft of	8"	to	12"
Garden St (Terra-Villa - Pulgas)	350	ft of	4"	to	8"
Tara St (Bay Rd to end of line)	1485	ft of	6"	to	8"

Based upon the unit costs, explained earlier, the total estimated budget for these projects is $718,608. An allowance of $100,000 should also be budgeted for water quality testing and maintenance prior to installing the emergency connections to the mutual systems. If any long-term use of the mutual water companies becomes needed, it would be fair to expect that some improvements would be necessary on the current mutual water company systems. To reflect this, an additional $150,000 should be budgeted for such examination and improvements.

7.8 Stormwater Capture and Reuse Projects

There are multiple sites within the City of East Palo Alto at which a stormwater capture and/or recycling project could be utilized. The two ideal locations are the Martin Luther King Park and the Jack Farrell Park sites. At each of these locations, a collection, treatment, storage, and irrigation reuse system could be installed to replace the potable water used currently for irrigation. Although the system construction is an initial capital cost, long-term savings result from a reduction of potable water usage.

Depending on the size of the storage constructed, there will be times when potable water use is still necessary. The highest demands for irrigation water also are the times of the year in which the least rainfall is available. As such, during the summer months much of the irrigation will still need to be supplied by potable sources, while during winter months there will be excess water captured. However, an average use for a park site is in the range of 5000 gallons per acre per day. The Martin Luther King Park is 5.44 acres, meaning 27,200 gallons of water would be used per day to irrigate the park. To have storage for three days, an 81,600-gallon storage system would be required.

As recommended, the total system would include a 90,000 gallon storage chamber, a tertiary treatment system, and an irrigation pump connected to the system.

There would also need to be some additional drainage collection systems in place to collect the water in the centralized location.

Allowance for storm-drain collection system	$100,000
90,000-gallon storage chamber	$200,000
Tertiary Treatment System	$100,000
Pumping System and Piping	$ 50,000
Total Budget	$450,000

7.9 Satellite Wastewater Treatment and Reuse

Satellite Wastewater Treatment and Reuse involves capturing of municipal wastewater from a trunkline before it leaves the City, treating it to California Title 22 standards, and reusing it for non-potable purposes. Water produced from a Satellite Wastewater Treatment and Reuse may be combined with captured stormwater and non-potable groundwater wells, reducing the use of potable water supplies.

A 250,000 gpd biological wastewater treatment process is the most proven technology for organic matter removal and nutrient reduction. Based upon the growth type of microorganisms, biological wastewater treatment can be divided into two major groups, suspended growth process (e.g., activated sludge) and attached growth process (e.g., trickling filter).

Though the capital cost for a package satellite wastewater treatment plant is significant ($6M - $7M), the operational cost is relatively low ($0.60 / thousand gallons). System operation is very simple and the equipment is very reliable. In California's very restricted water use condition grant programs for water reclamation and reuse have become increasingly available.

7.10 New Groundwater Well

Based on future needs and available groundwater, a 1,000 gpm well is proposed. It is expected that an iron-manganese treatment system will be necessary for this well given the water quality in the Gloria Bay Well. The location of the well will influence the cost, particularly with regard to site availability and hydrogeological conditions. This budget does not include any land-acquisition or water-rights costs should either be necessary.

Well construction	$600,000
Iron Manganese Treatment	$400,000
Associated Pumping and Piping	$100,000
Total Budget	$1,100,000

7.11 Ravenswood School District Well Investigation

The City of East Palo Alto should investigate the existence of the Ravenswood School District groundwater well and any other wells the district owns. The existence of one well has been confirmed but whether the well was properly destroyed is a concern. The City should investigate whether the well was destroyed properly as this could cause concern for contamination if the City was to develop additional groundwater wells. A preliminary budget estimate suggests a cost of $15,000.

7.12 CIP Budget Summary

Table 7-7 CIP Budget Summary

Project	Base Estimate	20% Design	20% Contingency	Total
Pipeline Replacement Projects	$22,891,217	$4,578,243	$4,578,243	$32,047,703
Water Meter Replacement Program	$4,175,000	$835,000	$835,000	$5,845,000
Maintenance Projects	$622,900	$124,580	$124,580	$872,060
Emergency Connections[1]	$500,000	$100,000	$100,000	$700,000
Storage Project	$5,000,000	$1,000,000	$1,000,000	$7,000,000
Treatment Facility for Gloria Bay Well	$600,000	$120,000	$120,000	$840,000
Facilities to Connect Mutual Water Companies[2]	$968,608	$193,722	$193,722	$1,356,052
Stormwater Reuse and Capture	$450,000	$90,000	$90,000	$630,000
Satellite Wastewater Treatment and Reuse	$6,000,000	$1,200,000	$1,200,000	$8,400,000
New Groundwater Well	$1,100,000	$220,000	$220,000	$1,540,000
Ravenswood School District Groundwater Well	$15,000	$0	$0	$15,000
Total Budget	**$42,322,725**	**$8,461,545**	**$8,461,545**	**$59,245,815**

[1] Estimated one connection to each city.

[2] Includes $100,000 for water sampling and $150,000 for mutual water company system improvements

8.0 FUNDING SOURCES

This section identifies the funding/financing opportunities to implement the Capital Improvement Projects listed is Section 7.

8.1 Current Funding for City of East Palo Alto

Several appropriations from the United States Congress have been set aside for the City of East Palo Alto over the past six years. The City has secured five appropriations in the amount of 3,034,500 with a match of $2,482,272, but many of these have yet to be awarded. Currently, the City is using appropriations from 2004 to develop this Master Plan. The City still has four appropriations in the amount of 2,928,400 with a match of $2,395,463. The total remaining project cost is $5,517,272. The following table lists the year of, the amount, statutory language, and status of each appropriation.

Table 8-1 Current Appropriations

Date of Appropriation	Amount of Appropriation/Match	Total Project Cost	Statutory Language on Scope	Award Status
2004	$106,100/$86,809	$192,909	Water, wastewater, and storm water	10/1/2006, expires 10/31/2010
2005	$192,400/$157,418	$349,818	Storm water	Not awarded, in jeopardy of loss
2008	$788,000/$644,727	$1,432,727	water infrastructure	Not awarded, no application or work plan submitted
2009	$1,100,000/$900,000	$2,000,000	water treatment upgrades	Not awarded, no application or work plan submitted
2010	$848,000/$693,818	$1,541,818	Water supply & storm water improvements	Not awarded, no application or work plan submitted
Total	**$3,034,500/$2,482,272**	**$5,517,272**	**Water infrastructure improvements**	**Application to be submitted**

The City of East Palo Alto (City) needs to determine how these funds will be used, request Congress revise the appropriation language so all funds can be applied for in a single, consolidated grant application (if appropriate), and submit the project work plan and grant application to US EPA. The U.S. Congress has made funding appropriations each year from 2005 to 2010 to the City for water, wastewater, and stormwater infrastructure purposes. If the City decides to pursue one application and work plan, then the language in each congressional appropriation purpose must be the same. Requesting that Congress revise the existing appropriation language to a broad purpose such as “water infrastructure improvements” would provide flexibility and consistency to support the highest priorities identified in this Master Plan. The USEPA is obligated to process the award within 30 days from the date the revised appropriation language has been changed by congress.

Another option is for the City to submit separate work plans and grants applications for each of the separate appropriations.

8.2 Pay-as-You-Go Funding

8.2.1 Utility Rate Charges

Water utility rate charges typically have two components. The first is often called the customer service charge and covers expenses that are uniform and do not vary across customers or customer classes. These expenses typically include such items as the cost of meter reading and billing. The second rate component is the commodity charge, which is based on how much water a customer consumes. This charge covers items that vary with water consumption, such as power and chemical treatment costs. Commodity charge rates can be structured as uniform, inclining, or declining blocks. Inclining blocks, where rates increase with higher water use, generally promote conservation better than other rate structures.

8.2.2 System Development Fees

System development fees (SDF) are fees designed to recover a proportionate share of the costs associated with expanding future system capacity and ensuring ongoing reliability. SDFs are a one-time charge applied at the time of development approval. Because such fees are collected only when and if development occurs, they cannot be relied upon to fund facilities in any particular year. However, if development is successful, SDFs serve to recapture a piece of the involved cost.

All SDFs are subject to Impact Fee Nexus Requirements, established by AB 1600. Adopted in 1987, the law requires that all public agencies satisfy the following requirements when establishing, increasing, or imposing a fee as a condition of approval for a development project:

1. Identify the purpose of the fee
2. Identify the use to which the fee will be put
3. Determine a reasonable relationship between:
    a. The fee's use and the type of development project on which the fee is imposed
    b. The need for the public facility and the type of development project on which the fee is imposed
    c. The amount of the fee and the cost of the public facility or portion of the public facility attributable to the development on which the fee is imposed

8.3 Financing

A number of financing options at both the state and federal levels are available to fund water system projects. Within California, the Department of Water Resources (DWR) California Department of Public Health (CDPH), and State Water Resources Control Board (SWRCB) oversee the vast majority of disbursements for public water systems. Funding from federal acts and agencies tends to be funneled through these state agencies. As grant programs vary widely in their application dates and restrictions on types of projects, consulting the appropriate departmental website is advised. Applications and contact information are also available online, and some agencies—the CDPH, for example—offer "universal pre-applications" that enable water systems administrators to apply in advance to all grant and loan programs for which their projects qualify.

8.4 Legislation

8.4.1 Proposition 13

In March of 2000, California voters passed a water bond in Proposition 13. The Department of Health Services (now CDPH) was designated to receive $70 million from the sale of general obligation bonds approved in the ballot measure. Of these funds, $68 million were to be used as the state match to access approximately $340 million in federal capitalization grant funds for public water infrastructure improvements during the subsequent four years. The remaining $2 million were allocated to provide technical assistance to water providers, with specific focus on disadvantaged communities. These monies are nearly exhausted, but the repayment of loans allows it to continue funding projects in small amounts.

8.4.2 Proposition 50

Entitled the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, Proposition 50 was approved by the California electorate on November 5, 2002 and amended by AB 1747 in August of 2003. Most funds have already been allocated by state agencies, but DWR has funds remaining for applicants who were approved during the last two-year funding cycle. Although DWR is not currently accepting applications, the agency tentatively plans to release new funding guidelines in early 2010. Applicants can download RFP requirements from the DWR website and submit their grant proposal(s) for programs.

8.4.3 Proposition 84

This proposition, titled the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006, authorizes approximately $5.4 billion in general obligation bonds to fund safe drinking water, water quality and supply, flood control, waterway and natural resource protection, water pollution and contamination control, state and local park improvements, public access to natural resources, and water conservation efforts. Of the whole, approximately $1.5 billion are allocated for safe drinking water, water quality, and other water projects. While most money has already been allocated, some funds are still available and are disbursed through a variety of state agencies and programs.

8.4.4 American Reinvestment and Recovery Act of 2009

In February 2009, President Obama signed into law The American Recovery and Reinvestment Act of 2009 (ARRA). ARRA dispenses funds to state agencies, which then make funding available to local and regional projects. All eligible projects must facilitate compliance with national or state water regulations, replace aging infrastructure, consolidate existing water systems, or enhance water conservation and security.

Normal construction loans comprise the majority of the project financing made available, and cover planning, design, acquisition, and construction costs. Per federal stipulations, funding is earmarked for projects focused on economic stimulus, creation of jobs, and/or infrastructure development. Designed to be expended in full within a five-year period, ARRA is specifically targeted at “shovel-ready” projects. Additionally, priority is given to green projects or project components as evaluated by the funding agency.

8.5 Grants

8.5.1 Water Recycling Funding Program

The State Water Resources Control Board's (SWRCB) Water Recycling Funding Program (WRFP) provides funding for the planning, design, and construction of water recycling projects. Funding, both through grants and loans, is available to assist public agencies with their feasibility studies, planning, and construction.

The Water Recycling Facilities Planning Grant Program (FPGP) component of WRFP provides grants to public agencies for facilities-planning studies. FPGP aims to assist agencies in the preparation of facilities planning studies for water recycling that uses treated municipal wastewater and/or treated groundwater from sources contaminated due to human activities. Grants are provided for facilities planning studies to determine the feasibility of using recycled water to offset the use of potable water from state and/or local supplies. The program funds up to 50% of a project's costs, and the maximum grant amount is $75,000.

The WRFP also includes a Construction Funding Program, which awards grants at the amount of 25% of the eligible construction cost of a proposed project or $5 million, whichever is less. Eligible costs may include allowances for design, legal tasks, construction management, and engineering during construction.

8.5.2 Integrated Regional Water Management Program

The Integrated Regional Water Management (IRWM) program is intended to promote integrated regional water management to ensure sustainable water use, reliable water supplies, better water quality, environmental stewardship, efficient urban development, and protection of agriculture. DWR's IRWM grant program encourages development of integrated regional strategies for management of water resources by providing funding through competitive grants. The program is funded through Propositions 50 and 84.

8.5.3 Local Groundwater Assistance

Local public agencies with authority to manage groundwater resources are eligible to apply for up to $250,000 of Local Groundwater Assistance (LGA) from DWR. The funds can be used to help fund groundwater data collection, modeling, monitoring and management studies; monitoring programs and installation of equipment; basin management; development of information systems; and other groundwater related work. Funded through Proposition 84, the LGA program is in its public comment stage until January 12, 2010. Final guidelines and the proposal solicitation package are scheduled to be available in early 2010.

8.5.4 United States Bureau of Reclamation

The United States Bureau of Reclamation (USBR) provides a smaller pool of grant money than does DWR, CDPH, or other state agencies, but funding is nevertheless worth pursuing. USBR creates a calendar annually for grant submittals and posts the RFP and response template on their website. Programs receiving grant awards are innovative in design or meet the needs of a niche market.

8.6 Loans

8.6.1 General Obligation Bonds

The City can issue general obligation bonds for capital improvements and replacement, which must be approved by voters before going into effect. General obligation bonds are debt instruments backed by the full faith and credit of the City. They are secured by an unconditional pledge of the City to levy assessments, charges or ad valorem taxes necessary to retire the bonds.

8.6.2 Revenue Bonds

Unlike general obligation bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the revenues of the City's water operating fund. Revenue bonds involve a comparatively greater risk to the investor than do general obligation bonds, as repayment of debt depends on the City levying and collecting adequate water rates. Due to this increased risk, revenue bonds generally command a higher interest rate than do general obligation bonds. This type of debt also has specific financial requirements concerning the amount of money that is left in reserve each year for annual debt payment.

8.6.3 Clean Water State Revolving Fund

The Clean Water State Revolving Fund (CWSRF) program is available to fund a wide variety of water quality projects including all types of nonpoint source, watershed protection and restoration, and estuary management projects, as well as more traditional municipal wastewater treatment projects. The fund provides financing for the construction of publicly-owned facilities, such as wastewater treatment, local sewers, sewer interceptors, water reclamation facilities, and stormwater treatment. Expanded use projects include implementation of nonpoint source projects or programs as well as development and implementation of estuary comprehensive conservation and management plan.

CWSRF monies are loaned to communities, and repayments are recycled back into the program to fund additional water quality protection projects. Because the program draws federal funds, its goals reflect both federal and state legislative intent. They assign certain projects higher funding priority than other eligible projects. Higher priority projects include those addressing public health risk problems, those needed to comply with federal regulations, those providing most assistance to disadvantaged or distressed communities on a per-household basis, and those with efficiency improvements or environmental benefits.

CWSRF is overseen by SWRCB, which accepts applications on a continuous basis through its website.

8.6.4 Safe Drinking Water State Revolving Fund

Similar to CWSRF, the Safe Drinking Water State Revolving Fund (SDWSRF) offers low-interest financing for projects designed to enhance the quality of local drinking water. Because the primary focus of SDWSRF is potable water, it is overseen by CDPH.

As with CWSRF, SDWSRF determines funding priority based on certain criteria. CDPH assigns higher priority to projects addressing public health risk problems, those needed to comply with federal regulations, those providing most assistance to disadvantaged or distressed communities on a per-household basis, and those with efficiency improvements or environmental benefits. Additionally, because ARRA provided $160 million to SDWSRF, additional priority is given to projects deemed shovel-ready or those expected to produce jobs within the next five years per ARRA guidelines. Also per ARRA direction, the maximum amount of loan financing to be awarded to a single project is $20 million per project and $30 million per entity; of this, the program forgives 50% or more depending on the level of disadvantage in the community served by the loan. The maximum repayment term of the loan is 20 years or the useful life of the project, unless otherwise allowed or restricted.

In accordance with federal requirements, all potential recipients for SDWSRF funding must have had their projects included on a statewide Project Priority List. Pre-applications for SDWSRF are addressed through a universal pre-application process, which is used for several CDPH drinking water system funding programs. The most recent pre-application period funding closed in September 2009. Information regarding the next pre-application date is pending.

Technical Appendix
Master Planning Regulation

Appendix 1:
SFPUC Water Supply Agreement

WATER SUPPLY AGREEMENT

between

THE CITY AND COUNTY OF SAN FRANCISCO

and

WHOLESALE CUSTOMERS

in

ALAMEDA COUNTY, SAN MATEO COUNTY AND SANTA CLARA COUNTY

JULY 2009

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LIST OF ATTACHMENTS

WHOLESALE WATER SUPPLY AGREEMENT

Introductory Statement

Both San Francisco, as the Regional Water System owner and operator, and its Wholesale Customers share a commitment to the Regional Water System providing a reliable supply of high quality water at a fair price, and achieving these goals in an environmentally sustainable manner.

Article 1. Parties, Effective Date, and Defined Terms

1.01 Definitions

The capitalized terms used in this Agreement shall have the meanings set forth in Attachment A.

1.02 Parties

The parties to this Agreement are the City and County of San Francisco and such of the following entities (all of which purchase water from San Francisco) as have executed this Agreement:

Alameda County Water District
California Water Service Company
City of Brisbane
City of Burlingame
City of Daly City
City of East Palo Alto
City of Hayward
City of Menlo Park
City of Millbrae
City of Milpitas
City of Mountain View
City of Palo Alto
City of Redwood City

City of San Bruno
City of San José
City of Santa Clara
City of Sunnyvale
Coastside County Water District
Estero Municipal Improvement District
Guadalupe Valley Municipal Improvement District
Mid-Peninsula Water District
North Coast County Water District
Purissima Hills Water District
Skyline County Water District
Stanford University
Town of Hillsborough
Westborough Water District

The entities listed above which have executed this Agreement shall be collectively referred to as the “Wholesale Customers.”

1.03 Effective Date

A. Except as provided in subsection C, this Agreement shall become effective only when it has been approved by San Francisco and by each of the entities listed in Section 1.02 and when San Francisco and each of those entities (except for the City of Hayward) have entered into an Individual Water Sales Contract as provided in Section 9.01.

B. If San Francisco and all of the entities listed in Section 1.02 approve this Agreement and (except for the City of Hayward) an Individual Water Sales Contract on or before July 1, 2009, the effective date shall be July 1, 2009. If San Francisco and all of the entities listed in Section 1.02 approve this Agreement and (except for the City of Hayward) an Individual Water Sales Contract after July 1, 2009 but on or before September 1, 2009, the effective date shall be the date on which the last entity listed in Section 1.02 approves this Agreement and, if required, an Individual Water Sales Contract.

C. If by September 1, 2009 this Agreement has been approved by fewer than all of the entities listed in Section 1.02 or fewer than all of such entities (other than the City of Hayward) have entered into an Individual Water Sales Contract, but it has been approved by entities representing at least 75% in number and 75% of the water purchased from SFPUC by all listed agencies during FY 2007-08 (i.e., 173.39 MGD), then San Francisco shall have the option to waive the requirement in subsection A that all listed agencies have approved this Agreement and an Individual Water Sales Contract as a condition precedent to this Agreement and any Individual Water Sales Contract becoming effective. San Francisco shall have 60 days from September 1, 2009 (i.e., until October 31, 2009) within which to decide whether or not to waive the condition. If San Francisco decides to waive the condition, those listed agencies that have approved this Agreement and Individual Water Sales Contract before October 31, 2009 will be bound thereby and this Agreement and Individual Water Sales Contracts will become effective as to them, as of the date of San Francisco's waiver. For purposes of determining whether listed agencies that have approved this Agreement represent at least 75% of the water purchased during FY 2007-08, the quantity of water attributable to each listed entity shall be as set forth on Attachment B.

D. The provisions of Article 9 that apply to fewer than all Wholesale Customers (i.e., Sections 9.02 - 9.07) shall not become effective unless San Francisco and the entity to which the section applies have each approved (1) this Agreement, and (2) the underlying Individual Water Sales Contract, unless otherwise provided in Article 9. This provision does not affect the continued enforceability of provisions in those sections that derive from independently enforceable judgments, orders or agreements.

Article 2. Term; Amendments During Term

2.01 Term

The term ("Term") of this Agreement shall be twenty five (25) years. The Term shall begin on July 1, 2009, regardless of whether the Effective Date is before or after that date, and shall end on June 30, 2034. Except as provided in Article 9, the term of all Individual Water Sales Contracts shall also begin on July 1, 2009 and end on June 30, 2034.

2.02 Extension and Renewal of Term

A. In December 2031, the SFPUC may provide written notice to the Wholesale Customers that it is willing to extend the Term of this Agreement. Between January 1, 2032 and June 30, 2032, any Wholesale Customer may accept the SFPUC's offer to extend the Term by providing a written notice of extension to the SFPUC. If such notices of extension are received from Wholesale Customers representing at least two-thirds in number as of June 30, 2032 and seventy five percent (75%) of the quantity of water delivered by the SFPUC to all Wholesale Customers during fiscal year 2030-31, the Term shall be extended for another five (5) years ("First Extension Term"), through June 30, 2039. No party to this Agreement which does not wish to remain a party during the Extension Term shall be compelled to do so by the actions of other parties under this section.

B. In December 2036, the SFPUC may provide written notice to the Wholesale Customers that it is willing to extend the Term of this Agreement. Between January 1, 2037 and June 30, 2037, any Wholesale Customer may accept the SFPUC's offer to extend the Term by providing a written notice of extension to the SFPUC. If such notices of extension are received from Wholesale Customers representing at least two-thirds in number as of June 30, 2037 and seventy five percent (75%) of the quantity of water delivered by the SFPUC to all Wholesale Customers during fiscal year 2035-36, the Term shall be extended for another five (5) years ("Second Extension Term"), through June 30, 2044. No party to this Agreement which does not wish to remain a party during the Extension Term shall be compelled to do so by the actions of other parties under this section.

C. After the expiration of the Term, and, if applicable, the Extension Terms, this Agreement may be renewed by mutual consent of the parties, subject to any modifications thereof which may be determined at that time. If fewer than all of the parties desire to renew this Agreement beyond its Term, with or without modifications, the SFPUC and the Wholesale

Customers who wish to extend the Agreement shall be free to do so, provided that no party to this Agreement which does not wish to become a party to such a renewed Agreement shall be compelled to do so by the actions of other parties under this section.

2.03 Amendments

A. Amendments to Agreement; General

1. This Agreement may be amended with the written consent of all parties.

2. This Agreement may also be amended with the written consent of San Francisco and of Wholesale Customers representing at least two-thirds in number (i.e., 18 as of July 1, 2009) and seventy five percent (75%) of the quantity of water delivered by San Francisco to all Wholesale Customers during the fiscal year immediately preceding the amendment.

3. No amendment which adversely affects a Fundamental Right of a Wholesale Customer may be made without the written consent of that customer. Amendments to Article 5 which merely affect the allocation of costs between City Retail customers on the one hand and Wholesale Customers collectively on the other, and amendments to Articles 6 and 7 which merely alter budgetary, accounting and auditing procedures do not affect Fundamental Rights and may be made with the consent of parties meeting the requirements of Section 2.03.A.2.

4. When an amendment has been approved by San Francisco and the number of Wholesale Customers required in Section 2.03.A.2, San Francisco shall notify each of the Wholesale Customers in writing of the amendment's adoption. Notwithstanding any provision of law or this Agreement, any Wholesale Customer that claims that the amendment violates its Fundamental Rights under Section 2.03.A.3, shall have 30 days from the date San Francisco delivers the notice of its adoption in which to challenge the amendment's validity through a judicial action. If no such action is filed within 30 days, the amendment shall be finally and conclusively deemed to have been adopted in compliance with this section.

B. Amendments to Article 9

1. Notwithstanding the provisions of Sections 2.03.A.2 and 2.03.A.3, any provision of Article 9 which applies only to an individual Wholesale Customer may be amended with the written concurrence of San Francisco and the Wholesale Customer to which it applies;

provided that the amendment will not, directly or indirectly, adversely affect the Fundamental Rights of the other Wholesale Customers.

2. Before making any such amendment effective, San Francisco shall give notice, with a copy of the text of the proposed amendment, to all other Wholesale Customers. The Wholesale Customers shall have 30 days in which to object to the amendment on the ground that it is not permissible under this subsection. If no such objection is received by San Francisco, the proposed amendment shall become effective. If one or more Wholesale Customers object to the amendment, San Francisco, the individual Wholesale Customer with which San Francisco intends to effect the amendment, and the Wholesale Customer(s) which lodged the objection shall meet to discuss the matter.

3. If the dispute cannot be resolved and San Francisco and the Wholesale Customer involved elect to proceed with the amendment, either San Francisco or the Wholesale Customer shall give written notice of such election to each Wholesale Customer that has objected. Any Wholesale Customer that has objected to such amendment shall have 30 days from receipt of this notice within which to commence an action challenging the validity of such amendment, and such amendment shall be deemed effective as of the end of this 30-day period unless restrained by order of court.

C. **Amendments to Attachments**. The following attachments may be amended with the written concurrence of San Francisco and BAWSCA on behalf of the Wholesale Customers:

Attachment	Name
G	January 2006 Water Quality Notification and Communications Plan
J	Water Use Measurement and Tabulation
L-1	Identification of WSIP Projects as Regional/Retail
N-1	Balancing Account/Rate Setting Calculation Table
N-2	Wholesale Revenue Requirement Schedules
N-3	Schedule of Projected Water Sales, Wholesale Revenue Requirement and Wholesale Rates
P	Management Representation Letter

Amendments to these attachments shall be approved on behalf of San Francisco by the Commission and on behalf of BAWSCA by its Board of Directors, unless the Commission by resolution delegates such authority to the General Manager of the SFPUC or the Board of Directors by resolution delegates such authority to the General Manager/CEO of BAWSCA.

D. **Amendments to Individual Water Sales Contracts**. Individual Water Sales Contracts described in Section 9.01 may be amended with the written concurrence of San Francisco and the Wholesale Customer which is a party to that Individual Water Sales Contract; provided that the amendment is not inconsistent with this Agreement or in derogation of the Fundamental Rights of other Wholesale Customers under this Agreement.

Article 3. Water Supply

3.01 <u>Supply Assurance</u>

A. San Francisco agrees to deliver water to the Wholesale Customers up to the amount of the Supply Assurance. The Supply Assurance is for the benefit of the entities listed in Section 1.02, irrespective of whether or not they have executed this Agreement. Water delivered by San Francisco to Retail Customers shall not be included in the Supply Assurance. Until December 31, 2018, the foregoing commitment is subject to Article 4.

B. Both the Supply Assurance and the Individual Supply Guarantees identified in Section 3.02 are expressed in terms of daily deliveries on an annual average basis and do not themselves constitute a guarantee by San Francisco to meet peak daily or hourly demands of the Wholesale Customers, irrespective of what those peak demands may be. The parties acknowledge, however, that the Regional Water System has been designed and constructed to meet peak daily and hourly demands and that its capacity to do so has not yet been reached. San Francisco agrees to operate the Regional Water System to meet peak requirements of the Wholesale Customers to the extent possible without adversely affecting its ability to meet peak demands of Retail Customers. This Agreement shall not preclude San Francisco from undertaking to meet specific peak demand requirements of individual Wholesale Customers in their Individual Water Sales Contracts.

C. The Supply Assurance is perpetual and shall survive the expiration or earlier termination of this Agreement. Similarly, the Individual Supply Guarantees identified in Section 3.02 and/or the Individual Water Sales Contracts are perpetual and shall survive the expiration or earlier termination of this Agreement or the Individual Water Sales Contracts.

D. Notwithstanding the Supply Assurance established by this section, the Individual Supply Guarantees identified in Section 3.02 and the Individual Water Sales Contracts, the amount of water made available by San Francisco to the Wholesale Customers is subject to reduction, to the extent and for the period made necessary by reason of water shortage, Drought, Emergencies, or by malfunctioning or rehabilitation of facilities in the Regional Water System. Any such reduction will be implemented in accordance with Section 3.11. The amount of water made available to the Wholesale Customers may not be reduced, however, merely because the water recycling and groundwater projects which the WSIP envisions to be constructed within San Francisco, or the conservation programs intended to reduce water use by Retail Customers that are included in the WSIP, do not generate the yield or savings (10 MGD combined) anticipated by San Francisco.

3.02 Allocation of Supply Assurance

A. Pursuant to Section 7.02 of the 1984 Agreement, a portion of the Supply Assurance has been allocated among 24 of the 27 Wholesale Customers. These Individual Supply Guarantees are also expressed in terms of annual average metered deliveries of millions of gallons per day and are listed in Attachment C.

B. Three Wholesale Customers do not have Individual Supply Guarantees. The cities of San Jose and Santa Clara do not have an Individual Supply Guarantees because San Francisco has provided water to them on a temporary and interruptible basis as described in Sections 4.05 and 9.06. The City of Hayward does not have an Individual Supply Guarantee because of the terms of the 1962 contract between it and San Francisco, as further described in Section 9.03.

C. If the total amount of water delivered by San Francisco to Hayward and to the Wholesale Customers that are listed on Attachment C exceeds 184 MGD over a period of three consecutive fiscal years (i.e., July 1 through June 30), then the Individual Supply Guarantees of those Wholesale Customers listed on Attachment C shall be reduced pro rata so that their combined entitlement and the sustained use by Hayward does not exceed 184 MGD. The procedure for calculating the pro rata reduction in Individual Supply Guarantees is set out in Attachment D.

1. The provisions of this subsection C are not in derogation of the reservation of claims to water in excess of the Supply Assurance which are contained in Section 8.07. Nor do they constitute an acknowledgement by Wholesale Customers other than Hayward that San Francisco is obligated or entitled to reduce their Individual Supply Guarantees in the circumstances described herein. The provisions of this subsection C shall, however, be operative unless and until a court determines that its provisions violate rights of the Wholesale Customers derived independently of this Agreement.

2. The foregoing paragraph is not intended to and shall not constitute a contractual commitment on the part of San Francisco to furnish more water than the Supply Assurance to the Wholesale Customers or a concession by San Francisco that the provisions of this subsection violate any rights of the Wholesale Customers.

D. Notwithstanding the reservation of claims contained in Sections 3.02.C and 8.07, it shall be the responsibility of each Wholesale Customer to limit its purchases of water from San Francisco so as to remain within its Individual Supply Guarantee. San Francisco shall not be liable to any Wholesale Customer or be obligated to supply more water to any Wholesale Customer individually or to the Wholesale Customers collectively than the amount to which it or they are otherwise entitled under this Agreement due to the use by any Wholesale Customer of more water than the amount to which it is entitled under this Agreement.

E. San Francisco shall install such new connections between the Regional Water System and the distribution system of any Wholesale Customer that are necessary to deliver the quantities of water to which the Wholesale Customer is entitled under this Agreement. San Francisco shall have the right to determine the location of such connections, in light of the need to maintain the structural integrity of the Regional Water System and, where applicable, the need to limit peaking directly off of Regional Water System pipelines by a Wholesale Customer's individual retail customers, the need to ensure that a Wholesale Customer's individual retail customers have access to alternative sources of water in the event of a reduction in San Francisco's ability to provide them with water, and other factors which may affect the desirability or undesirability of a particular location. San Francisco's decisions regarding the location of new connections and the location, size and type of any new meters shall not be reviewable by a court except for an abuse of discretion or failure to provide a Wholesale Customer with connections and meters adequate to deliver the quantity of water to which it is entitled under this Agreement.

3.03 <u>Wholesale Customer Service Areas</u>

A. Each of the Individual Water Sales Contracts described in Section 9.01 will contain, as an exhibit, a map of the Wholesale Customer's service area. A Wholesale Customer may not deliver water furnished to it by San Francisco outside the boundary of its service area without the prior written consent of San Francisco, except for deliveries to another Wholesale Customer on an emergency and temporary basis pursuant to Section 3.07.B.

B. If a Wholesale Customer wishes to expand its service area, it shall request San Francisco's consent to the expansion and provide information reasonably requested by San Francisco about the amount of water projected to be purchased from San Francisco to meet demand within the area proposed to be added to the service area.

C. San Francisco may refuse a Wholesale Customer's request to expand its service area on any reasonable basis. If San Francisco denies a request by a Wholesale Customer to expand its service area, or fails to act on the request for six months after it has been submitted, the Wholesale Customer may challenge San Francisco's denial or delay in court. Such a challenge may be based on the Wholesale Customers' claim, reserved in Section 8.07, that San Francisco is obligated under federal or state law to furnish water, included within its Individual Supply Guarantee, to it for delivery outside its then-existing service area and that it is entitled to enlarge its service area to supply water to such customers. San Francisco reserves the right to contest any such claim on any applicable ground. This subsection does not apply to San Jose and Santa Clara, whose maximum service areas are fixed pursuant to Section 9.06.

D. This section will not prevent San Francisco and any Wholesale Customer, other than San Jose and Santa Clara, from agreeing in an Individual Water Sales Contract or an amendment thereto that:

- the Wholesale Customer may expand its service area without subsequent San Francisco approval to a definitive size but no larger, or
- the Wholesale Customer will not expand its service area beyond its present limits without San Francisco approval

and waiving the provisions of this section with respect to any additional expansion.

E. If two or more Wholesale Customers agree to adjust the boundaries of their respective service areas so that one assumes an obligation to serve customers in an area that was previously within the service area of another Wholesale Customer, they may also correspondingly adjust their respective Individual Supply Guarantees. Such adjustments are not subject to the requirements of Section 3.04 and shall require only the consent of San Francisco and the Wholesale Customers involved, so long as the Supply Assurance and the Individual Supply Guarantees of other Wholesale Customers are not affected. Service area boundary adjustments that would result in the expansion of any California Water Service Company service areas are subject to the requirements of Section 9.02.D. Any adjustment of service area boundaries that would result in the supply of water in violation of this Agreement or the Act shall be void.

F. San Francisco acknowledges that it has heretofore consented in writing to deliveries of water by individual Wholesale Customers outside their service area boundaries and agrees that nothing in this Agreement is intended to affect such prior authorizations, which remain in full force and effect according to their terms. Such authorizations shall be identified in the Individual Water Sales Contracts.

3.04 Permanent Transfers of Individual Supply Guarantees

A. A Wholesale Customer that has an Individual Supply Guarantee may transfer a portion of it to one or more other Wholesale Customers, as provided in this section.

B. Transfers of a portion of an Individual Supply Guarantee must be permanent. The minimum quantity that may be transferred is 1/10th of a MGD.

C. Transfers of portions of Individual Supply Guarantees are subject to approval by the SFPUC. SFPUC review is limited to determining (1) whether a proposed transfer complies with the Act, and (2) whether the affected facilities in the Regional Water System have sufficient capacity to accommodate delivery of the increased amount of water to the proposed transferee.

D. The participants in a proposed transfer shall provide notice to the SFPUC specifying the amount of the Individual Supply Guarantee proposed to be transferred, the proposed effective date of the transfer, which shall not be less than 60 days after the notice is submitted to the SFPUC, and the Individual Supply Guarantees of both participants resulting from the transfer. The SFPUC may require additional information reasonably necessary to evaluate the operational impacts of the transfer. The SFPUC will not unreasonably withhold or delay its approval; if the SFPUC does not act on the notice within 60 days, the transfer will be deemed to have been approved.

E. Within 30 days after the transfer has become effective, both the transferor and the transferee will provide notice to the SFPUC and BAWSCA. By September 30 of each year during the Term, the SFPUC and BAWSCA will prepare an updated Attachment C to reflect transfers occurring during the immediately preceding fiscal year.

F. Amounts transferred will remain subject to pro rata reduction under the circumstances described in Section 3.02.C and according to the formula set forth in Attachment D.

3.05 Restrictions on Resale

Each Wholesale Customer agrees that it will not sell any water purchased from San Francisco to a private party for resale by such private party to others in violation of the Act.

Each Wholesale Customer also agrees that it will not sell water purchased from San Francisco to another Wholesale Customer without prior written approval of the SFPUC, except on a temporary and emergency basis as permitted in Section 3.07.B.2. The SFPUC agrees that it will not unreasonably withhold its consent to a request by a Wholesale Customer to deliver water to another Wholesale Customer for resale.

3.06 <u>Conservation; Use of Local Sources; Water Management Charge</u>

A. In order to support the continuation and expansion of water conservation programs, water recycling, and development of alternative supplies within the Wholesale Customers' service areas, the SFPUC will, if requested by BAWSCA, include the Water Management Charge in water bills sent to Wholesale Customers. The SFPUC will deliver all Water Management Charge revenue to BAWSCA monthly and shall deliver an annual accounting of Water Management Charge revenue to BAWSCA within 90 days after the end of each fiscal year. The SFPUC's obligations to collect and deliver Water Management Charge revenue to BAWSCA under this subsection are conditioned on BAWSCA's delivery to the SFPUC of an annual report describing the projects and programs on which Water Management Charge funds received from the SFPUC during the previous fiscal year were expended and an estimate of the amount of water savings attributable to conservation programs and of the yield of alternative supplies developed. This report will be due within 180 days after the end of each fiscal year during which Water Management Charge funds were received.

B. The SFPUC will work together with BAWSCA to explore ways to support water conservation programs, recycling projects, and conjunctive use alternatives outside the Wholesale Service Area, in particular projects and programs that have the potential to increase both flows in the lower Tuolumne River (downstream of New Don Pedro Reservoir) and water deliveries to the Regional Water System.

C. Each Wholesale Customer shall take all actions within its legal authority related to water conservation that are necessary to insure that the SFPUC (a) remains eligible for (i) state and federal grants and (ii) access to the Drought Water Bank operated by the California Department of Water Resources, as well as other Drought-related water purchase or transfer programs, and (b) complies with future legal requirements imposed on the Regional Water System by the federal government, the State, or any other third party as conditions for receiving funding or water supply.

D. San Francisco and each Wholesale Customer agree that they will diligently apply their best efforts to use both surface water and groundwater sources located within their respective service areas and available recycled water to the maximum feasible extent, taking into account the environmental impacts, the public health effects and the effects on supply reliability of such use, as well as the cost of developing such sources.

3.07 <u>Restrictions on Purchases of Water from Others; Minimum Annual Purchases</u>

A. Each Wholesale Customer (except for Alameda County Water District and the cities of Milpitas, Mountain View and Sunnyvale) agrees that it will not contract for, purchase or receive, with or without compensation, directly or indirectly, from any person, corporation, governmental agency or other entity, any water for delivery or use within its service area without the prior written consent of San Francisco.

B. The prohibition in subsection A does not apply to:

1. recycled water;

2. water necessary on an emergency and temporary basis, provided that the Wholesale Customer promptly gives San Francisco notice of the nature of the emergency, the amount of water that has been or is to be purchased, and the expected duration of the emergency; or

3. water in excess of a Wholesale Customer's Individual Supply Guarantee.

C. Alameda County Water District and the cities of Milpitas, Mountain View and Sunnyvale may purchase water from sources other than San Francisco, provided that San Francisco shall require that each purchase a minimum annual quantity of water from San Francisco. These minimum quantities are set out in Attachment E and shall also be included in the Individual Water Sales Contracts between San Francisco and each of these four Wholesale Customers. The minimum purchase requirement in these Individual Water Sales Contracts will be waived during a Drought or other period of water shortage if the water San Francisco makes available to these Wholesale Customers is less than its minimum purchase quantity.

3.08 <u>Water Quality</u>

A. San Francisco shall deliver treated water to Wholesale Customers (except Coastside County Water District, which receives untreated water from Crystal Springs and Pilarcitos Reservoirs) that complies with primary maximum contaminant level and treatment technique standards at the regulatory entry points designated in the San Francisco Regional Water System Domestic Water Supply Permit (currently Permit No. 02-04-04P3810001) issued by the California Department of Public Health (CDPH).

B. San Francisco will provide notice to the Wholesale Customers in accordance with the Water Quality Notification and Communications Plan (current version dated January 2006), attached hereto as Attachment G. San Francisco will regularly update its plan in consultation with the Wholesale Customers and the CDPH. The next update will be completed one year after the Effective Date and include expanded coverage of secondary maximum contaminant level exceedances and water quality communication triggers. The plan will note that the Wholesale Customers will receive the same notification no later than the San Francisco water system (currently Permit No. 02-04-01P3810011) except for distribution-related issues.

C. San Francisco and the Wholesale Customers will establish a Water Quality Committee. The Water Quality Committee will meet at least quarterly to collaboratively address water quality issues, such as Water Quality Notification and Communications Plan updates, regulatory issues, and water quality planning studies/ applied research. San Francisco and each Wholesale Customer will designate a representative to serve on the committee. There will be a Chair and Vice Chair position for the Water Quality Committee. The Chair and Vice Chair positions will be held by San Francisco and the Wholesale Customers and rotate between them on an annual basis.

3.09 <u>Completion of WSIP</u>

San Francisco will complete construction of the physical facilities in the WSIP by December 31, 2015. The SFPUC agrees to provide for full public review and comment by local and state interests of any proposed changes that delay previously adopted project completion dates or that delete projects. The SFPUC shall meet and consult with BAWSCA before proposing to the Commission any changes in the scope of WSIP projects which reduce their capacity or ability to achieve adopted levels of service goals. The SFPUC retains discretion to determine whether to approve the physical facilities in the WSIP until after it completes the CEQA process as set forth in Section 4.07.

3.10 <u>Regional Water System Repair, Maintenance and Operation</u>

A. San Francisco will keep the Regional Water System in good working order and repair consistent with prudent utility practice.

B. San Francisco will submit reports to its Retail and Wholesale Customers on the "State of the Regional Water System," including reports on completed and planned maintenance, repair or replacement projects or programs, by September of every even-numbered year, with reports to start in September 2010.

C. San Francisco will cooperate with any audit of the SFPUC's asset management practices that may be initiated and financed by BAWSCA or the Wholesale Customers. BAWSCA may contract with third parties to conduct the audits. San Francisco will consider the findings and recommendations of such audits and will provide a written response indicating agreement with the recommendations, or disagreement with particular recommendations and the reasons why, within 90 calendar days after receipt.

D. San Francisco will continue to operate its reservoirs in a manner that assigns higher priority to the delivery of water to the Bay Area and the environment than to the generation of electric power. The SFPUC, as the Regional Water System operator, is solely responsible for making day-to-day operational decisions.

3.11 Shortages

A. Localized Water Reductions. Notwithstanding San Francisco's obligations to deliver the Supply Assurance to the Wholesale Customers collectively and the Individual Supply Guarantees to Wholesale Customers individually, San Francisco may reduce the amount of water available or interrupt water deliveries to specific geographical areas within the Regional Water System service area to the extent that such reductions are necessary due to Emergencies, or in order to install, repair, rehabilitate, replace, investigate or inspect equipment in, or perform other maintenance work on, the Regional Water System. Such reductions or interruptions may be imposed by San Francisco without corresponding reductions or interruptions in the amount of water available to SFPUC water users outside the specific geographical area where reductions or interruptions are necessary, if the system's ability to supply water outside the specific geographical area has not been impaired. In the event of such a reduction or interruption, San Francisco will restore the supply of water to the specific geographical area as soon as is possible. Except in cases of Emergencies (during which oral notice shall be sufficient), San Francisco will give the affected Wholesale Customer(s) reasonable written notice of such localized reductions or interruptions, the reasons therefor, and the probable duration thereof.

B. System-Wide Shortages and SFPUC Response to Regional Emergencies. Following a major system emergency event, the SFPUC will work closely with its Wholesale Customers to monitor customer demand, including the demand source. In the event that any individual Wholesale Service Area or Retail Service Area customer's uncontrolled distribution system leaks could result in major water waste and endanger the supply provided by the Regional Water System as a whole, flow through some customer connections may need to be temporarily reduced or terminated. SFPUC will work closely with customers to assess the nature of the demand (e.g. fire-fighting versus leakage), so that public health and safety protection can be given top priority.

1. All emergencies that require use of non-potable source water will require use of chlorine, or other suitable disinfectant, if feasible.

2. San Francisco will use its best efforts to meet the seismic reliability and delivery reliability level of service goals adopted by the Commission in conjunction with the WSIP. San Francisco will distribute water on an equitable basis throughout the Regional Water System service area following a regional Emergency, subject to physical limitations caused by damage to the Regional Water System.

3. San Francisco's response to Emergencies will be guided by the then-current version of the ERRP. The SFPUC shall periodically review, and the Commission may amend, the ERRP to ensure that it remains an up-to-date and effective management tool.

4. The SFPUC will give the Wholesale Customers notice of any proposal to amend the ERRP in a manner that would affect them. The notice will be delivered at least thirty days in advance of the date on which the proposal is to be considered by the Commission and will be accompanied by the text of the proposed amendment.

C. Shortages Caused by Drought; Acquisition of Dry Year Supplies. Notwithstanding San Francisco's obligations to deliver the Supply Assurance to the Wholesale Customers collectively and the Individual Supply Guarantees to Wholesale Customers individually, San Francisco may reduce the amount of water available to the Wholesale Customers in response to Drought.

1. The Tier 1 Shortage Plan (Attachment H) will continue to be used to allocate water from the Regional Water System between Retail and Wholesale Customers during system-wide shortages of 20% or less.

2. San Francisco and the Wholesale Customers may negotiate in good faith revisions to the Tier 1 Shortage Plan to adjust for and accommodate anticipated changes due to demand hardening in the SFPUC's Wholesale and Retail Service Areas. Until agreement is reached, the current Tier 1 Shortage Plan will remain in effect.

3. The SFPUC will honor allocations of water among the Wholesale Customers ("Tier 2 Allocations") provided by BAWSCA or if unanimously agreed to by all Wholesale Customers. If BAWSCA or all Wholesale Customers do not provide the SFPUC with Tier 2 Allocations, then the SFPUC may make a final allocation decision after first meeting and discussing allocations with BAWSCA and the Wholesale Customers. For Regional Water System shortages in excess of 20%, San Francisco shall (a) follow the Tier 1 Shortage Plan allocations up to the 20% reduction, (b) meet and discuss how to implement incremental reductions above 20% with the Wholesale Customers, and (c) make a final determination of allocations above the 20% reduction. After the SFPUC has made the final allocation decision, the Wholesale Customers shall be free to challenge the allocation on any applicable legal or equitable basis.

4. San Francisco will use its best efforts to identify potential sources of dry year water supplies and establish the contractual and other means to access and deliver those supplies in sufficient quantity to meet a goal of not more than 20 percent system-wide shortage in any year of the design drought.

5. San Francisco will cooperate with BAWSCA to improve water supply reliability. As an example of such cooperation, San Francisco may invite a representative of BAWSCA to attend and participate in meetings with third parties for development of dry year water supplies. If San Francisco does not invite a BAWSCA representative to attend a specific scheduled meeting, it will promptly (within 30 days of any such meeting) provide BAWSCA with a written or oral report on the meeting, including any decisions reached at it, as well as information about planned subsequent meetings. Progress in securing dry year water supplies will be reported to the SFPUC and the BAWSCA board of directors during the first quarter of each calendar year.

3.12 Wheeling of Water from Outside SFPUC System

Subject to the Wheeling Statute, the SFPUC will not deny use of Regional Water System unused capacity for wheeling when such capacity is available for wheeling purposes during periods when the SFPUC has declared a water shortage emergency under Water Code Section 350 if the following conditions are met:

A. The transferor pays reasonable charges incurred by the SFPUC as a result of the wheeling, including capital, operation, maintenance, administrative and replacement costs (as such are defined in the Wheeling Statute).

B. Wheeled water that is stored in the Regional Water System spills first.

C. Wheeled water will not unreasonably: (1) impact fish and wildlife resources in Regional Water System reservoirs; (2) diminish the quality of water delivered for consumptive uses; or (3) increase the risk of exotic species impairing Regional Water System operations. The transferor may at its own expense provide for treatment to mitigate these effects.

D. Priority will be given to wheeling by Wholesale Customers or BAWSCA over arrangements for third-party public entities.

3.13 Limits on New Customers

A. New Wholesale Customers Prior to December 31, 2018. Until December 31, 2018, San Francisco will not enter into contracts to supply water to any entity other than a Wholesale Customer (whether permanent or temporary, firm or interruptible) unless:

1. It completes any necessary environmental review under CEQA of the proposed new wholesale water service obligations as provided in Section 4.07;

2. It concurrently completes any necessary environmental review under CEQA as provided in Section 4.07 and commits to make both San Jose and Santa Clara permanent customers with Individual Supply Guarantees equal to at least 9 MGD; and

3. This Agreement is amended to incorporate any commitments to proposed new wholesale customers and to San Jose and Santa Clara, and to address the effects, if any, of the new customer(s) on water supply reliability, water quality and cost to existing customers of the Regional Water System.

B. New Wholesale Customers After December 31, 2018. As of January 1, 2019, San Francisco will not enter into contracts to supply water to any entity other than a Wholesale Customer (whether permanent or temporary, firm or interruptible) unless:

1. It completes any necessary environmental review under CEQA of the proposed new wholesale water service obligations as provided in Section 4.07;

2. It concurrently completes any necessary environmental review under CEQA as provided in Section 4.07 and commits to make both San Jose and Santa Clara permanent customers with Individual Supply Guarantees equal to at least 9 MGD;

3. Doing so increases the reliability of the Regional Water System; and

4. This Agreement is concurrently amended (a) to reflect that increased reliability by means of an increased commitment by San Francisco to deliver water during Droughts and (b) to address the effects, if any, of the new customer(s) on water supply, water quality and cost to existing customers of the Regional Water System.

C. New Retail Customers. San Francisco may enter into new retail water service obligations outside of the City and County of San Francisco:

1. Only in Alameda, San Mateo, Santa Clara, San Joaquin and Tuolumne Counties;

2. That are within or immediately adjacent to areas in which it currently serves other Retail Customers; and

3. Until the aggregate additional demand represented by the new retail customers reaches 0.5 MGD.

The limitations on serving new Retail Customers described in this subsection do not apply to historical obligations to supply water that may be contained in prior agreements between the SFPUC or its predecessor the Spring Valley Water Company, and individual users or property owners located adjacent to Regional Water System transmission pipelines.

D. Water Exchanges and Cost Sharing Agreements with Other Water Suppliers. Subject to completion of necessary environmental review under CEQA, San Francisco may at any time enter into water exchanges or cost sharing agreements with other water suppliers to enhance dry year or normal year water deliveries, provided that San Francisco cannot incur new water service obligations to such other water suppliers unless the requirements for taking on new wholesale customers in subsections A and B above are met.

3.14 Measurement of Water

A. The parties recognize that continuous and accurate measurement of water deliveries to and from the Regional Water System and maintenance of complete and accurate records of those measurements is necessary (1) for the costs of the Regional Water System to be allocated in accordance with this Agreement, (2) for implementation of other provisions of this Agreement, and (3) for effective operation and maintenance of a water system serving a large urbanized region.

B. It is the responsibility of the SFPUC to obtain and record these measurements. To do so, the SFPUC shall install, maintain and operate measuring and recording equipment at the following locations: (1) inputs to the Regional Water System from all water sources ("System Input Meters"), (2) internal flow meters to support operation of the Regional Water System ("In-Line Meters"), (3) deliveries to the City at the San Francisco-San Mateo County line ("County-Line Meters") and to three reservoirs in San Francisco ("In-City Terminal Reservoir Meters"), (4) deliveries to SFPUC Retail Customers located outside the boundaries of the City, and (5) deliveries to the Wholesale Customers, as described and illustrated in Attachment J.

C. The SFPUC shall inspect, test, service, and calibrate the measuring and recording equipment installed at the locations described in subsection B and will repair or replace them when necessary, in order to ensure that their accuracy is consistent with specifications provided in Attachment J.

D. The SFPUC shall continue to contract with a qualified independent metering consultant to perform periodic inspection, testing, servicing and calibration of the County-Line Meters, the In-City Terminal Reservoir Meters, and the System Input and In-Line Meters described in Attachment J, as well as the portion of the SFPUC's Supervisory Control and Data Acquisition (SCADA) system that utilizes the flow signals produced by that measuring and recording equipment. The method, schedule and frequency for calibration and maintenance of the County-Line Meters and the In-City Terminal Reservoir Meters are specified in Attachment J. The SFPUC shall provide copies of the metering consultant's reports to BAWSCA.

E. System Input Meters measure water deliveries into the Regional Water System from sources such as Hetch Hetchy and the SFPUC's water treatment plants. System Input Meters also measure deliveries from the Regional Water System to outside sources or from such sources to the Regional Water System through interties with the Santa Clara Valley Water District and the East Bay Municipal Utility District. In-Line Meters measure internal system flows and are located on the Bay Division Pipelines and other main transmission pipelines. These meters are collectively referred to as the "System Input and In-line Meters." Similar to the County-Line Meters, the System Input and In-Line Meters have secondary metering equipment, such as differential pressure transmitters and flow recorders. The System Input and In-Line Meters, and all associated secondary metering equipment, shall be calibrated and maintained according to the method, schedule, and frequency specified in the Procedures Manual described in subsection G, below.

F. The locations of the smaller and more numerous meters described in subsection B (4) and (5) are not illustrated in Attachment J; however, they are also critical in the determination of cost allocations, and accordingly require continued maintenance and calibration. It is the responsibility of the SFPUC to maintain the accuracy of these meters and their secondary metering equipment.

G. The SFPUC will prepare a Procedures Manual which will describe in detail the procedures for periodic inspection, testing, servicing and calibration of the measuring and recording equipment described in subsection B. Once the Procedures Manual is completed, the SFPUC and BAWSCA may agree that it should supersede some or all of the requirements in Attachment J regarding the County-Line and the In-City Terminal Reservoir Meters. Unless and until such an agreement is reached and documented, however, the requirements in Attachment J, Section D will continue in force as minimum standards for meter maintenance and calibration of the County-Line and In-City Terminal Reservoir Meters (subject to modification under the circumstances described in Attachment J, Section A.4).

H. If BAWSCA and the SFPUC are unable to agree on the water use calculations required by Attachment J for a particular year, the Wholesale Customers may file a demand for arbitration challenging the SFPUC's determination of the Wholesale Revenue Requirement for that year on the basis of its reliance on disputed water use calculations. Such a challenge must be brought in the manner and within the time specified in Section 8.01.

3.15 New Sources of Water Supply to Maintain Supply Assurance

A. Urgent Reductions of Existing Surface Water Supplies. Sudden and unanticipated events may require San Francisco to act promptly to protect the health, safety and economic well-being of its Retail and Wholesale Customers. Such sudden events include, but are not limited to drought, earthquakes, terrorist acts, catastrophic failures of facilities owned and operated by San Francisco, and other natural or man-made events. If such events diminish San Francisco's ability to maintain the Supply Assurance, San Francisco may increase the Wholesale Revenue Requirement to pay for planning, evaluation and implementation of replacement sources of supply when such needs arise and without the prior approval of the Wholesale Customers. San Francisco will keep the Wholesale Customers informed of actions being taken under this subsection, progress made, and contingency actions the Wholesale Customers may need to consider taking. To the extent appropriate and applicable, San Francisco will act in accordance with Section 3.11 and the ERRP. Nothing in this subsection limits San Francisco's obligations under Section 3.11 to pursue additional sources of supply to augment supplies available during drought.

B. Non-Urgent Reductions of Existing Surface Water Supplies. Climate change, regulatory actions and other events may impact San Francisco's ability to maintain the Supply Assurance from its existing surface water supplies, but on timescales long enough to permit San Francisco to collaborate with its Wholesale Customers on how best to address possible impacts to water supply. If such events diminish San Francisco's ability to maintain the Supply Assurance, San Francisco may increase the Wholesale Revenue Requirement to pay for planning, evaluation and implementation of replacement sources of supply when such needs arise and without the prior approval of the Wholesale Customers. San Francisco will keep the Wholesale Customers informed of actions being taken under this subsection, progress made, and contingency actions the Wholesale Customers may need to consider taking. San Francisco will solicit input and recommendations from BAWSCA and the Wholesale Customers, and take those recommendations into consideration. Prior to Commission approval of plans or taking other actions that would impact the Wholesale Revenue Requirement, San Francisco will hold a public hearing to receive written and oral comments. Nothing in this subsection modifies San Francisco's obligation to maintain the ability to provide the Supply Assurance under this Agreement.

3.16 New Sources of Water Supply to Increase Supply Assurance

A. Surface Water Supplies From Existing Watersheds After 2018. The Commission action in SFPUC Resolution Number 08-0200, adopted October 30, 2008 requires certain decisions by San Francisco regarding whether to supply more than 265 MGD from its watersheds following 2018. Such decisions are to be made by December 31, 2018, subject to the exercise of San Francisco's retained CEQA discretion in Section 4.07. San Francisco's future decisions may include an offer to increase the Supply Assurance at the request of some or all of its Wholesale Customers. Costs associated with providing additional water from its existing water supplies in San Mateo, Santa Clara, Alameda, Tuolumne, and Stanislaus Counties shall be allocated to Wholesale and Retail Customers as described in Article 5.

B. **New Water Supplies.** If San Francisco seeks to develop additional water supplies from new sources to increase the Supply Assurance available to Wholesale Customers, studies and resulting water supply projects will be conducted jointly with BAWSCA under separate agreement(s) specifying the purpose of the projects, the anticipated regional benefits and how costs of studies and implementation will be allocated and charged. Nothing in this Agreement shall serve as precedent for the allocation of such new supply capital costs between Retail and Wholesale Customers or associated operational expenses, which shall only occur following approval of both parties and amendment of this Agreement, if necessary, under Section 2.03.

3.17 Westside Basin Conjunctive Use Program

Subject to completion of necessary CEQA review as provided in Section 4.07, the SFPUC may enter into an agreement with the cities of Daly City and San Bruno and the California Water Service Company, South San Francisco Service Area ("Participating Pumpers") governing the operation of the South Westside Basin Conjunctive Use Program ("Program"), a WSIP Project. The Program would produce Regional benefits for all customers of the Regional Water System by making use of available groundwater storage capacity in the Southern portion of the Westside Basin through the supply of additional surface water ("In Lieu Water") to the Participating Pumpers from the Regional Water System, in exchange for a corresponding reduction in groundwater pumping at existing wells owned by the Participating Pumpers. The new groundwater supply that would accrue to storage as a result of delivery of In Lieu Water would then be recovered from the SFPUC basin storage account during water shortages using new SFPUC Regional Program wells operated by the Participating Pumpers and the SFPUC. Program annual operations and maintenance expenses and water supplies are expected to be allocated as follows:

A. All In Lieu Water delivered to the Participating Pumpers shall be (1) temporary and interruptible in nature and (2) at the sole discretion of the SFPUC based on the total volume of water available to the Regional Water System.

B. All In Lieu Water delivered to the Participating Pumpers shall be considered a delivery of water to storage and shall not be construed to affect or increase the Individual Supply Guarantees of these wholesale customers or to otherwise entitle them to any claim of water in excess of their Individual Supply Guarantees or their Interim Supply Allocations. Furthermore, Environmental Enhancement Surcharges authorized under Section 4.04 will not be applied by the SFPUC to any quantity of In Lieu Water that is delivered to the Participating Pumpers, but will instead be based solely on Participating Pumper water deliveries in excess of their respective Interim Supply Allocations.

C. Any operation and maintenance expenses incurred by the Participating Pumpers and the SFPUC that are related to the operation of Regional Program wells and related assets shall be included as Regional pumping expenses under Section 5.05.B and included as part of the Wholesale Revenue Requirement. For rate setting purposes, estimated Regional Program operation and maintenance expenses shall be used as set forth in Section 6.01. Operation and maintenance expenses associated with the Participating Pumpers' existing wells that do not provide Regional benefits shall not be included in the Wholesale Revenue Requirement. On a case-by-case basis, the SFPUC may include Participating Pumper existing well operation and maintenance expenses in the Wholesale Revenue Requirement provided that such expenses (1) are solely attributable to Regional Program operations and (2) are not caused by the Participating Pumper's failure to operate and maintain its existing wells in a reasonable and prudent manner consistent with water utility industry standards.

D. The SFPUC will audit operation and maintenance expenses submitted by the Participating Pumpers for reimbursement to confirm that such costs were incurred as a result of operating Regional Program wells and related assets. Costs associated with the use of Program facilities for Direct Retail or Direct Wholesale purposes, or that do not otherwise provide Regional benefits, shall not be included in the Wholesale Revenue Requirement. The SFPUC is responsible for resolving disputes with the Participating Pumpers concerning expense allocations. Program expense documentation, including documentation of negotiation and settlement of disputed costs, will be available for review during the Compliance Audit described in Section 7.04. The Wholesale Customers may dispute the SFPUC's resolution of expense allocations through the arbitration provisions in Section 8.01 of this Agreement.

E. The SFPUC may direct the Participating Pumpers to recover water from the SFPUC basin storage account for any type of shortage referenced in Section 3.11. Water recovered from the SFPUC basin storage account using Regional Program wells may be used for (1) the benefit of all Regional Water System customers; (2) Retail Customers; or (3) one or more of the Participating Pumpers. The Wholesale Revenue Requirement shall only include operation and maintenance expenses incurred due to the operation of Program wells for Regional benefits.

F. All water recovered from the SFPUC basin storage account by the Participating Pumpers and by the SFPUC for delivery to Retail Customers during Shortages caused by Drought shall be used to free up a comparable volume of surface water from the Regional Water System for allocation in accordance with the Tier 1 Shortage Plan.

G. If the Program is terminated for any reason, including breach of the Program agreement by the Participating Pumpers or SFPUC, or due to regulatory action or legal action, then

1. Any water remaining SFPUC Regional storage account shall be used for the benefit of all customers of the Regional Water System;

2. Outstanding eligible operation and maintenance expenses, including costs incurred during recovery of remaining stored water, will be allocated as provided in this section; and

3. The Wholesale Customers will be credited with their share of proceeds from disposition of Program facilities or reimbursed their share of such capital costs for any Program facilities which are retained by the SFPUC for Direct Retail benefit and not used for the benefit of the Wholesale Customers, on the basis of (a) original cost less depreciation and outstanding related Indebtedness or (b) original cost less accumulated depreciation for revenue funded Regional Program facilities.

Article 4. Implementation of Interim Supply Limitation.

4.01 Interim Supply Limitation Imposed by SFPUC

In adopting the WSIP in Res. No. 08-0200, the Commission included full implementation of all proposed WSIP capital improvement projects to achieve level of service goals relating to public health, seismic safety, and delivery reliability, but decided to adopt a water supply element that includes the Interim Supply Limitation. This article describes how the parties will implement the Interim Supply Limitation imposed by the SFPUC between the Effective Date and December 31, 2018.

4.02 Retail and Wholesale Customer Allocations Under Interim Supply Limitation

The Interim Supply Limitation is allocated as follows between Retail and Wholesale Customers:

Retail Customers' allocation:	81 MGD
Wholesale Customers' allocation:	184 MGD

The Wholesale Customers' collective allocation of 184 MGD under the Interim Supply Limitation includes the demand of the cities of San Jose and Santa Clara, whose demand is not included in the Supply Assurance, as provided in Section 3.02.B. By December 31st, 2010, the Commission will establish each Wholesale Customer's Interim Supply Allocation at a public meeting.

4.03 Transfers of Interim Supply Allocations

A. Any Wholesale Customer, including Hayward, may transfer a portion of its Interim Supply Allocation to one or more other Wholesale Customers, as provided in this section. All Wholesale Customers are also eligible transferees, including California Water Service Company up to its Individual Supply Guarantee.

B. Transfers of a portion of an Interim Supply Allocation must be prospective. The duration of a transfer cannot be less than the balance of the fiscal year. The minimum quantity that may be transferred is 1/10th of a MGD.

C. Transfers of portions of Interim Supply Allocations are subject to approval by the SFPUC. SFPUC review is limited to determining (1) whether a proposed transfer complies with the Act, and (2) whether the affected facilities in the Regional Water System have sufficient capacity to accommodate delivery of the increased amount of water to the proposed transferee.

D. The participants in a proposed transfer shall provide notice to the SFPUC specifying the amount of the Interim Supply Allocation proposed to be transferred and the proposed effective date of the transfer, which shall not be less than 60 days after the notice is submitted to the SFPUC. The SFPUC may require additional information reasonably necessary to evaluate the operational impacts of the transfer. The SFPUC will not unreasonably withhold or delay its approval; if the SFPUC does not act on the notice within 60 days, the transfer will be deemed to have been approved.

E. Within 30 days after the transfer has become effective, both the transferor and the transferee will provide written notice to the SFPUC and BAWSCA.

F. Transfers of Interim Supply Allocations shall continue in effect until the earlier of (1) delivery of written notice to the SFPUC by the transfer participants that the transfer has been rescinded or (2) December 31, 2018.

4.04 Environmental Enhancement Surcharge

A. Establishment of Environmental Enhancement Surcharge. Beginning with wholesale water rates for fiscal year 2011-2012, and continuing for the duration of the Interim Supply Limitation, the Commission will establish the Environmental Enhancement Surcharge concurrently with the budget-coordinated rate process set forth in Article 6 of this Agreement. The monetary amount of the Environmental Enhancement Surcharge per volume of water, such as dollars per acre-foot, will be equivalent for Retail Customer use in excess of 81 MGD and Wholesale Customer use in excess of 184 MGD. The Environmental Enhancement Surcharge will be simple to calculate so that Wholesale Customers can estimate potential surcharges for budgeting purposes and establish retail rates within their service areas.

B. Application of Environmental Enhancement Surcharge. Beginning in fiscal year 2011-12, the Environmental Enhancement Surcharge will be levied only if and when combined Retail Customer and Wholesale Customer purchases exceed the Interim Supply Limitation of 265 MGD and if the fund described in subsection D below has been established by the San Francisco Board of Supervisors. In that event, the Environmental Enhancement Surcharge will apply to Retail Customers for use in excess of 81 MGD and to individual

Wholesale Customers for use in excess of their Interim Supply Allocations established by the Commission pursuant to Section 4.02.

1. Environmental Enhancement Surcharges related to the Retail Customers' use in excess of their 81 MGD Retail Customer Allocation will be paid by the SFPUC, and no portion of such surcharges may be allocated to Wholesale Customers. The method of recovering the Environmental Enhancement Surcharges imposed upon Retail Customers shall be within the sole discretion of the SFPUC.

2. Environmental Enhancement Surcharges related to the individual Wholesale Customers' use in excess of their respective Interim Supply Allocations will be paid to the SFPUC by individual Wholesale Customers.

C. **<u>Collection of Environmental Enhancement Surcharge</u>**. Notwithstanding the budget-coordinated rate setting process contemplated in Article 6 of this Agreement, the Environmental Enhancement Surcharge for any given year will be determined retrospectively based on actual annual usage during the fiscal year in excess of the Interim Supply Allocation and paid in equal monthly installments over the remainder of the immediately following fiscal year.

D. **<u>Establishment of Fund for Environmental Enhancement Surcharge Proceeds</u>.** Environmental Enhancement Surcharges paid by the SFPUC and by Wholesale Customers will be placed into a restricted reserve fund. The SFPUC will request the San Francisco Board of Supervisors to establish this fund by ordinance and, if adopted, the fund will be subject to the following restrictions:

1. Interest earnings will stay in the reserve fund.

2. The reserve fund shall (a) be subject to automatic appropriation; (b) require unexpended and unencumbered fund balances to be carried forward from year to year; and (c) not be transferred to the San Francisco General Fund.

3. The reserve fund may be used only for specific environmental restoration and enhancement measures for the Sierra and local watersheds, such as those included in the Watershed Environmental Improvement Program.

4. Environmental Enhancement Surcharge proceeds shall be expended in an expeditious manner. Any Environmental Enhancement Surcharge proceeds that remain in

the reserve fund as of December 31, 2018 shall be used to complete projects previously approved under subsection E. Upon completion of the identified projects, the balance of any unexpended sums in the reserve fund shall be distributed to BAWSCA and the SFPUC in proportion to the total amount of surcharges assessed to the Wholesale and Retail Customers, respectively.

E. **Use of Environmental Enhancement Surcharge Proceeds**. Specific uses of Environmental Enhancement Surcharges will be decided by the SFPUC and BAWSCA General Managers following input from environmental stakeholders and other interested members of the public. If parties are unable to agree, then they will jointly select a third person to participate in making the decision.

4.05 San Jose/ Santa Clara Interim Supply Allocation and Process for Reduction/ Termination.

San Francisco will supply a combined annual average of 9 MGD to the cities of San Jose and Santa Clara through 2018. Water supplied by San Francisco may only be used in the existing defined service areas in the northern portions of San Jose and Santa Clara shown on Attachment Q. San Francisco may reduce the quantity of water specified in this section when it establishes the Interim Supply Allocations for Wholesale Customers in Section 4.02. The establishment of Interim Supply Allocations for San Jose and Santa Clara shall not be considered a reduction of supply within the meaning of this section, provided that the Interim Supply Allocations assigned to San Jose and Santa Clara do not effect a reduction greater than the aggregate average reduction in Individual Supply Guarantees for Wholesale Customers that have such guarantees. The application of Interim Supply Allocations to San Jose and Santa Clara is subject to the following provisions:

A. In December 2010 and in each December thereafter through 2017, the SFPUC shall prepare and the Commission shall consider, at a regularly scheduled public meeting, a Water Supply Development Report detailing progress made toward meeting the Interim Supply Limitation by June 30, 2018.

B. The annual Water Supply Development Report shall be based on water purchase projections and work plans for achieving the Interim Supply Limitation in the Retail and Wholesale Service Areas. The projections and work plans will be prepared by the SFPUC for the Retail Customers and by BAWSCA for the Wholesale Customers, respectively, and submitted to the Commission in June of each year beginning in 2010.

C. If the Commission finds that the projections in the Water Supply Development Report show that the Interim Supply Limitation will not be met by June 30, 2018, as a result of Wholesale Customers' projected use exceeding 184 MGD, the Commission may issue a conditional five-year notice of interruption or reduction in supply of water to San Jose and Santa Clara.

D. Upon issuance of the conditional notice of interruption or reduction, the SFPUC will prepare a new analysis of water supply that will be utilized by the San Francisco Planning Department in its preparation of any necessary documentation under CEQA pursuant to Section 4.07 on the impacts of interrupting or reducing service to San Jose and Santa Clara.

E. Such notice of interruption or reduction will be rescinded if the Commission finds, based upon a subsequent annual Water Supply Development Report, that sufficient progress has been made toward meeting the Interim Supply Limitation or projections show that the Interim Supply Limitation will be met by June 30, 2018.

F. In no case shall any interruption or reduction of service to San Jose or Santa Clara pursuant to this section become effective less than two years from the completion of the CEQA process (not including resolution of any appeals or litigation) or five years from the notice, whichever is longer. If the five-year notice is issued after 2013, such interruption or reduction would occur after 2018.

G. If deliveries to San Jose and Santa Clara are interrupted, existing turnout facilities to San Jose and Santa Clara will remain in place for possible use during emergencies.

H. San Francisco and the cities of San Jose and Santa Clara will cooperate with BAWSCA and the Santa Clara Valley Water District in the identification and implementation of additional water sources and conservation measures for the cities' service areas that are relevant to the water supply and the possible offer of permanent status for the two cities by the SFPUC.

4.06 San Francisco Decisions in 2018 Regarding Future Water Supply

A. By December 31, 2018, San Francisco will have completed any necessary CEQA review pursuant to Section 4.07 that is relevant to making San Jose and Santa Clara permanent customers of the Regional Water System and will decide whether or not to make San Jose and Santa Clara permanent customers of the Regional Water System. San Francisco will make San Jose and Santa Clara permanent customers only if, and to the extent that, San Francisco determines that Regional Water System long term water supplies are available. In the event that San Francisco decides to afford permanent status to San Jose and Santa Clara, this Agreement will be amended pursuant to Section 2.03.

B. By December 31, 2018, San Francisco will have completed any necessary CEQA review pursuant to Section 4.07 and will decide how much water if any, in excess of the Supply Assurance it will supply to Wholesale Customers from the Regional Water System to meet their projected future water demands until the year 2030, and whether to offer a corresponding increase in the Supply Assurance as a result of its determination.

4.07 <u>Retained Discretion of SFPUC and Wholesale Customers</u>

A. This Agreement contemplates discretionary actions that the SFPUC and the Wholesale Customers may choose to take in the future that could result in physical changes to the environment ("Discretionary Actions"). The Discretionary Actions include decisions to:

1. Develop additional or alternate water resources by the SFPUC or one or more Wholesale Customers;

2. Implement the physical facilities comprising the WSIP by December 31, 2015;

3. Approve wheeling proposals by Wholesale Customers;

4. Approve new wholesale customers and water exchange or cost sharing agreements with other water suppliers;

5. Provide additional water to San Jose and/or Santa Clara;

6. Offer permanent status to San Jose and/or Santa Clara;

7. Reduce or terminate supply to San Jose and/or Santa Clara;

8. Provide additional water to Wholesale Customers in excess of the Supply Assurance to meet their projected future water demands; and

9. Offer a corresponding volumetric increase in the Supply Assurance.

The Discretionary Actions may require the SFPUC or Wholesale Customers to prepare environmental documents in accordance with CEQA prior to the SFPUC or the Wholesale Customers determining whether to proceed with any of the Discretionary Actions. Accordingly, and notwithstanding any provision of this Agreement to the contrary, nothing in this Agreement commits the SFPUC or the Wholesale Customers to approve or carry out any Discretionary Actions that are subject to CEQA. Furthermore, the SFPUC's or Wholesale Customers' decisions to approve any of these Discretionary Actions are subject to the requirement that San Francisco and each Wholesale Customer, as either a "Lead Agency" (as defined in Section 21067 of CEQA and Section 15367 of the CEQA Guidelines) or a "Responsible Agency" (as defined in Section 21069 of CEQA and Section 15381 of the CEQA Guidelines) shall have completed any CEQA-required environmental review prior to approving a proposed Discretionary Action.

B. In considering any proposed Discretionary Actions, the SFPUC and Wholesale Customers retain absolute discretion to: (1) make such modifications to any of the proposed Discretionary Actions as may be necessary to mitigate significant environmental impacts; (2) select feasible alternatives to the proposed Discretionary Actions that avoid significant adverse impacts; (3) require the implementation of specific measures to mitigate the significant adverse environmental impacts as part of the decision to approve the Discretionary Actions; (4) balance the benefits of the proposed Discretionary Actions against any significant environmental impacts before taking final actions to approve the proposed Discretionary Actions if such significant impacts cannot otherwise be avoided; or (5) determine not to proceed with the proposed Discretionary Actions.

Article 5. Wholesale Revenue Requirement

5.01 Scope of Agreement

This Article shall be applicable only to the water rates charged by San Francisco to the Wholesale Customers. Nothing contained in this Agreement shall limit, constrain, or in any way affect the rates which San Francisco may charge for water sold to Retail Customers or the methodology by which such rates are determined.

5.02 General Principles

This Article sets forth the method by which the Wholesale Customers' collective share of expenses incurred by the SFPUC in delivering water to them will be determined. This collective share is defined as the "Wholesale Revenue Requirement."

A. The SFPUC currently operates several enterprises, including the Water Enterprise, the Wastewater Enterprise, and the Hetch Hetchy Enterprise.

B. The Wastewater Enterprise is responsible for treating sewage within San Francisco and provides no benefit to the Wholesale Customers.

C. The Hetch Hetchy Enterprise is responsible for storing and transmitting water to the Water Enterprise, generating hydroelectric power and transmitting it to San Francisco, generating electric power within San Francisco, and distributing electricity and steam heat within San Francisco. Its water supply operations provide benefits to the Wholesale Customers.

D. The Water Enterprise delivers water to both Retail Customers, which are located both within and outside San Francisco, and to the Wholesale Customers, all of which are located outside San Francisco.

E. This Article implements two general principles as follows: (1) the Wholesale Customers should not pay for expenses of SFPUC operations from which they receive no benefit and (2) the Wholesale Customers should pay their share of expenses incurred by the SFPUC in delivering water to them on the basis of Proportional Annual Use unless otherwise explicitly provided in this Agreement.

F. To implement these general principles, the Wholesale Revenue Requirement will consist of, and be limited to, the Wholesale Customers' shares of the following categories of expense:

1. Capital cost recovery of Water Enterprise Existing Assets, and Hetch Hetchy Enterprise Existing Assets classified as Water-Only and the Water-Related portion of Joint assets (Section 5.03)

2. Contribution to the capital cost of Water Enterprise New Regional Assets (Section 5.04)

3. Water Enterprise operation and maintenance expenses, including power purchased from the Hetch Hetchy Enterprise that is used in the operation of the Water Enterprise (Section 5.05)

4. Water Enterprise administrative and general expenses (Section 5.06)

5. Water Enterprise property taxes (Section 5.07)

6. The Water Enterprise's share of the Hetch Hetchy Enterprise's operation and maintenance, administrative and general, and property tax expenses (Section 5.08)

7. The Water Enterprise's share of the Hetch Hetchy Enterprise's capital cost of New Assets classified as Water-Only and the Water-Related portion of Joint assets (Section 5.09)

In each of these cost categories, Direct Retail Expenses will be allocated entirely to Retail Customers. Direct Wholesale Expenses will be allocated entirely to the Wholesale Customers. Regional Expenses will be allocated between Retail Customers and Wholesale Customers as provided in this Article.

G. For purposes of establishing the rates to be charged Wholesale Customers, expenses will be based on the budget for, and estimates of water purchases in, the following fiscal year, as provided in Article 6. For purposes of accounting, the Wholesale Revenue Requirement will be determined on the basis of actual expenses incurred and actual water use, as provided in Article 7.

H. In addition, rates charged to Wholesale Customers may include the Wholesale Customers' contribution to a Wholesale Revenue Coverage Reserve, as provided in Section 6.06, which is not included in the Wholesale Revenue Requirement itself.

5.03 Capital Cost Recovery - Existing Regional Assets

A. SFPUC has previously advanced funds to acquire or construct Existing Assets used and useful in the delivery of water to both Wholesale Customers and Retail Customers. The parties estimate that the Wholesale Customers' share of the net book value of these assets, as of the expiration of the 1984 Agreement on June 30, 2009, will be approximately $366,734,424, as shown on Attachment K-1.

B. In addition, SFPUC has also previously advanced funds received from Retail Customer revenues to acquire or construct assets included in Construction-Work-In-Progress (CWIP) as of June 30, 2009. The parties estimate that the Wholesale Customers' share of the book value of these revenue funded capital expenditures, as of the expiration of the 1984 Agreement on June 30, 2009, will be approximately $15,594,990, as shown on Attachment K-2. The Wholesale Customers shall pay their share of the cost of Existing Assets and revenue-funded CWIP by amortizing the amounts shown on Attachment K-1 and Attachment K-2 over 25 years at an interest rate of 5.13 percent. The amounts to be included in the Wholesale Revenue Requirement pursuant to this section shall be the sum of the annual principal and interest amounts shown on Attachments K-3 (for Water Enterprise Regional Assets and the one Direct Wholesale Asset) and K-4 (for Hetch Hetchy Enterprise Water-Only Assets and the Water-Related portion [45 percent] of Joint assets) calculated on the basis of monthly amortization of principal as set forth on Attachments K-3 and K-4.

C. In addition, the Commission has previously appropriated funds, advanced through rates charged to Retail Customers, for construction of capital projects. Some of these projects are active, and have unexpended balances of appropriated funds that are not included in CWIP as of June 30, 2009. These projects, and the associated balances, are shown on Attachment K-5. Expenditures of funds from these balances during FY 2009-10, FY 2010-11 and FY 2011-12 will be reviewed in FY 2012-13. The SFPUC will prepare a report showing the amount expended in each year on each project and the total expended during all years on all projects that are categorized as Regional or, in the case of Hetch Hetchy Enterprise, are categorized as either Water-Only or Joint. The wholesale share of that total will be determined using the allocation principles in this Agreement based on Proportional Water Use during those three years. The result, plus accrued interest at the rate specified in Section 6.05.B, will be calculated by the SFPUC and its calculation reviewed by the Compliance Auditor as part of the Compliance Audit for FY 2012-13. The audited total will be paid based on a schedule of level annual principal and interest amounts over ten years at an interest rate of 4.00%, calculated on a monthly amortization basis. All or any portion of the balance may be prepaid. The first year's payment will be included in the Wholesale Revenue Requirement for FY 2014-15.

D. The parties agree that the Wholesale Customers' share of the net book values of Existing Regional Assets as of June 30, 2008 as shown on Attachment K-1 are accurate. The compliance audit conducted on the calculation of the FY 2008-09 Suburban Revenue Requirement required by the 1984 Agreement will determine the actual amounts of depreciation on, and capital additions to, plant in service during that fiscal year. Those amounts will be compared to the corresponding estimates shown on Attachments K-1 and K-2. The differences will be added to or subtracted from the estimated asset values shown on Attachments K-1 and K-2 and the amortization schedules in Attachments K-3 and K-4 will be recalculated. The wholesale allocation factors shall be fixed at 70.1% for the Water Enterprise Existing Assets and 64.2% for Hetch Hetchy Enterprise Existing Assets for both the preliminary and final payment schedules. The SFPUC will prepare and provide to the Wholesale Customers revised Attachments K-1 through K-4 based on the Wholesale Customers' share of the net book value of the assets placed in service as of June 30, 2009 used to provide water service to the Wholesale Customers and the net book value of revenue-funded CWIP expended as of June 30, 2009. The revised Attachments K-1 through K-4 shall be approved by the General Manager of the SFPUC and the General Manager/CEO of BAWSCA and will be substituted for the original Attachments K-1 through K-4.

E. The original Attachments K-1 through K-4, based on estimates, shall be used for estimating the Wholesale Revenue Requirement for the fiscal year beginning July 1, 2009. The revised Attachments, based on audited actuals, shall be used to determine the actual Wholesale Revenue Requirement for FY 2009-10 and to determine the Wholesale Revenue Requirement(s) in all subsequent years, except as may be provided elsewhere in this Agreement.

F. The Wholesale Customers, acting through BAWSCA, may prepay the remaining unpaid Existing Assets principal balance, in whole or in part, at any time without penalty or early payment premium. Any prepayments will be applied in the month immediately following the month in which the prepayment is made and the revised monthly amount(s) will be used to calculate the Wholesale Revenue Requirement. Any partial prepayments must be in an amount at least equal to $10 million. In the event of a partial prepayment, an updated schedule for the remaining payments shall be prepared reflecting the unpaid balance after prepayment, amortized through the end of FY 2034, calculated as provided in this section. The updated schedule, approved by the General Manager of the SFPUC and the General Manager/CEO of BAWSCA, will be substituted for Attachment K-3 and/or Attachment K-4.

5.04 Capital Cost Contribution - New Regional Assets

A. Debt-Funded Capital Additions. The Wholesale Customers shall pay the wholesale share of Net Annual Debt Service for New Regional Assets. The Regional projects in the WSIP are identified in Attachment L-1.

1. The amount of Net Annual Debt Service for New Regional Assets will be determined for each series of Indebtedness issued. Until the proceeds of a particular series are Substantially Expended, the amount attributable to specific projects will be based on the expected use of proceeds shown in the "Certificate Regarding Use of Proceeds" executed by the SFPUC General Manager on behalf of the Commission in connection with the sale of the Indebtedness, provided such certificate identifies the use of proceeds at a level of detail equivalent to that shown on Attachment L-2, which is a copy of the certificate prepared for the 2006 Revenue Bonds, Series A. If a certificate does not identify the use of proceeds at that level of detail, the SFPUC General Manager shall prepare and execute a separate certificate which does identify the use of proceeds at the level of detail shown on Attachment L-2 and deliver it to BAWSCA within 15 days from the closing of the sale of the Indebtedness.

2. After the proceeds of a series are Substantially Expended, the SFPUC General Manager will prepare and execute a certificate showing the actual expenditure of proceeds at a level of detail equivalent to the initial General Manager certificate. The resulting allocation of Net Debt Service to New Regional Assets for a series of bonds will be used in the fiscal year in which the proceeds have been Substantially Expended and thereafter. Differences between the amount of Net Debt Service paid by Wholesale Customers prior to that year and the amount of Net Debt Service that they should have paid during that time based on the actual expenditure of proceeds will be taken into account in calculation of the balancing account for the fiscal year in which the proceeds were Substantially Expended. The application of the remaining proceeds shall be proportionate to the allocation of the Net Debt Service to New Regional Assets.

3. The Wholesale Customers' share of Net Annual Debt Service for the New Regional Assets that are categorized as Direct Wholesale will be 100 percent. (None of the

projects in the WSIP are categorized as Direct Wholesale.) The Wholesale Customers' share of Net Annual Debt Service for all other New Regional Assets will be determined each year and will be equal to the Wholesale Customers' Proportional Annual Use.

4. If Indebtedness is issued by the SFPUC to refund the 2006 Revenue Bonds, Series A or to refund any other long-term Indebtedness issued after July 1, 2009, the Net Annual Debt Service attributable to proceeds used for refunding will be allocated on the same basis as the Indebtedness being refunded.

5. The SFPUC will prepare an annual report showing for each issue of Indebtedness and through the most recently completed fiscal year: (1) net financing proceeds available to pay project costs, (2) actual earnings on proceeds, (3) actual expenditures by project. The report shall be substantially in the form of Attachment L-3 and shall be delivered to BAWSCA on or before November 30 of each year, commencing November 2009.

6. In addition to Net Debt Service, Wholesale Customers will pay a proportionate share of annual administrative costs associated with Indebtedness, such as bond trustee fees, credit rating agency fees, letter of credit issuer fees, San Francisco Revenue Bond Oversight Committee fees, etc., but only to the extent such fees are neither paid from proceeds of Indebtedness nor included in SFPUC operation and maintenance or administrative and general expenses.

B. Revenue-Funded Capital Additions. The Wholesale Customers shall pay the wholesale share of the appropriation contained in the SFPUC annual budget for each year to be used to acquire or construct New Regional Assets. If such appropriations are reimbursed from proceeds of Indebtedness, the Wholesale Customers will be credited for prior payments made under this Section 5.04.B.

The Wholesale Customers' share of the annual appropriation for revenue-funded New Regional Assets that are categorized as Direct Wholesale will be 100 percent. (None of the Repair and Replacement projects in the SFPUC's most recent capital improvement program updated on February 10, 2009, is categorized as Direct Wholesale.) The Wholesale Customers' share of the annual appropriation for all other revenue-funded New Regional Assets will be determined each year and will be equal to the Wholesale Customers' Proportional Annual Use in each fiscal year. The amount appropriated in each fiscal year for the wholesale share of New

Regional Assets shall be contributed to the Wholesale Capital Fund described in Section 6.08 and reported on and administered as shown in that section and Attachments M-1 through M-3.

5.05 Water Enterprise Operation and Maintenance Expenses

There are five categories of Water Enterprise Operation and Maintenance Expenses, described below:

A. Source of Supply

1. Description: This category consists of the costs of labor, supervision and engineering; materials and supplies; and other expenses incurred in the operation and maintenance of collecting and impounding reservoirs, dams, wells and other water supply facilities located outside San Francisco; watershed protection; water supply planning; and the purchase of water.

2. Allocation: Direct Retail expenses, including water supply planning for Retail operations (such as City Retail water conservation programs), will be assigned to the Retail Customers. Regional expenses will be allocated between Retail Customers and Wholesale Customers on the basis of Proportional Annual Use. Direct Wholesale expenses will be assigned to the Wholesale Customers. (As of the Effective Date there are no Direct Wholesale expenses in the Source of Supply category.)

B. Pumping

1. Description: This category consists of the costs of labor, supervision and engineering; materials and supplies; and other expenses incurred in the operation and maintenance of water pumping plants, ancillary structures and equipment and surrounding grounds; and fuel and power purchased for pumping water.

2. Allocation: Direct Retail expenses will be assigned to the Retail Customers. Regional expenses will be allocated between Retail Customers and Wholesale Customers on the basis of Proportional Annual Use. Direct Wholesale expenses will be assigned to the Wholesale Customers. (As of the Effective Date there are no Direct Wholesale expenses in the Pumping category.)

C. Treatment

1. Description: This category consists of the costs of labor, supervision and engineering; materials and supplies and other expenses incurred in the operation and

maintenance of water treatment plants and drinking water quality sampling and testing. The cost of water quality testing will not include expenses incurred on behalf of the Wastewater Enterprise. Any remaining costs, after adjusting for the Wastewater Enterprise, will be reduced by the amount of revenue received for laboratory analyses of any type performed for agencies, businesses and/or individuals other than the Water and Hetch Hetchy Enterprises.

2. Allocation: Direct Retail expenses will be assigned to the Retail Customers. Regional expenses will be allocated between Retail Customers and Wholesale Customers on the basis of Proportional Annual Use. Direct Wholesale expenses will be assigned to the Wholesale Customers. (As of the Effective Date there are no Direct Wholesale expenses in the Treatment category.)

D. <u>Transmission and Distribution</u>

1. Description: This category consists of the cost of labor, supervision and engineering; materials and supplies; and other expenses incurred in the operation and maintenance of transmission and distribution pipelines, appurtenances, meters (other than those expenses payable by individual Wholesale Customers pursuant to Section 5.10.C.3), distribution reservoirs storing treated water, craft shops and auto shops servicing vehicles used for operation and maintenance of the Regional Water System rather than for Direct Retail facilities, and miscellaneous facilities related to the transmission and distribution of water.

2. Allocation: Direct Retail Transmission and Distribution expenses will be assigned to the Retail Customers. Regional Transmission and Distribution expenses will be allocated between Retail and Wholesale Customers on the basis of Proportional Annual Use. Expenses incurred for the operation and maintenance of three terminal reservoirs, i.e., Sunset Reservoir (North and South Basins), University Mound Reservoir (North and South Basins), and Merced Manor Reservoir, as well as transmission pipelines delivering water to them, are classified as Regional expenses notwithstanding the location of the reservoirs within San Francisco. Direct Wholesale expenses will be assigned to the Wholesale Customers. (As of the Effective Date the only Direct Wholesale expenses in the Transmission and Distribution category are associated with the Palo Alto pipeline.)

E. Customer Services

1. Description: This category consists of labor; materials and supplies; and other expenses incurred for meter reading, customer record keeping, and billing and collection for the Water Enterprise.

2. Allocation: Customer Services expenses will be allocated among the Water Enterprise, the Wastewater Enterprise, and Hetch Hetchy Enterprise in proportion to the time spent by employees in Customer Services for each operating department/enterprise. The Water Enterprise's share of Customer Services expense will be allocated 98 percent to the Retail Customers and two percent to the Wholesale Customers, as illustrated on Attachment N-2, Schedule 1.

5.06 Water Enterprise Administrative and General Expenses

Administrative and General expenses consist of the Water Enterprise's share of the cost of general government distributed through the full-cost Countywide Cost Allocation Plan, the services of SFPUC support bureaus, Water Enterprise administrative and general expenses that cannot be directly assigned to a specific operating and maintenance category, and the cost of the Compliance Audit. These four subcategories, and the method by which costs in each are to be calculated and allocated, are as follows:

A. Countywide Cost Allocation Plan

1. Description: This subcategory consists of the Water Enterprise's share of the costs of San Francisco general government and other City central service departments which are not directly billed to the Water Enterprise or other operating departments. All San Francisco operating departments are assigned a prorated share of these costs through the full-cost Countywide Cost Allocation Plan (COWCAP) prepared annually by the San Francisco Controller.

2. Allocation: The Water Enterprise's assigned share of central government costs as shown in the annual full-cost COWCAP prepared by the San Francisco Controller, will be allocated between Retail Customers and Wholesale Customers on the basis of the composite percentage of the allocated expenses in the five categories of operation and maintenance expense described in Section 5.05. The composite wholesale percentage shown on Attachment N-2, Schedule 1 is 42.07 percent, derived by dividing the wholesale share of

Operation and Maintenance expenses ($46,573,883) by total Operation and Maintenance expenses ($110,700,133).

B. Services of SFPUC Bureaus

1. Description: This subcategory consists of the support services provided to the Water Enterprise by the SFPUC Bureaus, which presently consist of the General Manager's Office, Business Services, External Affairs, and Infrastructure Bureau. Business Services presently includes Financial Services, Information Technology Services, Human Resource Services, Fleet Management, and Customer Services.

2. Allocation: There are three steps involved in determining the Wholesale Customers' share of SFPUC Bureau costs.

a. Step One: Bureau expenses which have either been recovered separately or which provide no benefit to Wholesale Customers will be excluded. Examples of Bureau expenses recovered separately include (1) Customer Services expenses, which are recovered as provided in Section 5.05.E, and (2) Infrastructure expenses, which are assigned to individual projects and capitalized. An example of a Bureau expense that provides no benefit to Wholesale Customers is Information Technology Services expenses for support of the San Francisco Municipal Railway. In addition, the SFPUC will continue its practice of assigning City Attorney Office expenses charged to the General Manager's Office for projects or lawsuits that relate to only one enterprise directly to that enterprise. For example, costs related to a lawsuit involving the Wastewater Enterprise will not be assigned to the Water Enterprise.

b. Step Two: Bureau expenses adjusted as provided in Step One will be allocated among the Water Enterprise, the Wastewater Enterprise and the Hetch Hetchy Enterprise on the basis of the actual salaries of employees in each enterprise or department, as illustrated on Attachment N-2, Schedule 7.

c. Step Three: The amount allocated to the Water Enterprise through Step Two will be allocated between Retail Customers and Wholesale Customers on the basis of Proportional Annual Use.

C. Water Enterprise Administrative and General

1. Description: This category includes expenses incurred by the Water Enterprise that are not readily assignable to specific operating divisions. This category includes the following expenses:

a. Water Administration: This includes the costs of labor and other expenses of the administrative section of the Water Enterprise, supervision and engineering expenses, professional services, travel and training, equipment purchases, and materials and supplies not directly assignable to a specific operating unit.

b. Services Provided by Other City Departments: This includes charges of other San Francisco departments directly billed to the Water Enterprise administration by other San Francisco departments for services ordered by the Water Enterprise, such as legal services, risk management, telecommunications, employee relations, purchasing, mail services, and workers compensation claims paid.

c. Litigation and Claims Paid: This includes charges incurred for attorney services and claims and judgments paid in litigation arising from the operation of the Water Enterprise.

2. Allocation: In each of these three subcategories, expenses that benefit only Retail Customers will be excluded. For example, the cost of claims and judgments resulting from a break in or leak from pipelines or reservoirs in the Retail Service Area (with the exception of the three terminal reservoirs and pipelines delivering water to them) will be assigned to the Retail Customers. Remaining Water Enterprise Administrative and General expenses will be allocated between Retail Customers and Wholesale Customers on the basis of the composite percentage of allocated operation and maintenance expense categories described in Section 5.05.

D. Compliance Audit. The cost of the Compliance Audit described in Section 7.04 will be assigned 50 percent to the Retail Customers and 50 percent to the Wholesale Customers.

5.07 Water Enterprise Property Taxes

A. Description: This category consists of property taxes levied against property owned by San Francisco located in Alameda, San Mateo and Santa Clara counties and used and managed by the SFPUC.

B. Allocation: All property taxes paid, net of (1) reimbursements received from lessees and permit holders, and (2) refunds from the taxing authority, are Regional expenses. Net property taxes will be allocated between Retail Customers and Wholesale Customers on the basis of Proportional Annual Use.

5.08 Hetch Hetchy Enterprise Expenses

A. Introduction. There are two steps involved in determining the amount of the Wholesale Customers' share of Hetch Hetchy Enterprise expenses.

1. The first step is to determine the Water Enterprise's share of Hetch Hetchy Enterprise operation expenses, maintenance expenses, administrative and general expenses, and property taxes.

2. The second step is to determine the Wholesale Customers' share of expenses allocable to the Water Enterprise.

B. Determination of the Water-Related Portion of Hetch Hetchy Enterprise Expenses

1. Operation and Maintenance Expenses: This category consists of the cost of labor, materials and supplies, and other expenses incurred in operating and maintaining Hetch Hetchy Enterprise physical facilities.

a. Description: Expenses associated exclusively with the production and distribution of hydroelectric power (e.g., generating plants and power transmission lines and towers, transformers and associated electric equipment, purchased power, wheeling charges, rental of power lines, etc.) are categorized as Power-Only and are allocated to power. Expenses associated exclusively with the operation and maintenance of facilities that serve only the water function (e.g., water transmission pipelines and aqueducts, activities related to compliance with federal and state drinking water quality laws, etc.) are categorized as Water-Only and are allocated entirely to water. Expenses associated with the operation and maintenance of facilities that serve both the water and power functions (e.g., dams, security programs, etc.) are categorized as Joint and are reallocated as 55 percent Power-Related and 45 percent Water-Related.

2. Administrative and General Expenses: There are three subcategories of Hetch Hetchy Enterprise Administrative and General expenses.

a. Full-Cost Countywide Cost Allocation Plan: This subcategory consists of the cost of San Francisco general government and other City central service departments which are not directly billed to operating departments but allocated through the full-cost Countywide Cost Allocation Plan described in Section 5.06.A. Costs in this subcategory are classified as Joint, and are reallocated as 55 percent Power-Related and 45 percent Water-Related.

b. SFPUC Bureau Costs: This subcategory consists of the expenses described in Section 5.06.B. One hundred percent of Customer Services expenses allocated to the Hetch Hetchy Enterprise are categorized as Power-Only. The remaining amount of Bureau expenses allocated to the Hetch Hetchy Enterprise pursuant to Section 5.06.B will be reallocated between power and water in proportion to the salaries of Hetch Hetchy Enterprise employees assigned to each function as shown on Attachment N-2, Schedule 7.1.

c. Other Administrative and General: This subcategory includes payments to the United States required by the Act, labor, supervision and engineering and other costs not readily assignable to a specific operation or maintenance function or program. Costs related to power administration (such as long range planning and policy analysis for energy development, administration of power contracts, and administration of work orders to City departments for energy services) are Power-Only costs. Costs related to water administration (such as legal and professional services for the protection of the City's water rights) are Water-Only costs and will be assigned to the Water Enterprise. Costs related to both power administration and water administration (such as general administration, office rents, office materials and supplies, and services of other City departments benefitting to both power and water are Joint administrative and general costs and are reallocated as 55 percent Power-Related and 45 percent Water-Related.

3. Property Taxes. This category consists of property taxes levied against property owned by San Francisco in Tuolumne, Stanislaus, San Joaquin, and Alameda counties and operated and managed by the Hetch Hetchy Enterprise.

Allocation: Property taxes are classified as Joint costs. They will be reallocated as 55 percent Power-Related and 45 percent Water-Related.

C. Calculation of Wholesale Customers' Share of Hetch Hetchy Enterprise Expenses. The Water Enterprise's share of Hetch Hetchy Enterprise expenses consist of 100 percent of Water-Only expenses and the Water-Related portion (45%) of Joint expenses.

The Wholesale Customers' share of the sum of the Water Enterprise's share of Hetch Hetchy Enterprise expenses determined under subsection B shall be calculated by multiplying that dollar amount by Adjusted Proportional Annual Use.

5.09 Hetch Hetchy Enterprise Capital Costs

A. Introduction. Wholesale Customers are also allocated a share of Hetch Hetchy Enterprise capital costs.

B. Components of Capital Costs. The components of Hetch Hetchy Enterprise capital costs are as follows:

1. Existing Assets Cost Recovery. The Wholesale Customers' repayment of their share of Hetch Hetchy Existing Assets (Water-Only and the Water-Related portion [45 percent] of Joint assets) is shown on Attachment K-4 accompanying Section 5.03.

2. Debt Service on New Assets. The Water Enterprise will be assigned 100 percent of Net Annual Debt Service attributable to acquisition and construction of New Hetch Hetchy Enterprise assets that are Water-Only and the Water-Related portion (45 percent) of Net Annual Debt Service on New Hetch Hetchy Enterprise Joint assets. The provisions of Section 5.04.A apply to debt service on New Hetch Hetchy Enterprise assets.

3. Revenue-Funded Capital Additions. The Water Enterprise will be assigned 100 percent of capital expenditures from revenues for New Hetch Hetchy Enterprise assets that are Water-Only and the Water-Related portion (45 percent) of such expenditures for new Hetch Hetchy Enterprise Joint assets. The provisions of Section 5.04.B apply to the payment of New revenue-funded Hetch Hetchy Enterprise assets.

C. Calculation of Wholesale Customers' Share of Hetch Hetchy Enterprise Capital Costs. The Wholesale Customers' share of the Net Annual Debt Service and revenue funded capital expenditures determined under subsections B.2 and 3 shall be calculated by multiplying that dollar amount by Adjusted Proportional Annual Use.

5.10 Additional Agreements Related to Financial Issues

A. Wholesale Customers Not Entitled to Certain Revenues. The Wholesale Customers have no entitlement to any of the following sources of revenue to the SFPUC.

1. Revenues from leases or sales of SFPUC real property.

2. Revenues from the other utility services such as the sale of electric power, natural gas and steam.

3. Revenues from the sale of water to customers and entities other than the Wholesale Customers.

4. Revenues earned from the investment of SFPUC funds other than funds contributed by the Wholesale Customers to the Wholesale Revenue Coverage Reserve described in Section 6.06 or the Wholesale Capital Fund described in Section 6.08. Wholesale Customers are also entitled to the benefit of earnings on proceeds of Indebtedness (through expenditure on New Regional Assets and /or application to Debt Service) and to interest on the Balancing Account as provided in Section 6.05.B.

5. Revenues not related to the sale of water.

B. Wholesale Customers Not Charged with Certain Expenses. The Wholesale Customers will not be charged with any of the following expenses:

1. Capital costs for assets constructed or acquired prior to July 1, 1984 other than Existing Asset costs that are repaid pursuant to Section 5.03.

2. Expenses incurred by the SFPUC for generation and distribution of electric power, including Hetch Hetchy Enterprise Power-Only expenses and the Power-Related share of Hetch Hetchy Enterprise Joint expenses. An exception to this is Regional energy costs incurred by the Water Enterprise, for which Wholesale Customers are charged on the basis of Proportional Annual Use.

3. Expenses incurred by SFPUC in providing water to Retail Customers.

4. Expenses associated with the SFPUC's accruals or allocations for uncollectible Retail Water accounts.

5. Attorneys' fees and costs incurred by the Wholesale Customers that a court of competent jurisdiction orders San Francisco to pay as part of a final, binding judgment against San Francisco as provided in Section 8.03.B.2.

6. Any expenses associated with funding any reserves (other than the required Wholesale Revenue Coverage Reserve described in Section 6.06) accrued and not anticipated to be paid within one year unless such reserve is established by mutual agreement of the SFPUC and BAWSCA.

7. Any expenses accrued in respect to pending or threatened litigation, damage or personal injury claims or other loss contingencies unless projected to be paid within one year. Otherwise, such expenses will be charged to the Wholesale Customers when actually paid.

8. Any expense associated with installing, relocating, enlarging, removing or modifying meters and service connections at the request of an individual Wholesale Customer.

9. The Retail Customers' portion of any Environmental Enhancement Surcharges imposed to enforce the Interim Supply Limitation set forth in Section 4.04.

C. Revenues Not Credited to Payment of Wholesale Revenue Requirement. The following payments by Wholesale Customers, individually or collectively, are not credited as Wholesale revenues for purposes of Section 6.05.B:

1. Payments by individual Wholesale Customers of the Environmental Enhancement Surcharge imposed to enforce the Interim Supply Limitation set forth in Section 4.04.

2. Payments of attorneys' fees and costs incurred by San Francisco that a court of competent jurisdiction orders the Wholesale Customers to pay as part of a final, binding judgment against the Wholesale Customers, as provided in Section 8.03.B.3.

3. Payments by individual Wholesale Customers for installation, relocation, enlargement, removal or modification of meters and service connections requested by, and charged to, a Wholesale Customer.

4. Payments applied to the amortization of the ending balance in the balancing account under the 1984 Agreement, pursuant to Section 6.05.A.

5. Payments of the Water Management Charge which are delivered to BAWSCA pursuant to Section 3.06.

6. Payments directed to the Wholesale Revenue Coverage Reserve pursuant to Section 6.06.

7. Prepayments authorized by Sections 5.03.C and 5.03.F.

D. <u>Other</u>

1. The Wholesale Customers will receive a proportional benefit from funds received by the SFPUC from (a) governmental grants, rebates, reimbursements or other subventions, (b) private-sector grants for Regional capital or operating purposes of the Water Enterprise and the Water-Only and Water-related portion of Joint Hetch Hetchy Water Enterprise expenses, or (c) a SFPUC use of taxable bonds.

2. The Wholesale Customers will receive a proportionate benefit from recovery of damages, including liquidated damages, by SFPUC from judgments against or settlements with contractors, suppliers, sureties, etc., related to Regional Water System projects and the Water-Only and Water-Related portion of Joint Hetch Hetchy Enterprise projects.

3. The SFPUC will continue to charge Wholesale Customers for assets acquired or constructed with proceeds of Indebtedness on which Wholesale Customers paid Debt Service during the Term of this Agreement on the “cash” basis (as opposed to the “utility” basis) after the expiration or earlier termination of this Agreement. The undertaking in this Section 5.10.D.3 will survive the expiration or earlier termination of this Agreement.

Article 6. Integration of Wholesale Revenue Requirement with SFPUC Budget Development and Rate Adjustments

6.01 General

A. The purpose of the allocation bases set forth in Article 5 is to determine the Wholesale Revenue Requirement for each fiscal year. The Wholesale Revenue Requirement can only be estimated in advance, based on projected costs and water deliveries. These projections are used to establish water rates applicable to the Wholesale Customers.

B. After the close of each fiscal year, the procedures described in Article 7 will be used to determine the actual Wholesale Revenue Requirement for that year, based on actual costs incurred, allocated according to the provisions of Article 5, and using actual water delivery data. The amount properly allocated to the Wholesale Customers shall be compared to the amount billed to the Wholesale Customers for the fiscal year, other than those identified in Section 5.10.C. The difference will be entered into a balancing account to be charged to, or credited to, the Wholesale Customers, as appropriate.

C. The balancing account shall be managed as described in Section 6.05.

6.02 Budget Development

The SFPUC General Manager will send a copy of the proposed SFPUC budget to BAWSCA at the same time as it is sent to the Commission. In addition, a copy of materials submitted to the Commission for consideration at meetings prior to the meeting at which the overall SFPUC budget is considered (including (a) operating budgets for the Water Enterprise and the Hetch Hetchy Enterprise, (b) budgets for SFPUC Bureaus, and (c) capital budgets for the Water Enterprise and the Hetch Hetchy Enterprise) will also be sent to BAWSCA concurrently with their submission to the Commission.

6.03 Rate Adjustments

A. Budget Coordinated Rate Adjustments. Adjustments to the rates applicable to the Wholesale Customers shall be coordinated with the budget development process described in this section except to the extent that Sections 6.03.B and 6.03.C authorize emergency rate increases and drought rate increases, respectively.

If the SFPUC intends to increase wholesale water rates during the ensuing fiscal year, it will comply with the following procedures:

1. Adjustments to the wholesale rates will be adopted by the Commission at a regularly scheduled meeting or at special meeting, properly noticed, called for the purpose of adjusting rates or for taking any other action under the jurisdiction of the Commission.

2. The SFPUC will send a written notice by mail or electronic means to each Wholesale Customer and to BAWSCA of the recommended adjustment at least thirty (30) days prior to the date of the meeting at which the Commission will consider the proposed adjustment. The notice will include the date, time and place of the Commission meeting.

3. The SFPUC shall prepare and provide to each Wholesale Customer and to BAWSCA the following materials: (a) a table illustrating how the increase or decrease in the Wholesale Revenue Requirement and wholesale rates were calculated, substantially in the form of Attachment N-1, (b) a schedule showing the projected expenses included in the Wholesale Revenue Requirement for the fiscal year for which the rates are being proposed, and supporting materials, substantially in the form of Attachment N-2, and (c) a schedule showing projected water sales, Wholesale Revenue Requirements and wholesale rates for the fiscal year for which rates are being set and the following four years, substantially in the form of Attachment N-3. These materials will be included with the notification required by Section 6.03.A.2.

4. Rate adjustments will be effective no sooner than thirty (30) days after adoption of the wholesale rate by the Commission.

5. San Francisco will use its best efforts to provide the Wholesale Customers with the information described above. San Francisco's failure to comply with the requirements set forth in this section shall not invalidate any action taken by the Commission (including, but not limited to, any rate increase or decrease adopted). In the event of such failure, the Wholesale Customers may either invoke arbitration, as set forth in Section 8.01, or seek injunctive relief, to compel San Francisco to remedy the failure as soon as is reasonably practical, and San Francisco shall be free to oppose the issuance of the requested judicial or arbitral relief on any applicable legal or equitable basis. The existence of this right to resort to arbitration shall not be deemed to preclude the right to seek injunctive relief.

6. Because delays in the budget process or other events may cause San Francisco to defer the effective date of Wholesale Customer rate adjustments until after the beginning of San Francisco's fiscal year, nothing contained in this Agreement shall require San Francisco to make any changes in the water rates charged to Wholesale Customers effective at

the start of San Francisco's fiscal year or at any other specific date. Nothing in the preceding sentence shall excuse non-compliance with the provisions of Section 6.02 and this section.

B. **Emergency Rate Increases**. The Commission may adjust the Wholesale Customers' rates without complying with the requirements of Section 6.03.A in response to an Emergency that damages the Regional Water System and disrupts San Francisco's ability to maintain normal deliveries of water to Retail and Wholesale Customers. In such an Emergency, the Commission may adopt an emergency rate surcharge applicable to Wholesale Customers without following the procedures set forth in this section, provided that any such rate surcharge imposed by the Commission shall be applicable to both Retail and Wholesale Customers and incorporate the same percentage increase for all customers. Any emergency rate surcharge adopted by the Commission shall remain in effect only until the next-budget coordinated rate-setting cycle.

C. **Drought Rates**. If the Commission declares a water shortage emergency under Water Code Section 350, implements the Tier 1 Shortage Plan (Attachment H) described in Section 3.11.C, and imposes drought rates on Retail Customers, it may concurrently adjust wholesale rates independently of coordination with the annual budget process. Those adjustments may be designed to encourage water conservation and may constitute changes to the structure of the rates within the meaning of Section 6.04. The parties agree, however, that, in adopting changes in rates in response to a declaration of water shortage emergency, the Commission shall comply with Section 6.03.A.1 and 2 but need not comply with Section 6.04.B. Drought Rate payments and payments of excess use charges levied in accordance with the Tier 1 Shortage Plan described in Section 3.11.C constitute Wholesale Customer Revenue and count towards the Wholesale Revenue Requirement. The SFPUC may use these revenues to purchase additional water for the Wholesale Customers from the State Drought Water Bank or other willing seller.

6.04 **Rate Structure**

A. This Agreement is not intended and shall not be construed to limit the Commission's right (a) to adjust the structure of the rate schedule applicable to the Wholesale Customers (i.e., the relationship among the several charges set out therein) or (b) to add, delete, or change the various charges which make up the rate schedule, provided that neither such charges nor the structure of the rate schedule(s) applicable to the Wholesale Customers shall be arbitrary, unreasonable, or unjustly discriminatory as among said customers. The

SFPUC will give careful consideration to proposals for changes in the rate schedule made jointly by the Wholesale Customers but, subject to the limitations set out above, shall retain the sole and exclusive right to determine the structure of the rate schedule.

B. If the SFPUC intends to recommend that the Commission adopt one or more changes to the structure of wholesale rates (currently set forth in SFPUC Rate Schedule W-25), it shall prepare and distribute to the Wholesale Customers and BAWSCA a report describing the proposed change(s), the purpose(s) for which it/they are being considered, and the estimated financial effect on individual Wholesale Customers or classes of customers. Wholesale Customers may submit comments on the report to the SFPUC for sixty (60) days after receiving the report. The SFPUC will consider these comments and, if it determines to recommend that the Commission adopt the change(s), as described in the report or as modified in response to comments, the SFPUC General Manager shall submit a report to the Commission recommending specific change(s) in the rate structure. Copies of the General Manager's report shall be sent to all Wholesale Customers and BAWSCA at least thirty (30) days prior to the Commission meeting at which the changes will be considered.

C. The SFPUC may recommend, and the Commission may adopt, changes in the structure of wholesale rates at any time. However, the new rate schedule implementing these changes will become effective at the beginning of the following fiscal year.

6.05 Balancing Account

A. Balancing Account Established Under 1984 Agreement. The amount of credit in favor of San Francisco as of the expiration of the term of 1984 Agreement (June 30, 2009) is not known with certainty as of preparation and execution of this Agreement. It will not be known with certainty until the Compliance Audit for FY 2008-09 is completed and disputes, if any, that the Wholesale Customers or the SFPUC may have with the calculation of the Suburban Revenue Requirement for that fiscal year and for previous fiscal years have been settled or decided by arbitration.

The parties anticipate that the amount of the credit in favor of San Francisco as of June 30, 2009 may be within the range of $15 million to $20 million.

In order to reduce the credit balance due San Francisco under the 1984 Agreement in an orderly manner, while avoiding unnecessary fluctuations in wholesale rates, the parties agree to implement the following procedure.

1. In setting wholesale rates for FY 2009-10, SFPUC will include a balancing account repayment of approximately $2 million.

2. In setting wholesale rates for FY 2010-11 and following years, SFPUC will include a balancing account repayment of not less than $2 million and not more than $5 million annually until the full amount of the balance due, plus interest at the rate specified in Section 6.05.B, is repaid.

3. The actual ending balance as of June 30, 2009 will be determined, by the parties' agreement or arbitral ruling, after the Compliance Audit report for FY 2008-09 is delivered to BAWSCA. That amount, once determined, will establish the principal to be amortized through subsequent years' repayments pursuant to this Section 6.05.A.

B. Balancing Account Under This Agreement

1. Operation. After the close of each fiscal year, the SFPUC will compute the costs allocable to the Wholesale Customers for that fiscal year pursuant to Article 5, based on actual costs incurred by the SFPUC and actual amounts of water used by the Wholesale Customers and the Retail Customers. That amount will be compared to the amounts billed to the Wholesale Customers for that fiscal year (including any Excess Use Charges, but excluding revenues described in Section 5.10.C). The difference will be posted to a "balancing account" as a credit to, or charge against, the Wholesale Customers. Interest shall also be posted to the balancing account calculated by multiplying the amount of the opening balance by the average net interest rate, certified by the Controller as earned in the San Francisco Treasury for the previous fiscal year on the San Francisco County Pooled Investment Account. Interest, when posted, will carry the same mathematical sign (whether positive or negative) as carried by the opening balance. The amount posted to the balancing account in each year shall be added to, or subtracted from, the balance in the account from previous years. The calculation of the amount to be posted to the balancing account shall be included in the report prepared by the SFPUC pursuant to Section 7.02.

The opening balance for fiscal year 2009-10 shall be zero.

2. Integration of Balancing Account with Wholesale Rate Setting Process. If the amount in the balancing account is owed to the Wholesale Customers (a positive balance), the SFPUC shall take it into consideration in establishing wholesale rates. However, the SFPUC need not apply the entire amount to reduce wholesale rates for the immediately ensuing

year. Instead, the SFPUC may prorate a positive ending balance over a period of up to three successive years in order to avoid fluctuating decreases and increases in wholesale rates.

a. If a positive balance is maintained for three successive years and represents 10 percent or more of the Wholesale Revenue Requirement for the most recent fiscal year, the SFPUC shall consult with BAWSCA as to the Wholesale Customers' preferred application of the balance. The Wholesale Customers shall, through BAWSCA, direct that the positive balance be applied to one or more of the following purposes: (a) transfer to the Wholesale Revenue Coverage Reserve, (b) amortization of any remaining negative balance from the ending balancing account under the 1984 Agreement, (c) prepayment of the existing asset balance under Section 5.03, (d) water conservation or water supply projects administered by or through BAWSCA, (e) immediate reduction of wholesale rates, or (f) continued retention for future rate stabilization purposes. In the absence of a direction from BAWSCA, the SFPUC shall continue to retain the balance for rate stabilization in subsequent years.

b. If the amount in the balancing account is owed to the SFPUC (a negative balance), the SFPUC shall not be obligated to apply all or any part of the negative balance in establishing wholesale rates for the immediately ensuring year. Instead, the SFPUC may prorate the negative balance in whole or in part over multiple years in order to avoid fluctuating increases and decreases in wholesale rates.

6.06 Wholesale Revenue Coverage Reserve

A. The SFPUC may include in wholesale rates for any fiscal year an additional dollar amount ("Wholesale Revenue Coverage"), which for any fiscal year shall equal the following:

1. The lesser of (i) 25% of the Wholesale Customers' share of Net Annual Debt Service for that fiscal year determined as described in Section 5.04.A, or (ii) the amount necessary to meet the Wholesale Customers' proportionate share of Debt Service coverage required by then-current Indebtedness for that fiscal year, minus

2. A credit for (i) the actual amounts previously deposited in the "Wholesale Revenue Coverage Reserve" (as defined in subsection B below), (ii) accrued interest on the amounts on deposit in the Wholesale Revenue Coverage Reserve, and (iii) an amount equal to any additional interest that would have accrued on the actual amounts previously deposited in

the Wholesale Revenue Coverage Reserve assuming no withdrawals had been made therefrom.

B. During each fiscal year, the SFPUC will set aside and deposit that portion of revenue equal to Wholesale Revenue Coverage into a separate account that the SFPUC will establish and maintain, to be known as the "Wholesale Revenue Coverage Reserve." Deposits into the Wholesale Revenue Coverage Reserve shall be made no less frequently than monthly. The Wholesale Revenue Coverage Reserve shall be credited with interest at the rate specified in Section 6.05.B. The SFPUC may use amounts in the Wholesale Revenue Coverage Reserve for any lawful purpose. Any balance in the Wholesale Revenue Coverage Reserve in excess of the Wholesale Revenue Coverage amount as of the end of any fiscal year (as calculated in subsection 6.06(A) above) shall be applied as a credit against wholesale rates in the immediately following fiscal year unless otherwise directed by BAWSCA.

C. Within 180 days following the later of expiration of the Term or final payment of Debt Service due on Indebtedness issued during the Term to which Wholesale Customers were contributing, SFPUC shall rebate to the Wholesale Customers an amount equal to the Wholesale Revenue Coverage amount in effect for the fiscal year during which the Term expires or the final payment of Debt Service on Indebtedness is made based on each Wholesale Customer's Proportional Annual Use in the fiscal year during which the Term expires or the final payment of debt service on Indebtedness is made.

D. SFPUC shall provide a schedule of debt issuance (with assumptions), and the Wholesale Customers' share of Net Annual Debt Service (actual and projected) expected to be included in wholesale rates starting in 2009-10 through the expected completion of the WSIP. The schedule is to be updated annually prior to rate setting. If estimated Debt Service is used in rate setting, the SFPUC must be able to demonstrate that the Water Enterprise revenues will be sufficient to meet the additional bonds test for the proposed bonds and rate covenants for the upcoming year.

E. Conditions in the municipal bond market may change from those prevailing in 2009. If, prior to expiration of the Term, the SFPUC determines that it would be in the best financial interest of both Retail Customers and Wholesale Customers of the Regional Water System for the Debt Service coverage requirement to be increased in one or more series of proposed new Indebtedness above 1.25%, or for the coverage covenant to be strengthened in other ways, it will provide a written report to BAWSCA. The report will contain (1) a description of proposed covenant(s) in the bond indenture; (2) an explanation of how savings are expected to be achieved (e.g., increase in the SFPUC's credit rating over the then-current level; ability to obtain credit enhancement, etc.); (3) the estimated all-in true interest cost savings; (4) a comparison of the Wholesale Revenue Requirements using the Debt Service coverage limitation in subsection A and under the proposed methodology; and (5) a comparison of the respective monetary benefits expected to be received by both Retail and Wholesale Customers. The SFPUC and BAWSCA agree to meet and confer in good faith about the proposed changes.

F. Any increase in Debt Service coverage proposed by the SFPUC shall be commensurate with Proportional Water Use by Retail and Wholesale Customers. If the SFPUC demonstrates that an increase in Debt Service coverage will result in equivalent percentage reductions in total Wholesale and Retail Debt Service payments over the life of the proposed new Indebtedness, based on Proportional Water Use, BAWSCA may agree to a modification of the Wholesale Revenue Coverage requirement in subsection A. If BAWSCA does not agree to a proposed modification in coverage requirements in the covenants for new Indebtedness, SFPUC may nevertheless proceed with the modification and the issuance of new Indebtedness. Any Wholesale Customer, or BAWSCA, may challenge an increase in the Wholesale Revenue Requirement resulting from the modification in Debt Service coverage through arbitration as provided in Section 8.01.A. If the arbitrator finds that the increase in Debt Service coverage (1) did not and will not result in equivalent percentage reductions in total Wholesale and Retail Debt Service payments over the life of the proposed new Indebtedness, based on Proportional Water Use, or (2) was not commensurate with Proportional Water Use, the arbitrator may order the Wholesale Revenue Requirement to be recalculated both retrospectively and prospectively to eliminate the differential impact to Wholesale or Retail Customers, subject to the limitation in Section 8.01.C.

6.07 Working Capital Requirement

A. The SFPUC maintains working capital in the form of unappropriated reserves for the purpose of bridging the gap between when the SFPUC incurs operating expenses required to provide service and when it receives revenues from its Retail and Wholesale Customers. The Wholesale Customers shall fund their share of working capital as part of the annual Wholesale Revenue Requirement calculation. The amount of wholesale working capital for which the Wholesale Customers will be responsible will be determined using the 60-day standard formula approach.

B. Applying this approach, annual wholesale working capital equals one-sixth of the wholesale allocation of operation and maintenance, administrative and general, and property tax expenses for the Water and Hetch Hetchy Enterprises. Wholesale working capital shall be calculated separately for the Water and Hetch Hetchy Enterprises.

C. Each month, the sum of the Water Enterprise and Hetch Hetchy Enterprise working capital components will be compared with the ending balance in the Wholesale Revenue Coverage Reserve to determine if the Wholesale Customers provided the minimum required working capital. If the Wholesale Revenue Coverage Reserve is greater than the total Water Enterprise and Hetch Hetchy Enterprise working capital requirement, the Wholesale Customers will have provided their share of working capital. If the Wholesale Revenue Coverage Reserve is less than the total Water Enterprise and Hetch Hetchy Enterprise working capital requirement, the Wholesale Customers will be charged interest on the difference, which will be included in the adjustment to the Balancing Account under Section 6.05.B for the subsequent fiscal year.

6.08 <u>Wholesale Capital Fund</u>

A. The SFPUC currently funds revenue-funded capital projects through annual budget appropriations that are included in rates established for that fiscal year and transferred to a capital project fund from which expenditures are made. Consistent with the San Francisco Charter and Administrative Code, the SFPUC appropriates funds in advance of construction in order to maintain a positive balance in the capital project fund. The capital project fund also accrues interest and any unspent appropriations in excess of total project costs. It is the SFPUC's practice to regularly monitor the capital project fund balance to determine whether a surplus has accumulated, which can be credited against the next fiscal year's capital project appropriation.

B. The SFPUC shall establish a comparable Wholesale Revenue-Funded Capital Fund (Wholesale Capital Fund) to enable the Wholesale Customers to fund the wholesale share of revenue-funded New Regional Assets. The Wholesale Capital Fund balance is zero as of July 1, 2009. The SFPUC may include in wholesale rates for any fiscal year an amount equal to the wholesale share of the SFPUC's appropriation for revenue funded New Regional Assets for that year, which sum will be credited to the Wholesale Capital Fund. The wholesale share of other sources of funding, where legally permitted and appropriately accounted for under GAAP, will also be credited to the Wholesale Capital Fund, together with interest earnings on the Wholesale Capital Fund balance.

C. The SFPUC will expend revenues appropriated and transferred to the Wholesale Capital Fund only on New Regional Assets. The annual capital appropriation included in each fiscal year's budget will be provided to BAWSCA in accordance with Section 6.02 and will take into account the current and projected balance in the Wholesale Capital Fund, as well as current and projected unexpended and unencumbered surplus, as shown on attachment M-1, which will be prepared by the SFPUC each year.

D. Commencing on November 30, 2010 and thereafter in each fiscal year during the Term, the SFPUC will also provide an annual report to BAWSCA on the status of individual revenue-funded New Regional Assets, substantially in the form of Attachment M-2.

E. In order to prevent the accumulation of an excessive unexpended and unencumbered surplus in the Wholesale Capital Fund, the status of the fund balance will be reviewed through the Compliance Audit at five-year intervals, commencing in FY 2014-15. Any excess fund balance (i.e., an accumulated unexpended, unencumbered amount in excess of ten percent (10%) of the wholesale share of total capital appropriations for New Regional Assets during the five preceding years) will be transferred to the credit of the Wholesale Customers to the Balancing Account described in Section 6.05. Attachment M-3 illustrates the operation of this review process, covering FY 2009-10 through FY 2013-14 and FY 2014-15 through 2018-19.

F. Three years prior to the end of the Term, the SFPUC and BAWSCA will discuss the disposition of the Wholesale Capital Fund balance at the end of the Term. Absent agreement, any balance remaining in the Wholesale Capital Fund at the end of the Term shall be transferred to the Balancing Account, to the credit of the Wholesale Customers.

Article 7. Accounting Procedures; Compliance Audit

7.01 <u>SFPUC Accounting Principles, Practices</u>

A. <u>Accounting Principles</u>. San Francisco will maintain the accounts of the SFPUC and the Water and Hetch Hetchy Enterprises in conformity with Generally Accepted Accounting Principles. San Francisco will apply all applicable pronouncements of the Governmental Accounting Standards Board (GASB) as well as statements and interpretations of the Financial Accounting Standards Board and Accounting Principles Board opinions issued on or before March 30, 1989, unless those pronouncements or opinions conflict with GASB pronouncements.

B. <u>General Rule</u>. San Francisco will maintain the accounting records of the SFPUC and the Water and Hetch Hetchy Enterprises in a format and level of detail sufficient to allow it to determine the annual Wholesale Revenue Requirement in compliance with this Agreement and to allow its determination of the Wholesale Revenue Requirement to be audited as provided in Section 7.04.

C. <u>Water Enterprise</u>. San Francisco will maintain an account structure which allows utility plant and operating and maintenance expenses to be segregated by location (inside San Francisco and outside San Francisco) and by function (Direct Retail, Regional and Direct Wholesale).

D. <u>Hetch Hetchy Enterprise</u>. San Francisco will maintain an account structure which allows utility plant and operating and maintenance expenses to be segregated into Water Only, Power Only and Joint categories.

E. <u>SFPUC</u>. San Francisco will maintain an account structure which allows any expenses of SFPUC bureaus that benefit only the Wastewater Enterprise, the Power-Only operations of the Hetch Hetchy Enterprise or Retail Customers to be excluded from the Wholesale Revenue Requirement.

F. <u>Utility Plant Ledgers</u>. San Francisco will maintain subsidiary plant ledgers for the Water and Hetch Hetchy Enterprises that contain unique identifying numbers for all assets included in the rate base and identify the original cost, annual depreciation, accumulated depreciation, date placed in service, useful life, salvage value if any, source of funding (e.g., bond series, revenues, grants), and classification for purposes of this Agreement.

G. **<u>Debt</u>.** San Francisco will maintain documentation identifying:

1. The portion of total bonded debt outstanding related to each series of each bond issue.

2. The portion of total interest expense related to each series of each bond issue.

3. The use of proceeds of each bond issue (including proceeds of commercial paper and/or other interim financial instruments redeemed or expected to be redeemed from bonds and earnings on the proceeds of financings) in sufficient detail to determine, for each bond issue, the proceeds and earnings of each (including proceeds and earnings of interim financing vehicles redeemed by a bond issue) and the total amounts expended on Direct Retail improvements and the total amounts expended on Regional improvements.

H. **<u>Changes in Accounting</u>.** Subject to subsections A thru G, San Francisco may change the chart of accounts and accounting practices of the SFPUC and the Water and Hetch Hetchy Enterprises. However, the allocation of any expense to the Wholesale Customers that is specified in the Agreement may not be changed merely because of a change in (1) the accounting system or chart of accounts used by SFPUC, (2) the account to which an expense is posted or (3) a change in the organizational structure of the SFPUC or the Water or Hetch Hetchy Enterprises.

I. **<u>Audit</u>.** San Francisco will arrange for an audit of the financial statements of Water and Hetch Hetchy Enterprises to be conducted each year by an independent certified public accountant, appointed by the Controller, in accordance with Generally Accepted Auditing Standards.

7.02 <u>Calculation of and Report on Wholesale Revenue Requirement</u>

A. Within five months after the close of each fiscal year, San Francisco will prepare a report showing its calculation of the Wholesale Revenue Requirement for the preceding fiscal year and the change in the balancing account as of the end of that fiscal year. The first such report will be prepared by November 30, 2010 and will cover fiscal year 2009-10 and the balancing account as of June 30, 2010.

B. The report will consist of the following items:

1. Statement of changes in the balancing account for the fiscal year being reported on, and for the immediately preceding fiscal year, substantially in the form of Attachment O.

2. Detailed supporting schedules 8.1 through 8.2 substantially in the form of Attachment N-2.

3. Description and explanation of any changes in San Francisco's accounting practices from those previously in effect.

4. Explanation of any line item of expense (shown on Attachment N-2, schedules 1 and 4) for which the amount allocated to the Wholesale Customers increased by (a) ten percent or more from the preceding fiscal year, or (b) more than $1,000,000.

5. Representation letter signed by the SFPUC General Manager and by other SFPUC financial staff shown on Attachment P, as the General Manager may direct, subject to change in position titles at the discretion of the SFPUC.

C. The report will be delivered to the BAWSCA General Manager by the date identified in Subsection A.

Once the report has been delivered to BAWSCA, San Francisco will, upon request:

1. Provide BAWSCA with access to, and copies of, all worksheets and supporting documents used or prepared by San Francisco during its calculation of the Wholesale Revenue Requirement;

2. Make available to BAWSCA all supporting documentation and calculations used by San Francisco in preparing the report; and

3. Promptly provide answers to questions from BAWSCA staff about the report.

7.03 Appointment of Compliance Auditor

A. **Purpose.** The purpose of this section is to provide for an annual Compliance Audit by an independent certified public accountant of the procedures followed and the underlying data used by San Francisco in calculating the Wholesale Revenue Requirement for the preceding fiscal year. The annual Compliance Audit shall also determine whether the Wholesale Revenue Requirement has been calculated in accordance with the terms of the Agreement and whether amounts paid by the Wholesale Customers in excess of or less than the Wholesale Revenue Requirement have been posted to the balancing account, together with interest as provided in Section 6.05.

B. **Method of Appointment**. The Controller shall select an independent certified public accountant ("Compliance Auditor") to conduct the Compliance Audit described below. The Compliance Auditor may be the same certified public accountant engaged by the Controller to audit the financial statements of the Water and Hetch Hetchy Enterprises. Subject to approval by the Controller and the General Manager of the SFPUC, the Compliance Auditor shall have the authority to engage such consultants as it deems necessary or appropriate to assist in the audit. The terms of this Article shall be incorporated into the contract between San Francisco and the Compliance Auditor, and the Wholesale Customers shall be deemed to be third-party beneficiaries of said contract.

7.04 Conduct of Compliance Audit

A. **Standards**. The Compliance Auditor shall perform the Compliance Audit in accordance with Generally Accepted Auditing Standards. In particular, its review shall be governed by the standards contained in Section AU 623 (Reports on Specified Elements, Accounts or Items of a Financial Statement) of the AICPA, *Professional Standards*, as amended from time to time.

B. **Preliminary Meeting; Periodic Status Reports; Access to Data**. Prior to commencing the audit, the Compliance Auditor shall meet with San Francisco and BAWSCA to discuss the audit plan, the procedures to be employed and the schedule to be followed. During the course of the audit, the Compliance Auditor shall keep San Francisco and BAWSCA informed of any unforeseen problems or circumstances which could cause a delay in the audit or any material expansion of the audit's scope. The Compliance Auditor shall be given full access to all records of the SFPUC and the Water and Hetch Hetchy Enterprises that the Auditor deems necessary for the audit.

C. **Audit Procedures**. The Compliance Auditor shall review San Francisco's calculation of the Wholesale Revenue Requirement and the underlying data in order to carry out the purpose of the audit described in Section 7.03.A and to issue the report described in Section 7.05. At a minimum, the Compliance Auditor shall address the following:

1. Water Enterprise Operating and Maintenance Expenses. The Compliance Auditor shall review Water Enterprise cost ledgers to determine whether the recorded operating and maintenance expenses fairly reflect the costs incurred, were recorded on a basis consistent with applicable Generally Accepted Accounting Principles, and were allocated to the Wholesale Customers as provided in this Agreement.

2. Water Enterprise Administrative and General Expenses. The Compliance Auditor shall review Water Enterprise cost ledgers and other appropriate financial records, including those of the SFPUC, to determine whether the recorded administrative and general expenses fairly reflect the costs incurred by or allocated to the Water Enterprise, whether they were recorded on a basis consistent with applicable Generally Accepted Accounting Principles, whether SFPUC charges were allocated to the Water Enterprise in accordance with this Agreement, and whether the amount of administrative and general expenses allocated to the Wholesale Customers was determined as provided by this Agreement.

3. Property Taxes. The Compliance Auditor shall review Water Enterprise cost ledgers to determine whether the amount of property taxes shown on the report fairly reflects the property tax expense incurred by San Francisco for Water Enterprise property outside of San Francisco and whether there has been deducted from the amount to be allocated (1) all taxes actually reimbursed to San Francisco by tenants of Water Enterprise property under leases that require such reimbursement and (2) any refunds received from the taxing authority. The Compliance Auditor also shall determine whether the amount of property taxes allocated to the Wholesale Customers was determined as provided in this Agreement.

4. Debt Service. The Compliance Auditor shall review SFPUC records to determine whether debt service, and associated coverage requirements, were allocated to the Wholesale Customers as provided in this Agreement.

5. Amortization of Existing Assets in Service as of June 30, 2009. The Compliance Auditor shall review both Water and Hetch Hetchy Enterprise records to determine whether the payoff amount for Existing Assets allocated to the Wholesale Customers as shown on Attachment K-1 through K-4 was calculated as provided in Section 5.03 of this Agreement.

6. Revenue-Funded Capital Appropriations/Expenditures. The Compliance Auditor shall review San Francisco's calculation of actual expenditures on the wholesale share of revenue-funded New Regional Assets and remaining unexpended and unencumbered project balances in the "Wholesale Capital Fund" described in Section 6.08, to determine whether the procedures contained in that section were followed.

7. Hetch Hetchy Expenses. The Compliance Auditor shall determine whether Hetch Hetchy Enterprise expenses were allocated to the Wholesale Customers as provided in this Agreement.

D. Use of and Reliance on Audited Financial Statements and Water Use Data

1. In performing the audit, the Compliance Auditor shall incorporate any adjustments to the cost ledgers recommended by the independent certified public accountant, referred to in Section 7.01.I, which audited the financial statements of the Water and Hetch Hetchy Enterprises. The Compliance Auditor may rely upon the work performed by that independent certified public accountant if the Compliance Auditor reviews the work and is willing to take responsibility for it as part of the compliance audit.

2. In performing the Compliance Audit and issuing its report, the Compliance Auditor may rely on water use data furnished by the Water Enterprise, regardless of whether the Wholesale Customers contest the accuracy of such data. The Compliance Auditor shall have no obligation to independently verify the accuracy of the water use data provided by San Francisco; however, the Compliance Auditor shall disclose in its report any information which came to its attention suggesting that the water use data provided by San Francisco are inaccurate in any significant respect.

E. Exit Conference. Upon completion of the audit, the Compliance Auditor shall meet with San Francisco and BAWSCA to discuss audit findings, including (1) any material weakness in internal controls and (2) adjustments proposed by the Compliance Auditor and San Francisco's response (i.e., booked or waived).

7.05 Issuance of Compliance Auditor's Report

A. San Francisco will require the Compliance Auditor to issue its report no later than nine months after the fiscal year under audit (i.e., March 31 of the following calendar year). The Compliance Auditor's report shall be addressed and delivered to San Francisco and BAWSCA. The report shall contain:

1. A statement that the Auditor has audited the report on the calculation of the Wholesale Revenue Requirement and changes in the balancing account, and supporting documents, prepared by San Francisco as required by Section 7.02.

2. A statement that the audit was conducted in accordance with auditing standards generally accepted in the United States of America, and that the audit provides a reasonable basis for its opinion.

3. A statement that in the Compliance Auditor's opinion the Wholesale Revenue Requirement was calculated by San Francisco in accordance with this Agreement and that the change in the balancing account shown in San Francisco's report was calculated as required by this Agreement and presents fairly, in all material respects, changes in and the balance due to (or from) the Wholesale Customers as of the end of the fiscal year under audit.

7.06 Wholesale Customer Review

A. One or more Wholesale Customers, or BAWSCA, may engage an independent certified public accountant (CPA) to conduct a review (at its or their expense) of San Francisco's calculation of the annual Wholesale Revenue Requirement and a review of changes in the balancing account.

B. If a Wholesale Customer or BAWSCA wishes such a review to be conducted it will provide written notice to SFPUC within 30 days of the date the Compliance Auditor's report is issued. The notice will identify the CPA or accounting/auditing firm that will conduct the review and the specific aspects of the Compliance Auditor's report that are the subject of the review. If more than one notice of review is received by the SFPUC, the requesting Wholesale Customers shall combine and coordinate their reviews and select a lead auditor to act on their behalf for the purposes of requesting documents and conducting on-site investigations.

C. San Francisco will cooperate with the CPA appointed by a Wholesale Customer or BAWSCA. This cooperation includes making requested records promptly available, making knowledgeable SFPUC personnel available to timely and truthfully answer the CPA's questions and directing the Compliance Auditor to cooperate with the CPA.

D. The Wholesale Customer's review shall be completed within 60 days after the date the Compliance Auditor's report is issued. At the conclusion of the review, representatives of San Francisco and BAWSCA shall meet to discuss any differences between them concerning San Francisco's compliance with Articles 5 or 6 of this Agreement during the preceding fiscal year or San Francisco's calculation of the Wholesale Revenue Requirement for the preceding fiscal year. If such differences cannot be resolved, the dispute shall be submitted to arbitration in accordance with Section 8.01.

Article 8. Other Agreements of the Parties

8.01 Arbitration and Judicial Review

A. General Principles re Scope of Arbitration. All questions or disputes arising under the following subject areas shall be subject to mandatory, binding arbitration and shall not be subject to judicial determination:

1. the determination of the Wholesale Revenue Requirement, which shall include both the calculations used in the determination and the variables used in those calculations;

2. the SFPUC's adherence to accounting practices and conduct of the Compliance Audit; and

3. the SFPUC's classification of new assets for purposes of determining the Wholesale Revenue Requirement.

All other questions or disputes arising under this Agreement shall be subject to judicial determination. Disputes about the scope of arbitrability shall be resolved by the courts.

B. Demand for Arbitration. If any arbitrable question or dispute should arise, any Wholesale Customer or the SFPUC may commence arbitration proceedings hereunder by service of a written Demand for Arbitration. Demands for arbitration shall set forth all of the issues to be arbitrated, the general contentions relating to those issues, and the relief sought by the party serving the Demand. Within 45 days after service of a Demand upon it, any Wholesale Customer or the SFPUC may serve a Notice of Election to become a party to the arbitration and a Response to the issues set forth in the Demand. The Response shall include the party's general contentions and defenses with respect to the claims made in the Demand, and may include any otherwise arbitrable claims, contentions and demands that concern the fiscal year covered by the Demand. If a timely Notice of Election and Response is not filed by any such entity, it shall not be a party to the arbitration but shall nonetheless be bound by the award of the arbitrator. If no party to this Agreement serves a timely Notice of Election and Response, the party seeking arbitration shall be entitled to the relief sought in its Demand for Arbitration without the necessity of further proceedings. Any claims not made in a Demand or Response shall be deemed waived.

If a Demand or Notice of Election is made by the SFPUC, it shall be served by personal delivery or certified mail to each Wholesale Customer at the address of such customer as set forth in the billing records of the SFPUC. If a Demand or Notice of Election is made by a Wholesale Customer, service shall be by certified mail or personal delivery to the General Manager, SFPUC, 1155 Market Street, 11th Floor, San Francisco, California 94103, and to each of the other Wholesale Customers. If arbitration is commenced, the Wholesale Customers shall use their best efforts to formulate a single, joint position with respect thereto. In any event, with respect to the appointment of arbitrators, as hereinafter provided, all Wholesale Customers that take the same position as to the issues to be arbitrated shall jointly and collectively be deemed to be a single party.

C. Limitations Period. All Demands For Arbitration shall be served within twelve months of receipt by BAWSCA of the Wholesale Revenue Requirement Compliance Auditor's Report for that year. If a party fails to file a Demand within the time period specified in this subsection, that party waives all present and future claims with respect to the fiscal year in question. If no such Demand is served within the twelve month period specified above, the SFPUC's determination of the Wholesale Revenue Requirement for that year shall be final and conclusive. Whether any particular claim is barred by the twelve month limitations period provided for herein shall be for the arbitrator to determine. Prior to the expiration of the twelve month limitations period, the parties to the dispute may agree by written stipulation to extend the period by up to six additional months.

The Arbitrator may order the alteration or recalculation of underlying Water Enterprise and/or Hetch Hetchy Enterprise accounts or asset classifications. Such changes shall be used to calculate the Wholesale Revenue Requirement for the fiscal year in dispute and shall also be used to determine future Wholesale Revenue Requirements, if otherwise applicable, even though the existing entries in such accounts or the asset classifications, in whole or in part, predate the twelve month period described above, so long as a timely arbitration Demand has been filed in accordance with this subsection.

D. Number and Appointment of Arbitrators. All arbitration proceedings under this section shall be conducted by a single arbitrator, selected by the SFPUC and a designated representative of the Wholesale Customers or each group of Wholesale Customers that take the same position with respect to the arbitration, within 75 days after service of the Demand. If the parties to the arbitration cannot agree on an arbitrator within 75 days, any party may petition the Marin County Superior Court for the appointment of an arbitrator pursuant to Code of Civil Procedure Section 1281.6 (or any successor provision).

E. **<u>Guidelines for Qualifications of Arbitrators</u>.** The Wholesale Customers and the SFPUC acknowledge that the qualifications of the arbitrator will vary with the nature of the matter arbitrated, but, in general, agree that such qualifications may include service as a judge or expertise in one or more of the following fields: public utility law, water utility rate setting, water system and hydraulic engineering, utility accounting methods and practices, and water system operation and management. The parties to the arbitration shall use their best efforts to agree in advance upon the qualifications of any arbitrator to be appointed by the Superior Court.

F. **<u>Powers of Arbitrator; Conduct of Proceedings</u>**

1. Except as provided in this section, arbitrations under this section shall be conducted under and be governed by the provisions of California Code of Civil Procedure Sections 1282.2 through 1284.2 (hereinafter, collectively, “Code sections”), and arbitrators appointed hereunder shall have the powers and duties specified by the Code sections.

2. Within the meaning of the Code sections, the term “neutral arbitrator” shall mean the single arbitrator selected by the parties to the arbitration.

3. Unless waived in writing by the parties to the arbitration, the notice of hearing served by the arbitrator shall not be less than 90 days.

4. The lists of witnesses (including expert witnesses), and the lists of documents (including the reports of expert witnesses) referred to in Code of Civil Procedure Section 1282.2 shall be mutually exchanged, without necessity of demand therefore, no later than 60 days prior to the date of the hearing, unless otherwise agreed in writing by the parties to the arbitration. Upon application of any party, or on his or her own motion, the arbitrator may schedule one or more prehearing conferences for the purposes of narrowing and/or expediting resolution of the issues in dispute. Strict conformity to the rules of evidence is not required, except that the arbitrator shall apply applicable law relating to privileges and work product. The arbitrator shall consider evidence that he or she finds relevant and material to the dispute, giving the evidence such weight as is appropriate. The arbitrator may limit testimony to exclude evidence that would be immaterial or unduly repetitive, provided that all parties are afforded the opportunity to present material and relevant evidence.

5. Within thirty days after the close of the arbitration hearing, or such other time as the arbitrator shall determine, the parties will submit proposed findings and a proposed remedy to the arbitrator. The parties may file objections to their adversary's proposed findings and remedy within a time limit to be specified by the arbitrator. The arbitrator shall not base his or her award on information not obtained at the hearing.

6. The arbitrator shall render a written award no later than twelve months after the arbitrator is appointed, either by the parties or by the court, provided that such time may be waived or extended as provided in Code of Civil Procedure Section 1283.8.

7. The provisions for discovery set forth in Code of Civil Procedure Section 1283.05 are incorporated into and made part of this Agreement, except that: (a) leave of the arbitrator need not be obtained for the taking of depositions, including the depositions of expert witnesses; (b) the provisions of Code of Civil Procedure Section 2034.010 et seq., relating to discovery of expert witnesses, shall automatically be applicable to arbitration proceedings arising under this Agreement without the necessity for a formal demand pursuant to Section 2034.210 and the date for the exchange of expert discovery provided by Sections 2034.260 and 2034.270 shall be not later than 60 days prior to the date for the hearing; and (c) all reports, documents, and other materials prepared or reviewed by any expert designated to testify at the arbitration shall be discoverable. In appropriate circumstances, the arbitrator may order any party to this Agreement that is not a party to the arbitration to comply with any discovery request.

8. For the purposes of allocation of expenses and fees, as provided in Code of Civil Procedure Section 1284.2, if any two or more Wholesale Customers join together in a single, joint position in the arbitration, those Wholesale Customers shall be deemed to be a single party. If any Wholesale Customer or customers join together with the SFPUC in a single joint position in the arbitration, those Wholesale Customers and the SFPUC together shall be deemed to be a single party.

9. Subject to any other limitations imposed by the Agreement, the arbitrator shall have power to issue orders mandating compliance with the terms of the Agreement or enjoining violations of the Agreement. With respect to any arbitration brought to redress a claimed wholesale overpayment to the SFPUC, the arbitrator's power to award monetary relief

shall be limited to entering an order requiring that an adjustment be made in the amount posted to the balancing account for the fiscal year covered by the Demand.

10. All awards of the arbitrator shall be binding on the SFPUC and the Wholesale Customers regardless of the participation or lack thereof by any Wholesale Customer or the SFPUC as a party to the arbitration proceeding. The parties to an arbitration shall have the power to modify or amend any arbitration award by mutual consent. The arbitrator shall apply California law.

8.02 Attorneys' Fees

A. Arbitration or Litigation Between San Francisco and Wholesale Customers Arising under the Agreement or Individual Water Sales Contracts. Each party will bear its own costs, including attorneys' fees, incurred in any arbitration or litigation arising under this Agreement or the Individual Water Sales Contracts between San Francisco and the Wholesale Customers. Notwithstanding the foregoing, and subject to the limitations contained herein, the SFPUC may allocate to the Wholesale Customers as an allowable expense, utilizing the composite rate used for allocating other Water Enterprise administrative and general expenses, any attorneys' fees and costs incurred by the SFPUC in connection with arbitration and/or litigation arising under this Agreement and/or the Individual Water Sales Contracts. Attorneys' fees incurred by the SFPUC for attorneys employed in the San Francisco City Attorney's office shall be billed at the hourly rates charged for the attorneys in question by the San Francisco City Attorney's Office to the SFPUC. Attorneys' fees incurred by the SFPUC for attorneys other than those employed in the San Francisco City Attorney's Office shall be limited to the hourly rates charged to the SFPUC for attorneys and paralegals with comparable experience employed in the San Francisco City Attorney's office and in no event shall exceed the highest hourly rate charged by any attorney or paralegal employed in the City Attorney's Office to the SFPUC.

B. Arbitration or Litigation Outside of Agreement Concerning the SFPUC Water System or Reserved Issues

1. The attorneys' fees and costs incurred by the SFPUC in litigation between San Francisco and one or more of the Wholesale Customers arising from matters outside of the Agreement, including, without limitation, litigation and/or arbitration concerning the issues specifically reserved in the Agreement, shall be allocated between the Retail Customers and the

Wholesale Customers utilizing the composite rate used for allocating other Water Enterprise administrative and general expenses.

2. If, in any litigation described in subsection B.1 above, attorneys' fees and costs are awarded to one or more of the Wholesale Customers as prevailing parties, the SFPUC's payment of the Wholesale Customers' attorneys' fees and costs shall not be an allowable expense pursuant to subsection A.

3. If, in any litigation described in subsection B.1, the SFPUC obtains an award of attorneys' fees and costs as a prevailing party against one or more of the Wholesale Customers, any such award shall be reduced to offset the amount of the SFPUC's fees and costs, if any, that have already been paid by the Wholesale Customers in the current or any prior fiscal years pursuant to subsection B.1 and the provisions of Articles 5 and 6 of the Agreement.

4. Nothing contained in this Agreement, including this subsection, shall authorize a court to award attorneys' fees and costs to a prevailing party as a matter of contract and/or the provisions of Civil Code Section 1717, in litigation between San Francisco and one or more of the Wholesale Customers arising from matters outside of the Agreement, including, without limitation, litigation and/or arbitration concerning the issues specifically reserved in the Agreement.

C. Attorneys Fees and Costs Incurred by the SFPUC in Connection with the Operation and Maintenance of the SFPUC Water Supply System. All attorneys' fees and costs incurred by the SFPUC in connection with the operation and maintenance of the SFPUC's water supply system shall be allocated between Retail Customers and the Wholesale Customers utilizing the composite rate used for allocating other Water Enterprise administrative and general expenses.

8.03 Annual Meeting and Report

A. The parties wish to ensure that the Wholesale Customers may, in an orderly way, be informed of matters affecting the Regional Water System, including matters affecting the continuity and adequacy of their water supply from San Francisco.

For this purpose, the General Manager of the SFPUC shall meet annually with the Wholesale Customers and BAWSCA during the month of February, commencing

February 2010. At these annual meetings, the SFPUC shall provide the Wholesale Customers a report on the following topics:

1. Capital additions under construction or being planned for the Regional Water System, including the status of planning studies, financing plans, environmental reviews, permit applications, etc.;

2. Water use trends and projections for Retail Customers and Wholesale Customers;

3. Water supply conditions and projections;

4. The status of any administrative proceedings or litigation affecting San Francisco's water rights or the SFPUC's ability to deliver water from the watersheds which currently supply the Regional Water System;

5. Existing or anticipated problems with the maintenance and repair of the Regional Water System or with water quality;

6. Projections of Wholesale Revenue Requirements for the next five years;

7. Any other topic which the SFPUC General Manager places on the agenda for the meeting;

8. Any topic which the Wholesale Customers, through BAWSCA, request be placed on the agenda, provided that the SFPUC is notified of the request at least 10 days before the meeting.

B. The General Manager of the SFPUC, the Assistant General Manager of the Water Enterprise, and the Assistant General Manager of Business Services-CFO will use their best efforts to attend the annual meetings. If one or more of these officers are unable to attend, they will designate an appropriately informed assistant to attend in their place.

8.04 Administrative Matters Delegated to BAWSCA

A. The Wholesale Customers hereby delegate the authority and responsibility for performing the following administrative functions contemplated in this Agreement to BAWSCA:

1. Approval of calculations of Proportional Annual Water Use required by Section 3.14 and Attachment J, "Water Use Measurement and Tabulation";

2. Approval of amendments to Attachments J and K-3 and K-4, "25-Year Payoff Schedules for Existing Rate Base";

3. Agreement that the Water Meter and Calibration Procedures Manual to be prepared by the SFPUC may supersede some or all of the requirements in Attachment J, as described in Section 3.14;

4. Conduct of Wholesale Customer review of SFPUC's calculation of annual Wholesale Revenue Requirement/Change in Balancing Account described in Section 7.06;

5. Approval of an adjustment to Wholesale Revenue Coverage as described in Section 6.06.

B. A majority of the Wholesale Customers may, without amending this Agreement, delegate additional administrative functions to BAWSCA. To be effective, such expanded delegation must be evidenced by resolutions adopted by the governing bodies of a majority of the Wholesale Customers.

C. Unless otherwise explicitly stated, the administrative authority delegated to BAWSCA may be exercised by the General Manager/CEO of BAWSCA, rather than requiring action by the BAWSCA Board of Directors. In addition, the Wholesale Customers may, with the consent of BAWSCA, delegate to BAWSCA the initiation, defense, and settlement of arbitration proceedings provided for in Section 8.01.

8.05 Preservation of Water Rights; Notice of Water Rights Proceedings

A. It is the intention of San Francisco to preserve all of its water rights, irrespective of whether the water held under such water rights is allocated under this Agreement. Nothing in this Agreement shall be construed as an abandonment, or evidence of an intent to abandon, any of the water rights that San Francisco presently possesses.

B. San Francisco shall use its best efforts to give prompt notice to BAWSCA of any litigation or administrative proceedings to which San Francisco is a party involving water rights to the Regional Water System. The failure of San Francisco to provide notice as required by this section, for whatever reason, shall not give rise to any monetary liability.

8.06 SFPUC Rules and Regulations

The sale and delivery of all water under this Agreement shall be subject to such of the "Rules and Regulations Governing Water Service to Customers" of the Water Enterprise adopted by the Commission, as those rules and regulations may be amended from time to time, as are (1) applicable to the sale and delivery of water to the Wholesale Customers, (2) reasonable, and (3) not inconsistent with either this Agreement or with an Individual Water Sales Contract. The SFPUC will give the Wholesale Customers notice of any proposal to amend the Rules and Regulations in a manner that would affect the Wholesale Customers. The notice will be delivered at least thirty days in advance of the date on which the proposal is to be considered by the Commission and will be accompanied by the text of the proposed amendment.

8.07 Reservations of, and Limitations on, Claims

A. General Reservation of Raker Act Contentions. The 1984 Agreement resolved a civil action brought against San Francisco by certain of the Wholesale Customers. Plaintiffs in that action contended that they, and other Wholesale Customers that are municipalities or special districts, were "co-grantees" within the meaning of Section 8 of the Act and were entitled to certain rights, benefits and privileges by virtue of that status. San Francisco disputed those claims.

Nothing in this Agreement, or in the Individual Water Sales Contracts, shall be construed or interpreted in any way to affect the ultimate resolution of the controversy between the parties concerning whether any of the Wholesale Customers are "co-grantees" under the Act and, if so, what rights, benefits and privileges accrue to them by reason of that claimed status.

B. Claims Reserved but not Assertable During Term or Portions Thereof. The following claims, which San Francisco disputes, are reserved but may not be asserted during the Term (or portions thereof, as indicated):

1. The Wholesale Customers' claim that the Act entitles them to water at cost.

2. The Wholesale Customers' claim that San Francisco is obligated under the Act or state law to supply them with additional water in excess of the Supply Assurance. This claim may not be asserted unless and until San Francisco decides not to meet projected

water demands of Wholesale Customers in excess of the Supply Assurance pursuant to Section 4.06.

3. The claim by San Jose and Santa Clara that they are entitled under the Act, or any other federal or state law, to permanent, non-interruptible status and to be charged rates identical to those charged other Wholesale Customers. This claim may not be asserted unless and until San Francisco notifies San Jose or Santa Clara that it intends to interrupt or terminate water deliveries pursuant to Section 4.05.

4. The Wholesale Customers' claim that the SFPUC is not entitled to impose a surcharge for lost power generation revenues attributable to furnishing water in excess of the Supply Assurance. This claim may not be asserted unless and until SFPUC furnishes water in excess of the Supply Assurance during the Term and also includes such a surcharge in the price of such water.

5. Claims by Wholesale Customers (other than San Jose and Santa Clara, whose service areas are fixed) that SFPUC is obligated under the Act or state law to furnish water, within their Individual Supply Guarantee, for delivery to customers outside their existing service area and that Wholesale Customers are entitled to enlarge their service areas to supply those customers. Such claims may be asserted only after compliance with the procedure set forth in Section 3.03, followed by SFPUC's denial of, or failure for six months to act on, a written request by a Wholesale Customer to expand its service area.

C. **Waived Activities**. The Wholesale Customers (and the SFPUC, where specified) will refrain from the following activities during the Term (or portions thereof, as specified):

1. The Wholesale Customers and the SFPUC will not contend before any court, administrative agency or legislative body or committee that the methodology for determining the Wholesale Revenue Requirement (or the requirements for (a) amortization of the ending balance under the 1984 Agreement, or (b) contribution to the Wholesale Revenue Coverage) determined in accordance with this Agreement violates the Act or any other provision of federal law, state law, or San Francisco's City Charter, or is unfair, unreasonable or unlawful.

2. The Wholesale Customers will not challenge the transfer of funds by the SFPUC to any other San Francisco City department or fund, provided such transfer complies with the San Francisco City Charter. The transfer of its funds, whether or not permitted by the

City Charter, will not excuse the SFPUC from its failure to perform any obligation imposed by this Agreement.

3. The Wholesale Customers and the SFPUC will not assert monetary claims against one another based on the 1984 Agreement other than otherwise arbitrable claims arising from the three fiscal years immediately preceding the start of the Term (i.e., FYs 2006-07, 2007-08 and 2008-09). Such claims, if any, shall be governed by the dispute resolution provisions of this Agreement, except that the time within which arbitration must be commenced shall be 18 months from delivery of the Compliance Auditor's report.

D. <u>Other</u>

1. This Agreement shall determine the respective monetary rights and obligations of the parties with respect to water sold by the SFPUC to the Wholesale Customers during the Term. Such rights and obligations shall not be affected by any judgments or orders issued by any court in litigation, whether or not between parties hereto, and whether or not related to the controversy over co-grantee status, except for arbitration and/or litigation expressly permitted in this Agreement. No judicial or other resolution of issues reserved by this section will affect the Wholesale Revenue Requirement which, during the Term, will be determined exclusively as provided in Articles 5, 6 and 7 of this Agreement.

2. Because delays in the budget process or other events may cause the SFPUC to defer the effective date of changes in wholesale rates until after the beginning of the fiscal year, this Agreement does not require the SFPUC to make changes in wholesale rates effective at the start of the fiscal year or at any other specific date.

3. The Wholesale Customers do not, by executing this Agreement, concede the legality of the SFPUC's establishing Interim Supply Allocations, as provided in Article 4 or imposing Environmental Enhancement Surcharges on water use in excess of such allocations. Any Wholesale Customer may challenge such allocation when imposed and/or such surcharges if and when levied, in any court of competent jurisdiction.

4. The furnishing of water in excess of the Supply Assurance by San Francisco to the Wholesale Customers shall not be deemed or construed to be a waiver by San Francisco of its claim that it has no obligation under any provision of law to supply such water to the Wholesale Customers, nor shall it constitute a dedication by San Francisco to the Wholesale Customers of such water.

8.08 Prohibition of Assignment

A. This Agreement shall be binding on, and shall inure to the benefit of, the parties and their respective successors and permitted assigns. Each Wholesale Customer agrees that it will not transfer or assign any rights or privileges under this Agreement, either in whole or in part, or make any transfer of all or any part of its water system or allow the use thereof in any manner whereby any provision of this Agreement will not continue to be binding on it, its assignee or transferee, or such user of the system. Any assignment or transfer in violation of this covenant, and any assignment or transfer that would result in the supply of water in violation of the Act, shall be void.

B. Nothing in this section shall prevent any Wholesale Customer (except the California Water Service Company and Stanford) from entering into a joint powers agreement or a municipal or multi-party water district with any other Wholesale Customer (except the two listed above) to exercise the rights and obligations granted to and imposed upon the Wholesale Customers hereunder, nor shall this section prevent any Wholesale Customer (except the two listed above) from succeeding to the rights and obligations of another Wholesale Customer hereunder as long as the Wholesale Service Area served by the Wholesale Customers involved in the succession is not thereby enlarged.

8.09 Notices

A. All notices and other documents that San Francisco is required or permitted to send to the Wholesale Customers under this Agreement shall be sent to each and all of the Wholesale Customers by United States mail, first class postage prepaid, addressed to each Wholesale Customer at the address to which monthly water bills are mailed by the Water Enterprise.

B. All notices or other documents which the Wholesale Customers are required or permitted to send to San Francisco under this Agreement shall be sent by United States mail, first class postage prepaid, addressed as follows:

General Manager
San Francisco Public Utilities Commission
1155 Market Street, 11th Floor
San Francisco, CA 94103

C. Each Wholesale Customer is a member of BAWSCA. San Francisco shall send a copy of each notice or other document which it is required to send to all Wholesale Customers to BAWSCA addressed as follows:

General Manager/CEO
Bay Area Water Supply and Conservation Agency
155 Bovet Road, Suite 302
San Mateo, CA 94402

The failure of San Francisco to send a copy of such notices or documents to BAWSCA shall not invalidate any rate set or other action taken by San Francisco.

D. Any party (or BAWSCA) may change the address to which notice is to be sent to it under this Agreement by notice to San Francisco (in the case of a change desired by a Wholesale Customer or BAWSCA) and to the Wholesale Customer and BAWSCA (in the case of a change desired by San Francisco).

The requirements for notice set forth in Section 8.01 concerning arbitration shall prevail over this section, when they are applicable.

8.10 <u>Incorporation of Attachments</u>

Attachments A through Q, referred to herein, are incorporated in and made a part of this Agreement.

8.11 <u>Interpretation</u>

In interpreting this Agreement, or any provision thereof, it shall be deemed to have been drafted by all signatories, and no presumption pursuant to Civil Code Section 1654 may be invoked to determine the Agreement's meaning. The marginal headings and titles to the sections and paragraphs of this Agreement are not a part of this Agreement and shall have no effect upon the construction or interpretation of any part hereof.

8.12 <u>Actions and Approvals by San Francisco</u>

Whenever action or approval by San Francisco is required or contemplated by this Agreement, authority to act or approve shall be exercised by the Commission, except if such action is required by law to be taken, or approval required to be given, by the San Francisco Board of Supervisors. The Commission may delegate authority to the General Manager in accordance with the San Francisco City Charter and Administrative Code, except for actions that this Agreement requires to be taken by the Commission.

8.13 Counterparts

Execution of this Agreement may be accomplished by execution of separate counterparts by each signatory. San Francisco shall deliver its executed counterpart to BAWSCA and the counterpart which each Wholesale Customer executes shall be delivered to San Francisco. The separate executed counterparts, taken together, shall constitute a single agreement.

8.14 Limitations on Damages

A. Unless otherwise prohibited by this Agreement, general or direct damages may be recovered for a breach of a party's obligations under this Agreement. No party is liable for, or may recover from any other party, special, indirect or consequential damages or incidental damages, including, but not limited to, lost profits or revenue. No damages may be awarded for a breach of Section 8.17.

B. The limitations in subsection A apply only to claims for damages for an alleged breach of this Agreement. These limitations do not apply to claims for damages for an alleged breach of a legal duty that arises independently of this Agreement, established by constitution or statute.

C. If damages would be an inadequate remedy for a breach of this Agreement, equitable relief may be awarded by a court in a case in which it is otherwise proper.

D. This section does not apply to any claim of breach for which arbitration is the exclusive remedy pursuant to Section 8.01.A.

8.15 Force Majeure

A. Excuse from Performance. No party shall be liable in damages to any other party for delay in performance of, or failure to perform, its obligations under this Agreement, including the obligations set forth in Sections 3.09 and 4.06, if such delay or failure is caused by a "Force Majeure Event."

B. Notice. The party claiming excuse shall deliver to the other parties a written notice of intent to claim excuse from performance under this Agreement by reason of a Force

Majeure Event. Notice required by this section shall be given promptly in light of the circumstances, and, in the case of events described in (c), (d) or (e) of the definition of Force Majeure Event only, not later than ten (10) days after the occurrence of the Force Majeure Event. Such notice shall describe the Force Majeure Event, the services impacted by the claimed event, the length of time that the party expects to be prevented from performing, and the steps which the party intends to take to restore its ability to perform.

C. **Obligation to Restore Ability to Perform**. Any suspension of performance by a party pursuant to this section shall be only to the extent, and for a period of no longer duration than, required by the nature of the Force Majeure Event, and the party claiming excuse shall use its best efforts to remedy its inability to perform as quickly as possible.

8.16 No Third-Party Beneficiaries

This Agreement is exclusively for the benefit of the parties and not for the benefit of any other Person. There are no third-party beneficiaries of this Agreement and no person not a party shall have any rights under or interests in this Agreement.

No party may assert a claim for damages on behalf of a person other than itself, including a person that is not a party.

8.17 Good Faith and Fair Dealing

San Francisco and the Wholesale Customers each acknowledge their obligation under California law to act in good faith toward, and deal fairly with, each other with respect to this Agreement.

Article 9. Implementation and Special Provisions Affecting Certain Wholesale Customers

9.01 <u>General; Individual Water Sales Contracts</u>

A. As described in Section 1.03, San Francisco previously entered into Individual Water Sales Contracts with each of the Wholesale Customers. The term of the majority of Individual Water Sales Contracts will expire on June 30, 2009, concurrently with the expiration of the 1984 Agreement. Except as provided below in this Article, each of the Wholesale Customers will execute a new Individual Water Sales Contract with San Francisco concurrently with its approval of the Agreement.

B. The Individual Water Sales Contracts will describe the service area of each Wholesale Customer, identify the location and size of connections between the Regional Water System and the Wholesale Customer's distribution system, provide for periodic rendering and payment of bills for water usage, and in some instances contain additional specialized provisions unique to the particular Wholesale Customer and not of general concern or applicability. A sample Individual Water Sales Contract is provided at Attachment F. The Individual Water Sales Contracts between San Francisco and the Wholesale Customers will not contain any provision inconsistent with Articles 1 through 8 of this Agreement except (1) as provided below in this Article or (2) to the extent that such provisions are not in derogation of the Fundamental Rights of other Wholesale Customers under this Agreement. Any provisions in an Individual Water Sales Contract which are in violation of this section shall be void.

9.02 <u>California Water Service Company</u>

A. The parties recognize that the California Water Service Company is an investor-owned utility company and, as such, has no claim to co-grantee status under the Act, which specifically bars private parties from receiving for resale any water produced by the Hetch Hetchy portion of the Regional Water System. Accordingly, the following provisions shall apply to the California Water Service Company, notwithstanding anything to the contrary elsewhere in this Agreement.

B. The total quantity of water delivered by San Francisco to the California Water Service Company shall not in any calendar year exceed 47,400 acre feet, which is the estimated average annual production of Local System Water. If San Francisco develops additional Local System Water after the Effective Date, it may (1) increase the maximum delivery amount stated herein; and (2) increase the Supply Assurance, but not necessarily both. San Francisco has no obligation to deliver water to California Water Service Company in excess of the maximum stated herein, except as such maximum may be increased by San Francisco pursuant to this subsection. The maximum annual quantity of Local System Water set forth in this subsection is intended to be a limitation on the total quantity of water that may be allocated to California Water Service Company, and is not an Individual Supply Guarantee for purposes of Section 3.02. The maximum quantity of Local System Water set forth in this subsection is subject to reduction in response to (1) changes in long-term hydrology or (2) environmental water requirements that may be imposed by or negotiated with state and federal resource agencies in order to comply with state or federal law or to secure applicable permits for construction of Regional Water System facilities. San Francisco shall notify California Water Service Company of any anticipated reduction of the quantity of Local System Water set forth in this subsection, along with an explanation of the basis for the reduction.

C. Notwithstanding anything in Section 8.08 to the contrary, California Water Service Company shall have the right to assign to a public agency having the power of eminent domain all or a portion of the rights of California Water Service Company under any contract between it and San Francisco applicable to any individual district of California Water Service Company in connection with the acquisition by such public agency of all or a portion of the water system of California Water Service Company in such district. In the event of any such assignment of all the rights, privileges and obligations of California Water Service Company under such contract, California Water Service Company shall be relieved of all further obligations under such contract provided that the assignee public agency expressly assumes the obligations of California Water Service Company thereunder. In the event of such an assignment of a portion of the rights, privileges and obligations of California Water Service Company under such contract, California Water Service Company shall be relieved of such portion of such obligations so assigned thereunder provided that the assignee public agency shall expressly assume such obligations so assigned to it.

D. Should California Water Service Company seek to take over or otherwise acquire, in whole or in part, the service obligations of another Wholesale Customer under Section 3.03.E, it will so inform San Francisco at least six months prior to the effective date of the sale and provide information concerning the total additional demand proposed to be served, in order that San Francisco may compare the proposed additional demand to the then-current estimate of Local System Water. In this regard, California Water Service Company has notified the SFPUC that it has reached an agreement to acquire the assets of Skyline County Water District ("Skyline") and assume the responsibility for providing water service to customers in the Skyline service area. California Water Service Company has advised the SFPUC that, on September 18, 2008, the California Public Utilities Commission approved California Water Service Company's acquisition of Skyline. The SFPUC anticipates approving the transfer of Skyline's Supply Guarantee as shown on Attachment C to California Water Service Company and the expansion of California Water Service Company's service area to include the current Skyline service area before the Effective Date of this Agreement. All parties to this Agreement authorize corresponding modifications of Attachment C, as well as any of the Agreement's other provisions, to reflect the foregoing transaction without the necessity of amending this Agreement.

E. Nothing in this Agreement shall preclude San Francisco from selling water to any county, city, town, district, political subdivision, or other public agency for resale to customers within the service area of the California Water Service Company. Nothing in this Agreement shall require or contemplate any delivery of water to California Water Service Company in violation of the Act.

F. Nothing in this Agreement shall alter, amend or modify the Findings of Fact and Conclusions of Law and the Judgment dated May 25, 1961, in that certain action entitled *City and County of San Francisco v. California Water Service Company* in the Superior Court of the State of California in and for the County of Marin, No. 23286, as modified by the Quitclaim Deed from California Water Service Company to San Francisco dated August 22, 1961. The rights and obligations of San Francisco and California Water Service Company under these documents shall continue as therein set forth.

9.03 <u>City of Hayward</u>

A. San Francisco and the City of Hayward ("Hayward") entered into a water supply contract on February 9, 1962 ("the 1962 contract") which provides, *inter alia*, that San Francisco will supply Hayward with all water supplemental to sources and supplies of water owned or controlled by Hayward as of that date, in sufficient quantity to supply the total water needs of the service area described on an exhibit to the 1962 contract "on a permanent basis." The service area map attached as Exhibit C to the 1962 contract was amended in 1974 to remove an area of land in the Hayward hills and in 2008 to make minor boundary adjustments identified in SFPUC Resolution No. 08-0035.

B. The intention of the parties is to continue the 1962 contract, as amended, in effect as the Individual Water Sales Contract between San Francisco and Hayward. Accordingly, it shall not be necessary for San Francisco and Hayward to enter into a new Individual Water Sales Contract pursuant to this Article and approval of this Agreement by Hayward shall constitute approval of both this Agreement and an Individual Water Sales Contract for purposes of Section 1.03. The 1962 contract, as amended, will continue to describe the service area of Hayward, while rates for water delivered to Hayward during the Term shall be governed by Article 5 hereof. The 1962 contract, as amended, will continue in force after the expiration of the Term.

9.04 Estero Municipal Improvement District

A. San Francisco and the Estero Municipal Improvement District ("Estero") entered into a water supply contract on August 24, 1961, the term of which continues until August 24, 2011 ("the 1961 Contract"). The 1961 Contract provides, *inter alia*, that San Francisco will supply Estero with all water supplemental to sources and supplies of water owned or controlled by Estero as of that date, in sufficient quantity to supply the total water needs of the service area described on an exhibit to the 1961 Contract.

B. The intention of the parties is to terminate the 1961 Contract and replace it with a new Individual Water Sales Contract which will become effective on July 1, 2009. The new Individual Water Sales Contract will describe the current service area of Estero. The Individual Supply Guarantee applicable to Estero shall be 5.9 MGD, rather than being determined as provided in the 1961 Contract.

9.05 Stanford University

A. The parties recognize that The Board of Trustees of The Leland Stanford Junior University ("Stanford") operates a non-profit university, and purchases water from San Francisco for redistribution to the academic and related facilities and activities of the university and to residents of Stanford, the majority of whom are either employed by or students of Stanford. Stanford agrees that all water furnished by San Francisco shall be used by Stanford only for domestic purposes and those directly connected with the academic and related facilities and activities of Stanford, and no water furnished by San Francisco shall be used in any area now or hereafter leased or otherwise used for industrial purposes or for commercial purposes other than those campus support facilities that provide direct services to Stanford faculty, students or staff such as the U.S. Post Office, the bookstore and Student Union.

Nothing in this Agreement shall preclude San Francisco from selling water to any county, city, town, political subdivision or other public agency for resale to Stanford or to customers within the service area of Stanford.

B. Notwithstanding anything in Section 8.08 to the contrary, Stanford shall have the right to assign to a public agency having the power of eminent domain all or a portion of the rights of Stanford under this Agreement or the Individual Water Sales Contract between it and San Francisco in connection with the acquisition by such public agency of all or a portion of Stanford's water system. In the event of any such assignment of all the rights, privileges, and obligations of Stanford under such contract, Stanford shall be relieved of all further obligations under such contract, provided that the assignee public agency expressly assumes Stanford's obligations thereunder. In the event of such an assignment of a portion of the rights, privileges, and obligations of Stanford under such contract, Stanford shall be relieved of such obligations so assigned thereunder, provided that the assignee public agency shall expressly assume such obligations so assigned to it.

Nothing in this Agreement shall require or contemplate any delivery of water to Stanford in violation of the Act.

9.06 <u>City of San Jose and City of Santa Clara</u>

A. <u>Continued Supply on Temporary, Interruptible Basis</u>. During the term of the 1984 Agreement, San Francisco provided water to the City of San Jose ("San Jose") and the City of Santa Clara ("Santa Clara") on a temporary, interruptible basis pursuant to SFPUC Resolution No. 85-0256. Subject to termination or reduction of supply as provided in Section 4.05 of this Agreement, San Francisco will continue to supply water to San Jose and Santa Clara on a temporary, interruptible basis pending a decision by the Commission, pursuant to Section 4.05.H, as to whether to make San Jose and Santa Clara permanent customers of the Regional Water System. San Francisco will furnish water to San Jose and Santa Clara at the same rates as those applicable to other Wholesale Customers pursuant to this Agreement. Water delivered to San Jose and Santa Clara after July 1, 2009 may be limited by the SFPUC's ability to meet the full needs of all its other Retail and Wholesale Customers. The service areas of San Jose and Santa Clara set forth in their Individual Water Sales Contracts may not be expanded using the procedure set forth in Section 3.03. The combined annual average water usage of San Jose and Santa Clara shall not exceed 9 MGD. The allocation of that total amount between San Jose and Santa Clara shall be as set forth in their Individual Water Sales Contracts.

B. **Reservation of Rights.** In signing this Agreement, neither San Jose nor Santa Clara waives any of its rights to contend, in the event that San Francisco (1) elects to terminate or interrupt water deliveries to either or both of the two cities prior to 2018 using the process set forth in Section 4.05, or (2) does not elect to take either city on as a permanent customer in 2018, that it is entitled to permanent customer status, pursuant to the Act or any other federal or state law. In signing this Agreement, San Francisco does not waive its right to deny any or all such contentions.

9.07 City of Brisbane, Guadalupe Valley Municipal Improvement District, Town of Hillsborough

A. The parties acknowledge that San Francisco has heretofore provided certain quantities of water to the City of Brisbane ("Brisbane"), Guadalupe Valley Municipal Improvement District ("Guadalupe") and the Town of Hillsborough ("Hillsborough") at specified rates or without charge pursuant to obligations arising out of agreements between the predecessors of San Francisco and these parties, which agreements are referred to in judicial orders, resolutions of the SFPUC and/or the 1960 contracts between San Francisco and Brisbane, Guadalupe and Hillsborough. The parties intend to continue those arrangements and accordingly agree as follows:

1. Nothing in this Agreement is intended to alter, amend or modify the terms of SFPUC Resolution No. 74-0653 or the indenture of July 18, 1908 between the Guadalupe Development Company and the Spring Valley Water Company.

2. Nothing in this Agreement is intended to alter, amend or modify the Findings of Fact and Conclusions of Law and Judgment dated May 25, 1961 in that certain action entitled *City and County of San Francisco v. Town of Hillsborough* in the Superior Court of the State of California in and for the County of Marin, No. 23282, as modified by the Satisfaction of Judgment filed October 23, 1961 and the Compromise and Release between Hillsborough and San Francisco dated August 22, 1961. The rights and obligations of Hillsborough under these documents shall continue as therein set forth.

3. Nothing in this Agreement is intended to affect or prejudice any claims, rights or remedies of Guadalupe or of Crocker Estate Company, a corporation, or of Crocker

Land Company, a corporation, or of San Francisco, or of their successors and assigns, respectively, with respect to or arising out of that certain deed dated May 22, 1884, from Charles Crocker to Spring Valley Water Works, a corporation, recorded on May 24, 1884, in Book 37 of Deeds at page 356, Records of San Mateo County, California, as amended by that certain Deed of Exchange of Easements in Real Property and Agreement for Trade in Connection Therewith, dated July 29, 1954, recorded on August 4, 1954, in Book 2628, at page 298, Official Records of said San Mateo County, or with respect to or arising out of that certain action involving the validity or enforceability of certain provisions of said deed entitled *City and County of San Francisco v. Crocker Estate Company*, in the Superior Court of the State of California in and for the County of Marin, No. 23281.

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IN WITNESS WHEREOF the parties have executed this Agreement by their duly authorized officers.

CITY AND COUNTY OF SAN FRANCISCO
Acting by and through its Public Utilities Commission

By:________________________________
Edward Harrington
General Manager

Date: __________________________, 2009

Approved by Commission Resolution No. 09-0069,
adopted April 28, 2009

____
Michael Housh
Secretary to Commission

Approved as to form:

DENNIS J. HERRERA
City Attorney

By:________________________________
Joshua D. Milstein
Deputy City Attorney

Attachment A - Definitions

“1984 Agreement” refers to the 1984 Settlement Agreement and Master Water Sales Contract between the City and County of San Francisco and certain Suburban Purchasers in San Mateo County, Santa Clara County and Alameda County, which expires on June 30, 2009.

“Act” refers to the Raker Act, 38 Stat. 242, the Act of Congress, enacted in 1913, that authorized the construction of the Hetch Hetchy system on federal lands.

“Adjusted Proportional Annual Use” means the respective percentages of annual water use, as adjusted to reflect deliveries of water by the Hetch Hetchy Enterprise to outside City Retail Customers. The adjustment is calculated each year as described in Section B of Attachment J and is shown on lines 18 and 19 of Table 1 of that Attachment.

“Agreement” refers to this Water Supply Agreement, by and among San Francisco and the Wholesale Customers who approve this Agreement in accordance with Section 1.03.

“BAWSCA” refers to the Bay Area Water Supply and Conservation Agency established pursuant to Division 31 of the California Water Code (Water Code §§81300-81461) or its successor and permitted assigns.

“CEQA” refers to the California Environmental Quality Act found at §§21000 et seq. of the Public Resources Code and the Guidelines for the California Environmental Quality Act found at §§15000 et seq. of Title 14 of the California Code of Regulations, as amended from time to time.

“Commission” means the governing board of the SFPUC, whose members, as of the date of this Agreement, are appointed by the Mayor of San Francisco and confirmed by the San Francisco Board of Supervisors.

“Compliance Audit” refers to the annual audit of the Wholesale Revenue Requirement by the Compliance Auditor required by Sections 7.03 through 7.05.

“Compliance Auditor” refers to the independent certified public accountant chosen by the San Francisco Controller to conduct each fiscal year’s audit of the SFPUC’s calculation of the Wholesale Revenue Requirement as provided in Section 7.03.B.

“Countywide Cost Allocation Plan” refers to the full costs of the Water and Hetch Hetchy Enterprises’ prorated share of San Francisco city government expenses that are not directly billed to city departments, as determined by the Controller of the City and County of San Francisco.

“Debt Service” means principal and interest paid during a fiscal year on Indebtedness incurred by the SFPUC for the 2006 Revenue Bonds, Series A, and subsequently issued Indebtedness (exclusive of 2006 Revenue Bonds Series B and C), the proceeds of which are used or are scheduled to be used for the acquisition or construction of New Regional Assets or to refund such Indebtedness.

“Direct Retail” refers to Regional Water System capital or operating expenditures that are incurred to provide water service solely to Retail Customers.

“Direct Wholesale” refers to Regional Water System capital or operating expenditures that are incurred to provide water service solely to one or more Wholesale Customers.

“Drought” means a water shortage caused by lack of precipitation, as reflected in resolutions of the Commission calling for voluntary or mandatory water rationing based on evaluation of water stored or otherwise available to the Regional Water System, whether or not the Commission declares a water shortage emergency pursuant to Water Code §§ 350 et seq., as amended from time to time.

“Effective Date” refers to the date this Agreement will become effective in accordance with the terms of Section 1.03.

“Emergency” means a sudden, non-drought event, such as an earthquake, failure of Regional Water System infrastructure or other catastrophic event or natural disaster that results in an insufficient supply of water available to the Retail or Wholesale Service Areas for basic human consumption, firefighting, sanitation, and fire protection.

“Encumbrance” or **“Encumber”** refers to the process by which the City Controller certifies the availability of amounts previously appropriated by the Commission for specifically identified SFPUC capital projects performed either by third parties or through work orders to other City departments.

“Environmental Enhancement Surcharge” means the surcharge to be imposed by the SFPUC on individual parties to this Agreement whose use exceeds their Interim Supply Allocation when the collective use of water by all parties to this Agreement is in excess of the Interim Supply Limitation.

“ERRP” refers to a SFPUC document entitled *Emergency Response and Recovery Plan: Regional Water System* (“ERRP”) dated August 23, 2003, and updated November 2006.

“Excess Use Charges” are monthly charges set by the SFPUC, in the form of multipliers, that are applied to the Wholesale Customer water rates during times of mandatory rationing if a Wholesale Customer's water usage is greater than its shortage allocation. Excess Use Charges are further described in Section 4 of the Tier 1 Shortage Plan (Attachment H).

“Existing Assets” refers to Regional and Hetch Hetchy Water-Only and Water-Related capital assets plant in service as of June 30, 2009.

“Force Majeure Event” means an event not the fault of, and beyond the reasonable control of, the party claiming excuse which makes it impossible or extremely impracticable for such party to perform obligations imposed on it by this Agreement, by virtue of its effect on physical facilities and their operation or employees essential to such performance. Force Majeure Events include (a) an “act of God” such as an earthquake, flood, earth movement, or similar catastrophic event, (b) an act of the public enemy, terrorism, sabotage, civil disturbance or similar event, (c) a strike, work stoppage, picketing or similar concerted labor action, (d) delays in construction caused by unanticipated negligence or breach of contract by a third party or inability to obtain essential materials after diligent and timely efforts; or (e) an order or regulation issued by a federal or state regulatory agency after the Effective Date or a judgment or order entered by a federal or state court after the Effective Date.

“Fundamental Rights” of Wholesale Customers are their status as parties to this Agreement, their allocation of water recognized in Section 3.02, their protection against arbitrary, unreasonable, or unjustly discriminatory rates provided in Section 6.04, and any specific rights described in Article 9.

“Hetch Hetchy Enterprise” refers to Hetch Hetchy Water and Power Enterprise, a SFPUC operating department.

“Include” and its variants mean “including but not limited to” whenever used in this Agreement, regardless of whether or not it is capitalized.

“Indebtedness” includes revenue bonds, bond anticipation notes, certificates of participation (excluding certificates of participation towards which SFPUC contributes debt service as an operating expense), and commercial paper.

“Individual Water Sales Contract” refers to the contracts between each Wholesale Customer and San Francisco contemplated in Section 9.01 that details customer-specific matters such as location of service connections, service area maps and other matters specific to that customer.

“Individual Supply Guarantee” refers to each Wholesale Customer’s share of the Supply Assurance, as shown in Attachment C.

“Interim Supply Allocation” refers to each Wholesale Customer’s share, to be established by the SFPUC pursuant to Section 4.02, of the Interim Supply Limitation.

“Interim Supply Limitation” refers to the 265 MGD annual average limitation on water deliveries until December 31, 2018 from Regional Water System watersheds imposed by the SFPUC in its approval of the WSIP in Resolution Number 08-0200 dated October 30, 2008.

“Joint,” when used in connection with Hetch Hetchy Enterprise assets or expenses, refers to assets used or expenses incurred in providing both water supply (“Water-Related”) and in the generation and transmission of electrical energy (“Power-Related”).

“Local System Water” refers to Regional Water System water supplies developed in San Mateo, Alameda and Santa Clara Counties or otherwise not produced by the Hetch Hetchy Enterprise under rights of way granted by the Raker Act.

“MGD” refers to an average flow rate of one million gallons per day over a specific time period, often a year. For example, one MGD is equal to 365 million gallons per year or 1,120 acre feet per year.

“Net Annual Debt Service” refers to debt service less payments made from proceeds of Indebtedness (e.g., capitalized interest), earnings on bond proceeds (e.g., reserve fund earnings) used to pay Debt Service, and interest paid from renewed commercial paper, or from reserve fund liquidation.

"New Assets" refers to Regional and Hetch Hetchy Water-Only and Water-Related capital assets added to Regional Water System plant in service after June 30, 2009.

"New Regional Assets" refers to New Assets placed in service on or after July 1, 2009 that are used and useful in delivering water to Wholesale Customers. The following four categories comprise New Regional Assets:

1. Water Enterprise Regional Assets
2. Water Enterprise Direct Wholesale Assets
3. Hetch Hetchy Water Only Assets
4. Water-Related portion (45 percent) of Hetch Hetchy Joint Assets

"Power-Only," when used with reference to Hetch Hetchy Enterprise capital costs and operating and maintenance expenses, means capital costs and expenses that are incurred solely for the construction and operation of assets used to generate and transmit electrical energy.

"Power-Related" refers to the power related portion (55%) of Joint Hetch Hetchy Enterprise assets or expenses.

"Prepayment" refers to payments of principal and interest amounts not due in the year the prepayment is made, as described in Section 5.03.

"Proportional Annual Use" means the shares of deliveries from the Regional Water System used by City Retail Customers and by the Wholesale Customers in a fiscal year, expressed as a percentage. The percentages of annual use are calculated each year as described in Section B of Attachment J and are shown on lines 10 and 11 of Table 1 of that Attachment.

"Proportional Water Use" refers the general principle of allocating Regional Water System costs based on the relative purchases of water by Retail and Wholesale Customers.

"Regional," when used with reference to Water Enterprise capital assets and operating expenses, refers to assets and expenses that benefit Wholesale and Regional Customers.

"Regional Water System" means the water storage, transmission and treatment system operated by the SFPUC in Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo and San Francisco counties, including projects constructed under the WSIP, but excluding Direct Retail and Direct Wholesale assets.

“Retail Customers” means any customer that purchases water from San Francisco that is not a Wholesale Customer, whether located inside or outside of San Francisco.

“Retail Service Area” means the areas where SFPUC sells water to Retail Customers.

“Retail Water” means water sold by the SFPUC to its Retail Customers within and outside San Francisco.

“San Francisco” refers to the City and County of San Francisco.

“SFPUC” refers to the San Francisco Public Utilities Commission as an operating department of San Francisco, the General Manager of which reports to the Commission.

“SFPUC Bureaus” refers to the portions of the SFPUC that provide support services to the SFPUC Operating Departments. These presently consist of the General Manager’s Office, Business Services, and External Affairs.

“SFPUC Operating Departments” refers to the Water, Hetch Hetchy and Wastewater Program Enterprises under the control and management of the SFPUC pursuant to the San Francisco Charter.

“Substantially Expended”: A bond issue series is substantially expended when 98% of the proceeds and investment earnings contributed to the project fund have been expended.

“Supply Assurance” means the 184 MGD maximum annual average metered supply of water dedicated by San Francisco to public use in the Wholesale Service Area (not including San Jose and Santa Clara) in the 1984 Agreement and Section 3.01 of this Agreement.

“Term” means the 25-year term commencing July 1, 2009, including one or both 5-year extensions authorized by Section 2.02.A and B.

“Tier 1 Shortage Plan” refers to the Water Shortage Allocation Plan (Attachment H) adopted by the SFPUC and the Wholesale Customers in conjunction with this Agreement describing the method for allocating water between the SFPUC and the Wholesale Customers collectively for shortages of up to 20% of deliveries from the Regional Water System, as amended from time-to-time.

“Water Enterprise” refers to the San Francisco Water Department (SFWD), an SFPUC Operating Department.

“Water Management Charge” refers to the charge collected by San Francisco on behalf of BAWSCA for local water resource development in the Wholesale Service Area pursuant to Section 3.06 of this Agreement.

“Water-Only,” when used with reference to Hetch Hetchy Enterprise capital costs and operating and maintenance expenses, means capital costs and expenses that are incurred solely for the construction and operation of assets used to protect water quality or to provide for the delivery of water for consumptive purposes.

“Water-Related” refers to the water related portion (45%) of Joint Hetch Hetchy Enterprise assets or expenses.

“Water Supply Development Report” refers to the annual report prepared pursuant to Section 4.05, and submitted to the Commission for purposes of estimating whether Regional Water System demand will be within the Interim Supply Limitation by June 30, 2018.

“Wheeling Statute” refers to Article 4 of Chapter 11 of the California Water Code, as amended from time to time.

“Wholesale Capital Fund” is the account established by the SFPUC for deposit of Wholesale Customer revenue that is used to fund the wholesale share of revenue-funded New Regional Assets, as described in Section 6.08.

“Wholesale Customer” or “Customers” means one or more of the 27 water customers identified in Section 1.01 that are contracting for purchase of water from San Francisco pursuant to this Agreement.

“Wholesale Revenue Coverage” refers to the additional dollar amount included in wholesale rates each fiscal year that is charged to Wholesale Customers by the SFPUC for their proportionate share of Debt Service coverage under Section 6.06.A.

“Wholesale Revenue Coverage Reserve” refers to the account established by the SFPUC for deposit of Wholesale Revenue Coverage under Section 6.06.B.

"Wholesale Revenue Requirement" means the calculated Wholesale Customer portion of SFPUC Regional Water System capital and operating costs as determined in accordance with the provisions of Article 5 of this Agreement, formerly called the "Suburban Revenue Requirement" in the 1984 Agreement.

"Wholesale Service Area" means the combined service areas of the Wholesale Customers, as delineated on the service area maps attached to each Individual Water Sales Contract.

"WSIP" refers to the Water System Improvement Program approved by the Commission in Resolution No. 08-0200 on October 30, 2008, as amended from time to time.

ATTACHMENT B

WHOLESALE CUSTOMER REGIONAL WATER SYSTEM PURCHASES FY 2007-2008*

(To determine 75% approval process for Section 1.02)

WHOLESALE CUSTOMER	MGD
Alameda County Water District	12.90
California Water Service Company	37.72
City of Brisbane	0.23
City of Burlingame	4.50
City of Daly City	4.49
City of East Palo Alto	2.16
City of Hayward	19.33
City of Menlo Park	3.69
City of Millbrae	2.46
City of Milpitas	6.95
City of Mountain View	10.51
City of Palo Alto	12.72
City of Redwood City	11.01
City of San Bruno	1.86
City of San Jose	4.80
City of Santa Clara	3.49
City of Sunnyvale	10.52
Coastside County Water District	2.08
Estero Municipal Improvement District	5.51
Guadalupe Valley Municipal Improvement District	0.40
Mid-Peninsula Water District	3.25
North Coast County Water District	3.25
Purissima Hills Water District	2.31
Skyline County Water District	0.16
Stanford University	2.31
Town of Hillsborough	3.83
Westborough Water District	0.95
Total	173.39

*Source: SFPUC Commercial Division Records
Note: FY 2007-2008 was a Leap Year with 366 days.

ATTACHMENT C
INDIVIDUAL SUPPLY GUARANTEES

WHOLESALE CUSTOMER	(1) 100 Cubic Feet *	(2) MGD
Alameda County Water District	6,714,439	13.760
California Water Service Company**	17,320,807	35.499
City of Brisbane	224,435	0.460
City of Burlingame	2,553,753	5.234
City of Daly City	2,094,386	4.292
City of East Palo Alto	957,813	1.963
City of Menlo Park	2,174,231	4.456
City of Millbrae	1,538,120	3.152
City of Milpitas	4,504,533	9.232
City of Mountain View	6,567,648	13.460
City of Palo Alto	8,331,697	17.075
City of Redwood City	5,333,115	10.930
City of San Bruno	1,583,899	3.246
City of Sunnyvale	6,138,122	12.580
Coastside County Water District	1,061,453	2.175
Estero Municipal Improvement District	2,878,807	5.900
Guadalupe Valley Municipal Improvement District	254,436	0.521
Mid-Peninsula Water District	1,898,707	3.891
North Coast County Water District	1,872,928	3.838
Purissima Hills Water District	792,832	1.625
Skyline County Water District	88,537	0.181
Stanford University	1,479,764	3.033
Town of Hillsborough	1,995,644	4.090
Westborough Water District	644,172	1.320
Total:***	79,004,278	161.913

* 100 Cubic feet equals MGD divided by 0.00000204946. Figures in this column are calculated using unrounded MGD values and are more precise than the figures listed in column (2).

** Includes quantities from Los Trancos County Water District and Palomar Park Water District.

*** Total does not equal sum of MGD figures due to rounding. Total is not 184 MGD because table does not include the City of Hayward.

**** Cordilleras Mutual Water Association is not a party to this Agreement, but it has its own Supply Assurance of 3,007 hundred cubic feet (CCF).

ATTACHMENT D

PROCEDURE FOR PRO-RATA REDUCTION OF WHOLESALE CUSTOMERS' INDIVIDUAL SUPPLY GUARANTEES (SECTION 3.02).

The 23 wholesale customers listed on Attachment C have individual Supply Guarantees that total approximately 161.9 MGD.

If the amount of water purchased from SFPUC by Hayward exceeds 22.1 MGD for three consecutive fiscal years, the individual Supply Guarantees of each of those 23 wholesale customers will be reduced as described below.

STEP ONE:

Obtain the average annual excess purchases during the three fiscal year period. For example, assume Hayward uses 25.0 MGD, 24.2 MGD and 26.0 MGD in three consecutive years. The average annual excess use for that period is 2.9 MGD; calculated as follows:

$$\frac{[25.0\text{ MGD} + 24.2\text{ MGD} + 26.0\text{ MGD}]}{3} + 161.9\text{ MGD} = 186.9\text{ MGD}$$

$$186.9\text{ MGD} - 184.0\text{ MGD} = 2.9\text{ MGD}$$

STEP TWO:

Allocate the excess purchases among the 23 Wholesale Customers in proportion to each customer's Supply Guarantee as a percentage of the total Supply Guarantees (161.9 MGD as of FY 2009-10).

For example, assume that Wholesale Customer A's Supply Guarantee is 12.0 MGD. Wholesale Customer A's percentage share of the total individual supply guarantees is 0.074, calculated as follows:

$$\frac{12.0\text{ MGD}}{161.9\text{ MGD}} = 0.074$$

and its share of the excess use is 0.22 MGD, calculated as follows:

2.9 MGD x 0.074 = 0.22 MGD

STEP THREE:

Determine Wholesale Customer's adjusted Supply Guarantee by subtracting the result of Step Two from the Wholesale Customer's Supply Guarantee:

12 MGD - 0.22 MGD = 11.78 MGD

* * * * * * * * * *

Adjustments will be made at intervals comprised of distinct three-year periods of use by Hayward in excess of 22.1 MGD rather than overlapping periods. For example, assuming that the first adjustment were to occur in FY 2014-15 (based on use during FY 2011-12, FY 2012-13 and FY 2013-14), a second adjustment will not occur earlier than three full fiscal years thereafter (i.e., FY 2017-18, based on use by Hayward in FY 2014-15, FY 2015-16 and FY 2016-17). The figures used in the second and subsequent adjustments will reflect previous adjustments. For example, a second adjustment will use 158.9 MGD as the total of individual Supply Guarantees (161.6 MGD - 2.7 MGD = 158.9 MGD).

For purposes of simplicity, the volumetric units used in the foregoing example are MGD. For actual adjustment calculations, the unit employed will be hundreds of cubic feet ("ccf"), the unit by which the SFPUC measures water deliveries for billing purposes.

The procedure described and illustrated above is independent of and unrelated to the establishment by the SFPUC of Interim Supply Limitations described in Article 4.

ATTACHMENT E

MINIMUM ANNUAL PURCHASE QUANTITIES

(Section 3.07.C)

AGENCY	MINIMUM ANNUAL PURCHASE QUANTITY (IN MGD)
Alameda County Water District	7.648
City of Milpitas	5.341
City of Mountain View	8.930
City of Sunnyvale	8.930

<u>ATTACHMENT F</u>

WATER SALES CONTRACT

This Contract, dated as of ____________, 2009, is entered into by and between the City and County of San Francisco ("San Francisco") and

____

____ ("Customer").

<u>RECITALS</u>

San Francisco and the Customer have entered into a Water Supply Agreement ("WSA"), which sets forth the terms and conditions under which San Francisco will continue to furnish water for domestic and other municipal purposes to Customer and to other Wholesale Customers. The WSA contemplates that San Francisco and each individual Wholesale Customer will enter into an individual contract describing the location or locations at which water will be delivered to each customer by the San Francisco Public Utilities Commission ("SFPUC"), the customer's service area within which water so delivered is to be sold, and other provisions unique to the individual purchaser. This Water Sales Contract is the individual contract contemplated by the WSA.

<u>AGREEMENTS OF THE PARTIES</u>

1. <u>Incorporation of the WSA</u>

The terms and conditions of the WSA are incorporated into this Contract as if set forth in full herein.

2. <u>Term</u>

Unless explicitly provided to the contrary in Article 9 of the WSA, the term of this Contract shall be identical to that provided in Section ___ of the WSA.

3. Service Area

Water delivered by San Francisco to the Customer may be used or sold within the service area shown on the map designated Exhibit A attached hereto. Except as provided in Section ___ of the WSA, Customer shall not deliver or sell any water provided by San Francisco outside of this area without the prior written consent of the General Manager of the SFPUC.

4. Location and Description of Service Connections

Sale and delivery of water to Customer will be made through a connection or connections to the SFPUC Regional Water System at the location or locations shown on Exhibit A attached hereto and with the applicable present account number, description, connection size, and meter size shown on Exhibit B attached hereto.

5. Interties With Other Systems.

Customer maintains interties with neighboring water systems at the location or locations shown on Exhibit A attached hereto and with the connection size(s) as shown on Exhibit C attached hereto.

6. Billing and Payment

San Francisco shall compute the amounts of water delivered and bill Customer therefor on a monthly basis. The bill shall show the separate components of the charge (e.g., service, consumption, demand). Customer shall pay the amount due within thirty (30) days after receipt of the bill.

If Customer disputes the accuracy of any portion of the water bill it shall (a) notify the General Manager of the SFPUC in writing of the specific nature of the dispute and (b) pay the undisputed portion of the bill within thirty (30) days after receipt. Customer shall meet with the General Manager of the SFPUC or a delegate to discuss the disputed portion of the bill.

7., 8., 9... Other Specialized Provisions

[Certain Wholesale Customers will require additional provisions in their individual contracts addressed to issues such as minimum and/or maximum water delivery quantities, prior authorized wheeling arrangements, maximum expansion of the service area, etc. These and other provisions addressing issues unique to the particular Wholesale Customer may be added here, subject to the provisions of Section 9.01 of the WSA.]

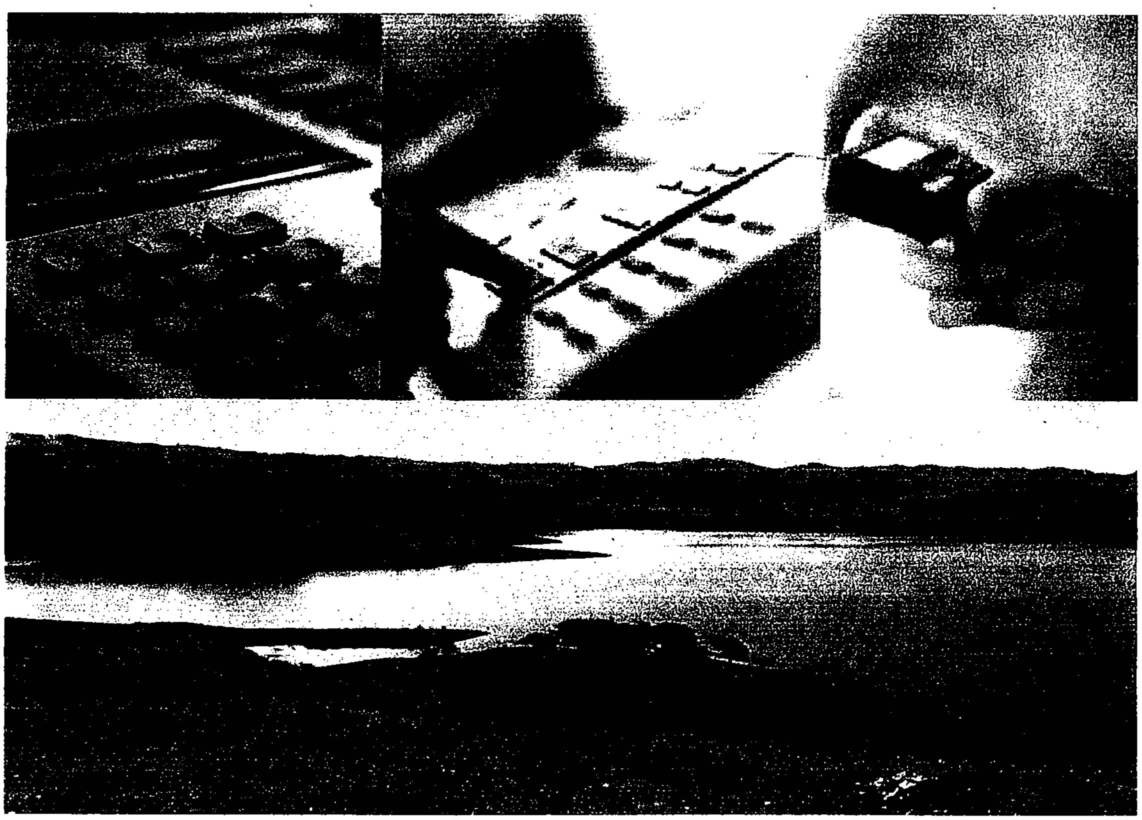
IN WITNESS WHEREOF, the parties hereto have executed this Contract, to become effective upon the effectiveness of the WSA, by their duly authorized representatives.

CITY AND COUNTY OF SAN FRANCISCO Acting by and through its Public Utilities Commission BY ______________________ Edward Harrington General Manager	Date: _____, 2009
NAME OF WHOLESALE CUSTOMER BY ______________________ Name: Title:	Date: _____, 2009

Note: This attachment is provided for the convenience of the prospective parties to the Water Supply Agreement and associated individual contracts. The format may be modified as desired by San Francisco and Wholesale Customer, subject to Section 9.01 of the WSA.

ATTACHMENT G

Water Quality
Notification and Communications Plan
Revision 4
January 2006



Updated by:
Water Quality Engineering
Olivia Chen Consultants, Inc.

ATTACHMENT H

WATER SHORTAGE ALLOCATION PLAN

This Interim Water Shortage Allocation Plan ("Plan") describes the method for allocating water between the San Francisco Public Utilities Commission ("SFPUC") and the Wholesale Customers collectively during shortages caused by drought. The Plan implements a method for allocating water among the individual Wholesale Customers which has been adopted by the Wholesale Customers. The Plan includes provisions for transfers, banking, and excess use charges. The Plan applies only when the SFPUC determines that a system-wide water shortage due to drought exists, and all references to "shortages" and "water shortages" are to be so understood. This Plan was adopted pursuant to Section 7.03(a) of the 1984 Settlement Agreement and Master Water Sales Contract and has been updated to correspond to the terminology used in the June 2009 Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County ("Agreement").

SECTION 1. SHORTAGE CONDITIONS

1.1. Projected Available SFPUC Water Supply. The SFPUC shall make an annual determination as to whether or not a shortage condition exists. The determination of projected available water supply shall consider, among other things, stored water, projected runoff, water acquired by the SFPUC from non-SFPUC sources, inactive storage, reservoir losses, allowance for carryover storage, and water bank balances, if any, described in Section 3.

1.2 Projected SFPUC Purchases. The SFPUC will utilize purchase data, including volumes of water purchased by the Wholesale Customers and by Retail Customers (as those terms are used in the Agreement) in the year immediately prior to the drought, along with other available relevant information, as a basis for determining projected system-wide water purchases from the SFPUC for the upcoming year.

1.3. Shortage Conditions. The SFPUC will compare the available water supply (Section 1.1) with projected system-wide water purchases (Section 1.2). A shortage condition exists if the SFPUC determines that the projected available water supply is less than projected system-wide water purchases in the upcoming Supply Year (defined as the period from July 1 through June 30). When a shortage condition exists, SFPUC will determine whether voluntary or mandatory actions will be required to reduce purchases of SFPUC water to required levels.

1.3.1 Voluntary Response. If the SFPUC determines that voluntary actions will be sufficient to accomplish the necessary reduction in water use throughout its service area, the SFPUC and the Wholesale Customers will make good faith efforts to reduce their water purchases to stay within their annual shortage allocations and associated monthly water use budgets. The SFPUC will not impose excess use charges during periods of voluntary rationing, but may suspend the prospective accumulation of water bank credits, or impose a ceiling on further accumulation of bank credits, consistent with Section 3.2.1 of this Plan.

1.3.2 Mandatory Response. If the SFPUC determines that mandatory actions will be required to accomplish the necessary reduction in water use in the SFPUC service area, the SFPUC may implement excess use charges as set forth in Section 4 of this Plan.

1.4. Period of Shortage. A shortage period commences when the SFPUC determines that a water shortage exists, as set forth in a declaration of water shortage emergency issued by the SFPUC pursuant to California Water Code Sections 350 et seq. Termination of the water shortage emergency will be declared by resolution of the SFPUC.

SECTION 2. SHORTAGE ALLOCATIONS

2.1. Annual Allocations between the SFPUC and the Wholesale Customers. The annual water supply available during shortages will be allocated between the SFPUC and the collective Wholesale Customers as follows:

Level of System Wide Reduction in Water Use Required	Share of Available Water	
	SFPUC Share	Wholesale Customers Share
5% or less	35.5%	64.5%
6% through 10%	36.0%	64.0%
11% through 15%	37.0%	63.0%
16% through 20%	37.5%	62.5%

The water allocated to the SFPUC shall correspond to the total allocation for all Retail Customers.

2.2 Annual Allocations among the Wholesale Customers. The annual water supply allocated to the Wholesale Customers collectively during system wide shortages of 20 percent or less will be apportioned among them based on a methodology adopted by all of the Wholesale Customers, as described in Section 3.11(C) of the Agreement. In any year for which the methodology must be applied, the Bay Area Water Supply and Conservation Agency ("BAWSCA") will calculate each Wholesale Customer's individual percentage share of the amount of water allocated to the Wholesale Customers collectively pursuant to Section 2.1. Following the declaration or reconfirmation of a water shortage emergency by the SFPUC, BAWSCA will deliver to the SFPUC General Manager a list, signed by the President of BAWSCA's Board of Directors and its General Manager, showing each Wholesale Customer together with its percentage share and stating that the list has been prepared in accordance with the methodology adopted by the Wholesale Customers. The SFPUC shall allocate water to each Wholesale Customer, as specified in the list. The shortage allocations so established may be transferred as provided in Section 2.5 of this Plan. If BAWSCA or all Wholesale Customers do not provide the SFPUC with individual allocations, the SFPUC may make a final allocation decision after first meeting and discussing allocations with BAWSCA and the Wholesale Customers.

The methodology adopted by the Wholesale Customers utilizes the rolling average of each individual Wholesale Customer's purchases from the SFPUC during the three immediately preceding Supply Years. The SFPUC agrees to provide BAWSCA by November 1 of each year a list showing the amount of water purchased by each Wholesale Customer during the immediately preceding Supply Year. The list will be prepared using Customer Service Bureau report MGT440 (or comparable official record in use at the time), adjusted as required for any reporting errors or omissions, and will be transmitted by the SFPUC General Manager or his designee.

2.3. Limited Applicability of Plan to System Wide Shortages Greater Than Twenty Percent. The allocations of water between the SFPUC and the Wholesale Customers collectively, provided for in Section 2.1, apply only to shortages of 20 percent or less. The SFPUC and Wholesale Customers recognize the possibility of a drought occurring which could create system-wide shortages greater than 20 percent despite actions taken by the SFPUC aimed at reducing the probability and severity of water shortages in the SFPUC service area. If the SFPUC determines that a system wide water shortage greater than 20 percent exists, the SFPUC and the Wholesale Customers agree to meet within 10 days and discuss whether a change is required to the allocation set forth in Section 2.1 in order to mitigate undue hardships that might otherwise be experienced by individual Wholesale Customers or Retail Customers. Following these discussions, the Tier 1 water allocations set forth in Section 2.1 of this Plan, or a modified version thereof, may be adopted by mutual written consent of the SFPUC and the Wholesale Customers. If the SFPUC and Wholesale Customers meet and cannot agree on an appropriate Tier 1 allocation within 30 days of the SFPUC's determination of water shortage greater than 20 percent, then (1) the provisions of Section 3.11(C) of the Agreement will apply, unless (2) all of the Wholesale Customers direct in writing that a Tier 2 allocation methodology agreed to by them be used to apportion the water to be made available to the Wholesale Customers collectively, in lieu of the provisions of Section 3.11(C).

The provisions of this Plan relating to transfers (in Section 2.5), banking (in Section 3), and excess use charges (in Section 4) shall continue to apply during system-wide shortages greater than 20 percent.

2.4. Monthly Water Budgets. Within 10 days after adopting a declaration of water shortage emergency, the SFPUC will determine the amount of Tier 1 water allocated to the Wholesale Customers collectively pursuant to Section 2.1. The SFPUC General Manager, using the Tier 2 allocation percentages shown on the list delivered by BAWSCA pursuant to Section 2.2, will calculate each Wholesale Customer's individual annual allocation. The SFPUC General Manager, or his designee, will then provide each Wholesale Customer with a proposed schedule of monthly water budgets based on the pattern of monthly water purchases during the Supply Year immediately preceding the declaration of shortage (the "Default Schedule"). Each Wholesale Customer may, within two weeks of receiving its Default Schedule, provide the SFPUC with an alternative monthly water budget that reschedules its annual Tier 2 shortage allocation over the course of the succeeding Supply Year. If a Wholesale Customer does not deliver an alternative monthly water budget to the SFPUC within two weeks of its receipt of the Default Schedule, then its monthly budget for the ensuing Supply Year shall be the Default Schedule proposed by the SFPUC.

Monthly Wholesale Customer water budgets will be derived from annual Tier 2 allocations for purposes of accounting for excess use. Monthly Wholesale Customer water budgets shall be adjusted during the year to account for transfers of shortage allocation under Section 2.5 and transfers of banked water under Section 3.4.

2.5. Transfers of Shortage Allocations. Voluntary transfers of shortage allocations between the SFPUC and any Wholesale Customers, and between any Wholesale Customers, will be permitted using the same procedure as that for transfers of banked water set forth in Section 3.4. The SFPUC and BAWSCA shall be notified of each transfer. Transfers of shortage allocations shall be deemed to be an emergency transfer and shall become effective on the third business day after notice of the transfer has been delivered to the SFPUC. Transfers of shortage allocations shall be in compliance with Section 3.05 of the Agreement. The transferring parties will meet with the SFPUC, if requested, to discuss any effect the transfer may have on its operations.

SECTION 3. SHORTAGE WATER BANKING

3.1. Water Bank Accounts. The SFPUC shall create a water bank account for itself and each Wholesale Customer during shortages in conjunction with its resale customer billing process. Bank accounts will account for amounts of water that are either saved or used in excess of the shortage allocation for each agency; the accounts are not used for tracking billings and payments. When a shortage period is in effect (as defined in Section 1.4), the following provisions for bank credits, debits, and transfers shall be in force. A statement of bank balance for each Wholesale Customer will be included with the SFPUC's monthly water bills.

3.2. Bank Account Credits. Each month, monthly purchases will be compared to the monthly budget for that month. Any unused shortage allocation by an agency will be credited to that agency's water bank account. Credits will accumulate during the entire shortage period, subject to potential restrictions imposed pursuant to Section 3.2.1. Credits remaining at the end of the shortage period will be zeroed out; no financial or other credit shall be granted for banked water.

3.2.1. Maximum Balances. The SFPUC may suspend the prospective accumulation of credits in all accounts. Alternatively, the SFPUC may impose a ceiling on further accumulation of credits in water bank balances based on a uniform ratio of the bank balance to the annual water allocation. In making a decision to suspend the prospective accumulation of water bank credits, the SFPUC shall consider the available water supply as set forth in Section 1.1 of this Plan and other reasonable, relevant factors.

3.3. Account Debits. Each month, monthly purchases will be compared to the budget for that month. Purchases in excess of monthly budgets will be debited against an agency's water bank account. Bank debits remaining at the end of the fiscal year will be subject to excess use charges (see Section 4).

3.4. Transfers of Banked Water. In addition to the transfers of shortage allocations provided for in Section 2.5, voluntary transfers of banked water will also be permitted between the SFPUC and any Wholesale Customer, and among the Wholesale Customers. The volume of transferred water will be credited to the transferee's water bank account and debited against the transferor's water bank account. The transferring parties must notify the SFPUC and BAWSCA of each transfer in writing (so that adjustments can be made to bank accounts), and will meet with the SFPUC, if requested, to discuss any affect the transfer may have on SFPUC operations. Transfers of banked water shall be deemed to be an emergency transfer and shall become effective on the third business day after notice of the transfer has been delivered to the SFPUC.

If the SFPUC incurs extraordinary costs in implementing transfers, it will give written notice to the transferring parties within ten (10) business days after receipt of notice of the transfer. Extraordinary costs means additional costs directly attributable to accommodating transfers and which are not incurred in non-drought years nor simply as a result of the shortage condition itself. Extraordinary costs shall be calculated in accordance with the procedures in the Agreement and shall be subject to the disclosure and auditing requirements in the Agreement. In the case of transfers between Wholesale Customers, such extraordinary costs shall be considered to be expenses chargeable solely to individual Wholesale Customers and shall be borne equally by the parties to the transfer. In the case of transfers between the SFPUC and a Wholesale Customer, the SFPUC's share of any extraordinary transfer costs shall not be added to the Wholesale Revenue Requirement.

3.4.1. Transfer Limitations. The agency transferring banked water will be allowed to transfer no more than the accumulated balance in its bank. Transfers of estimated prospective banked credits and the "overdrafting" of accounts shall not be permitted. The price of transfer water originally derived from the SFPUC system is to be determined by the transferring parties and is not specified herein. Transfers of banked water shall be in compliance with Section 3.05 of the Agreement.

SECTION 4. WHOLESALE EXCESS USE CHARGES

4.1. Amount of Excess Use Charges. Monthly excess use charges shall be determined by the SFPUC at the time of the declared water shortage consistent with the calendar in Section 6 and in accordance with Section 6.03 of the Agreement. The excess use charges will be in the form of multipliers applied to the rate in effect at the time the excess use occurs. The same excess use charge multipliers shall apply to the Wholesale Customers and all Retail Customers. The excess use charge multipliers apply only to the charges for water delivered at the rate in effect at the time the excess use occurred.

4.2 Monitoring Suburban Water Use. During periods of voluntary rationing, water usage greater than a customer's allocation (as determined in Section 2) will be indicated on each SFPUC monthly water bill. During periods of mandatory rationing, monthly and cumulative water usage greater than a Wholesale Customer's shortage allocation and the associated excess use charges will be indicated on each SFPUC monthly water bill.

4.3. Suburban Excess Use Charge Payments. An annual reconciliation will be made of monthly excess use charges according to the calendar in Section 6. Annual excess use charges will be calculated by comparing total annual purchases for each Wholesale Customer with its annual shortage allocation (as adjusted for transfers of shortage allocations and banked water, if any). Excess use charge payments by those Wholesale Customers with net excess use will be paid according to the calendar in Section 6. The SFPUC may dedicate excess use charges paid by Wholesale Customers toward the purchase of water from the State Drought Water Bank or other willing sellers in order to provide additional water to the Wholesale Customers. Excess use charges paid by the Wholesale Customers constitute Wholesale Customer revenue and shall be included within the SFPUC's annual Wholesale Revenue Requirement calculation.

SECTION 5. GENERAL PROVISIONS GOVERNING WATER SHORTAGE ALLOCATION PLAN

5.1. Construction of Terms. This Plan is for the sole benefit of the parties and shall not be construed as granting rights to any person other than the parties or imposing obligations on a party to any person other than another party.

5.2. Governing Law. This Plan is made under and shall be governed by the laws of the State of California.

5.3. Effect on Agreement. This Plan describes the method for allocating water between the SFPUC and the collective Wholesale Customers during system-wide water shortages of 20 percent or less. This Plan also provides for the SFPUC to allocate water among the Wholesale Customers in accordance with directions provided by the Wholesale Customers through BAWSCA under Section 2.2, and to implement a program by which such allocations may be voluntarily transferred among the Wholesale Customers. The provisions of this Plan are intended to implement Section 3.11(C) of the Agreement and do not affect, change or modify any other section, term or condition of the Agreement.

5.4. Inapplicability of Plan to Allocation of SFPUC System Water During Non-Shortage Periods. The SFPUC's agreement in this Plan to a respective share of SFPUC system water during years of shortage shall not be construed to provide a basis for the allocation of water between the SFPUC and the Wholesale Customers when no water shortage emergency exists.

5.5. Termination. This Plan shall expire at the end of the Term of the Agreement.. The SFPUC and the Wholesale Customers can mutually agree to revise or terminate this Plan prior to that date due to changes in the water delivery capability of the SFPUC system, the acquisition of new water supplies, and other factors affecting the availability of water from the SFPUC system during times of shortage.

SECTION 6. ALLOCATION CALENDAR

6.1. Annual Schedule. The annual schedule for the shortage allocation process is shown below. This schedule may be changed by the SFPUC to facilitate implementation.

6.1.1

In All Years	Target Dates
1. SFPUC delivers list of annual purchases by each Wholesale Customer during the immediately preceding Supply Year	November 1
2. SFPUC meets with the Wholesale Customers and presents water supply forecast for the following Supply Year	February
3. SFPUC issues initial estimate of available water supply	February 1
4. SFPUC announces potential first year of drought (if applicable)	February 1
5. SFPUC and Wholesale Customers meet upon request to exchange information concerning water availability and projected system-wide purchases	February 1-May 31
6. SFPUC issues revised estimate of available water supply, and confirms continued potential shortage conditions, if applicable	March 1
7. SFPUC issues final estimate of available water supply	April 15th or sooner if adequate snow course measurement data is available to form a robust estimate on available water supply for the coming year.
8. SFPUC determines amount of water available to Wholesale Customers collectively	April 15th or sooner if adequate snow course measurement data is available to form a robust estimate on available water supply for the coming year.

In Drought Years	Target Dates
9. SFPUC formally declares the existence of water shortage emergency (or end of water shortage emergency, if applicable) under Water Code Sections 350 et. seq.	April 15-31
10. SFPUC declares the need for a voluntary or mandatory response	April 15-31
11. BAWSCA submits calculation to SFPUC of individual Wholesale Customers' percentage shares of water allocated to Wholesale Customers collectively	April 15- 31
12. SFPUC determines individual shortage allocations, based on BAWSCA's submittal of individual agency percentage shares to SFPUC, and monthly water budgets (Default Schedule)	April 25—May 10
13. Wholesale Customers submit alternative monthly water budgets (optional)	May 8-May 24
14. Final drought shortage allocations are issued for the Supply Year beginning July 1 through June 30	June 1
15. Monthly water budgets become effective	July 1
16. Excess use charges indicated on monthly Suburban bills	August 1 (of the beginning year) through June 30 (of the succeeding year)
17. Excess use charges paid by Wholesale Customers for prior year	August of the succeeding year

ATTACHMENT I

NOT USED

ATTACHMENT J

DEFINITIONS AND FORMULAS FOR CALCULATING PROPORTIONAL ANNUAL WATER USE

TABLE OF CONTENTS

This Attachment contains four sections, three figures, and five tables.

Table 1 presents the format for the water usage and allocation rate calculations for reference and to illustrate the definitions and formulas described in Sections A through C. Tables 2 and 3 list the meters whose locations are shown on Figures 1 and 3, respectively. Table

4 identifies the type of meter and associated metering equipment for the County-line Meters and Terminal Reservoirs. Table 5 identifies the meter calibration and maintenance frequency for the meters and equipment listed in Table 4.

SECTION A. WATER METERS

1. General

The Agreement provides that certain operating and maintenance expenses and the capital cost of certain categories of utility plant in service are to be allocated between San Francisco and the Wholesale Customers on the basis of proportionate annual usage of the Regional Water System. The purpose of this Attachment is to describe the meters and illustrate the method by which proportionate annual usage will be calculated.

2. Units of Measurement, Rounding, Conversion

The SFPUC will compile the usage data required to complete Table 1 annually. The units of measurement and conventions for converting and rounding will be as follows.

The data in the Table 1 will be presented, and the calculations contemplated by this Attachment shown, in units of millions of gallons per day (mgd), rounded to the nearest tenth of an mgd. Percentages (e.g., the City and Wholesale usage rates) shall be carried to two digits to the right of the decimal point and reduction factors shall be carried to four digits to the right of the decimal point. Data compiled by the SFPUC in units of hundreds of cubic feet per year (ccf) shall be converted to mgd by multiplying hundreds of cubic feet per year by 0.0000020493 (or 2.0493×10^{-6}) for non-leap years and 0.0000020437 (or 2.0437×10^{-6}) for leap years.

In rounding, if the rightmost digit dropped is 0 through 4, the preceding digit shall be left unchanged; if the rightmost digit dropped is 5 through 9, the preceding digit shall be increased by 1.

3. Location of Meters/Gauges

The SFPUC presently maintains meters and gauges that have been used to determine the proportionate usage of the Regional Water System, in accordance with the methods and calculations described in Exhibit J to the 1984 contract between San Francisco and the Wholesale Customers. These meters consist of "County-Line Meters," "In-City Terminal Reservoir Meters" and "System Input and In-line Meters" as described in the following subsections. As new capital improvement projects are designed and constructed by the SFPUC, it may be necessary for new meters to be installed to ensure continued accurate determinations of the proportionate usage of the Regional Water System. "Planned meters" are included in the following subsections where planned capital improvement projects are likely to require the installation of additional meters.

a. County-line Meters

The SFPUC presently maintains meters at or near the San Mateo-San Francisco County line to measure flow through all transmission pipelines entering the City ("County-line Meters"). The existing and planned County-line Meters are listed in Table 2 and shown on Figures 1 and 2. Additional details pertaining to the County-line meters located at the Lake Merced Pump Station, and specifically to water deliveries from the pump station to Sunset Reservoir, Sutro Reservoir, and Lake Merced are provided below.

(1) County-Line deliveries to Sunset and Sutro Reservoirs

Water delivered to the City through the Sunset Supply Pipeline may be pumped from the Lake Merced Pump Station to either Sunset Reservoir or Sutro Reservoir located within the City. When water is pumped from the Lake Merced Pump Station to both Sunset and Sutro reservoirs simultaneously, the recording instrumentation on the Sunset and Sutro venturi meters are designed to record flows through both meters. When water is pumped to Sutro Reservoir only (typically utilizing Pump No. 4 at the

Lake Merced Pump Station), the source water is from the Sunset Reservoir (not the County-line), and the direction of flow through the Sunset venturi meter is reversed. Under this pumping scenario, the recording instrumentation on the Sunset and Sutro venturi meters are designed to not record flow on their respective recorders such that the in-City transfer of water between Sunset and Sutro Reservoirs is not included as a County-line delivery to the City. Figure 2 provides a generalized schematic of the Lake Merced Pump Station and the typical direction of flow from the County-line, through the pump station.

(2) County-line deliveries to Lake Merced

In order to raise and maintain water levels in Lake Merced, the SFPUC occasionally delivers water directly from the Regional Water System to Lake Merced. Deliveries from the Regional Water System to Lake Merced are accomplished at the Lake Merced Pump Station. The procedure involves operating valves on the suction side of Sunset Pump No. 2 such that water may flow by gravity in the Sunset Supply Pipeline, from San Mateo County, across the County-line and into San Francisco, through Lake Merced Pump Station and into the Lake Merced wet well. A 16-inch pipeline connection on the suction side of Sunset Pump No. 2 allows for deliveries of water to the wet well (see Figure 2). Water deliveries from the Regional Water System to Lake Merced are considered County-line deliveries and an in-City usage in the calculation of water allocation rates.

b. In-City Terminal Reservoirs

Water usage by the City includes water deliveries from the SFPUC's "terminal reservoirs." The terminal reservoirs are: 1) Sunset Reservoir, 2) University Mound Reservoir, and 3) Merced Manor Reservoir. The terminal reservoirs are shown on Figure 1.

c. System Input and In-Line Meters

The SFPUC presently measures water flow into and through the Regional System utilizing "System Input and In-Line Meters." The existing and planned System Input and In-Line Meters are listed in Table 3 and shown on Figure 3.

d. Wholesale Customer Meters and City Retail Customer Meters Located Outside the Boundaries of the City

The SFPUC presently measures water deliveries from the Regional Water System to its Wholesale Customers at various locations where the water delivery systems of the individual Wholesale Customers tie into the Regional Water System. The meters at these locations are referred to as the Wholesale Customers' "master meters." The SFPUC also measures water deliveries from the Regional Water System to other customers located outside of the boundaries of the City that are not Wholesale Customers. Water deliveries to the Wholesale Customers and Retail Customers outside the City's boundaries that receive water from the Regional Water System are accounted for by the SFPUC's Customer Service Division as described in Section B.

4. Replacement and Relocation of Meters, Gauges, and Recording Devices.

The SFPUC presently equips all of its large venturi meters with differential pressure transmitters. The smaller meters utilize other methods and equipment to register and record flows. The SFPUC will maintain the meters, gauges, and recording devices described above in subsections (a), (b), (c), and (d) unless and until such meters, gauges, and recording devices are replaced.

The SFPUC may replace the meters, gauges, and recording devices described above in subsections (a), (b), (c), and (d) or install new meters, gauges, and recording devices at new locations, provided that such changes do not diminish the accuracy of the water flow measurements or impair the ability of the SFPUC to separate direct City water use from water use by the wholesale customers. Maintenance and calibration procedures for new or replaced equipment may change. Modified maintenance and calibration procedures for new or replaced equipment will conform to industry standards set forth in AWWA Manual M33, the applicable standards in the International Society of Automation, and will implement the manufacturer's instructions for maintenance and calibration. The SFPUC will provide BAWSCA with advance written notice of any such changes, together with a brief explanation of the reasons therefor and a description of the type and location of the replacement. Such notice shall automatically amend the list of meters, gauges, and recording devices set forth above in subsections (a), (b), (c), and (d).

5. Recording of Water Flow Data

a. Flow Data

The City shall record and maintain data measuring base water flow throughout the SFPUC Regional Water System as necessary to determine proportional annual water usage.

b. Reservoir Data

The SFPUC shall record and maintain data measuring the levels of the terminal reservoirs described above in subsection A.3.b and shown on Figure 1 on an hourly basis. Flow values derived from reservoir level readings for all reservoirs in the SFPUC wholesale system shall be calculated using the tables contained in the SFPUC publication "Reservoir Data" (aka "The Weir Book"), which set forth the relationship between reservoir levels and water volumes, as such tables may be amended from time to time to reflect changes in the volumes of the various reservoirs. The tables to be used initially shall be those from the current edition of The Weir Book.

SECTION B. CALCULATION OF PROPORTIONAL ANNUAL USAGE

"Base rates" means the percentages of annual SFPUC deliveries attributed to the Wholesale Customers and to City Retail Customers.

The percentage of annual SFPUC metered deliveries attributed to the Wholesale Customers (i.e., the wholesale base rate) shall be calculated for each fiscal year as described below and illustrated in Table 1. The item numbers listed below correspond to the item numbers listed in Table 1.

(1) "Gross San Francisco County line base deliveries" shall equal the total amount of water flowing into the City's distribution system through transmission pipelines entering the City, as measured by the County-Line Meters described in Section A.3.a. and shown on Figures 1 and 2.

(2) "Daly City base deliveries" shall equal the water flowing to Daly City through meter accounts provided downstream of the County-Line meters or through SFPUC's City Distribution Division. At present these accounts are:

- (a) CSPL1/Macdonald Avenue Service (Account number 010084-01-0)
- (b) Guttenberg Street Service (Account number 010013-01-3)
- (c) Carter Street Service (Account numbers 284070-01-8 and 284071-01-6)

These accounts represent a portion of the total deliveries to Daly City. The quantities of water delivered to these four Daly City accounts are reported monthly in Form MGT441 by the SFPUC's Customer Service Division. These connections to meters are presently located within the City, and thus record water which has already been recorded by the SFPUC's master meters at the County line. So long as this condition continues, Daly City base deliveries shall be subtracted from "Gross San Francisco County line base deliveries."

(3) "Net San Francisco base deliveries" shall equal the result of subtracting "Daly City base deliveries" from "Gross San Francisco County line base deliveries."

(4) "Other suburban raw water base deliveries" shall equal the sum of all deliveries of raw (untreated) water to customers of the SFPUC located outside the City other than deliveries to the Wholesale Customers. "Other suburban raw water base deliveries" include deliveries of raw water in Alameda and San Mateo Counties to SFPUC Retail Customers, City departments and commissions, and other users affiliated with San Francisco.

(5) "Other suburban treated water base deliveries" shall equal the sum of all deliveries of treated water to customers of the SFPUC located outside the City other than deliveries to the Wholesale Customers. Other suburban treated water base deliveries include deliveries of treated water to the SFPUC's Retail Customers in San Mateo, Santa Clara and Alameda Counties (such as NASA Ames Research Center and LLNL), to City departments and commissions and other users affiliated with San Francisco (such as the San Francisco International Airport, the San Francisco County Jail, and tenants of land owned by the City Recreation and Park Department).

(6) "Other suburban base deliveries" shall equal the sum of "Other suburban raw water deliveries" and "Other suburban treated water deliveries." The combined amount of raw and treated water delivered to suburban entities other than the Wholesale Customers is reported monthly in Form MGT440 by the SFPUC's Customer Service Division.

(7) "Total City base usage" shall equal "Net San Francisco base deliveries" plus "Other suburban base deliveries."

(8) "Total wholesale base usage" shall equal the sum of all metered deliveries to the Wholesale Customers measured at their SFPUC master meters (including all deliveries to Daly City which are comprised of deliveries through meters located outside San Francisco and meters located inside San Francisco, deliveries through the latter of which are designated above in paragraph B.1.2 as "Daly City base

deliveries"). The quantity of water delivered to the individual Wholesale Customers, and the combined amount of water delivered to all Wholesale Customers is reported monthly in Form MGT440 by the SFPUC's Customer Service Division.

(9) "Total system base usage" shall equal "City base usage" plus "Wholesale base usage."

(10) "Wholesale base rate" shall equal the percentage obtained by dividing "Wholesale base usage" by "Total system base usage."

(11) "City base rate" shall equal the percentage obtained by subtracting "Wholesale base rate" from 100 percent.

(12) "Base system input" shall equal all amounts of water supplied to the SFPUC Regional Water System, which presently comes from the following sources:

(a) Hetch Hetchy water as measured at the venturi meters on the 58–inch, 61-inch, and 78.5-inch San Joaquin Pipeline Nos. 1, 2, and 3 near Oakdale.

(b) Water supplied by HHWPD to LLNL as measured at the customer meter. Water delivered from the system to LLNL shall be deemed negative in sign for the purpose of determining "Base system input."

(c) Hetch Hetchy water pumped from the Alameda siphons to San Antonio Reservoir as measured at the venturi meter on the 60-inch San Antonio pipeline. Water delivered from the system to San Antonio Reservoir shall be deemed negative in sign for the purpose of determining "Base system input."

(d) Sunol Valley Water Treatment Plant as measured at the meter on the 78-inch effluent pipeline.

(e) Harry Tracy Water Treatment Plant as measured at the venturi meters on the 60-inch and 78-inch effluent pipelines.

(f) Raw water deliveries to all SFPUC Retail Customers outside the City boundaries as measured at the customer meter. These deliveries are considered positive for the purposes of Table 1. Currently, raw water deliveries to the system are represented by the following account numbers contained in Form MGT440 prepared by the SFPUC's Customer Service Division:

266081-01-7 (Calaveras Nursery)
266081-02-5 (Calaveras Nursery)
264355-01-7 (Caltrans)
266084-02-9 (Color Spot Nursery)
272701-02-0 (Color Spot Nursery)
266069-02-0 (Crystal Springs Golf Course)
266078-02-1 (Dell Franklin)
266078-01-3 (Dells Nursery)
266084-01-1 (Hi-C Nursery)
272701-01-2 (Hi-C Nursery)
284112-01-8 (Hansen Aggregates)
266084-03-7 (Jeff Anhorn Nursery)
272701-03-8 (Jeff Anhorn Nursery)
266079-02-9 (Mission Valley Rock)
281043-01-8 (Mission Valley Rock)
267618-02-3 (Nagata Farms)
267618-01-5 (Nagata Farms)
266090-01-8 (Naka Nursery)

266091-01-6 (Naka Nursery)

266090-02-6 (Naka Nursery)

266091-02-4 (Naka Nursery)

264315-02-9 (Pacific Nurseries)

266076-01-7 (Sunol Christmas Tree Farm)

266076-02-5 (Sunol Tree Farm)

276095-01-5 (Sunol Valley Golf & Recreation)

266077-02-3 (Ura Farm)

264352-01-4 (Ura, John)

266075-01-9 (Valley Crest)

268276-01-1 (Valley Crest Nursery)

266093-01-2 (Valley Crest Tree Company)

268426-02-0 (Valley Crest Tree Company)

266075-02-7 (Valley Crest Tree Company)

266093-02-0 (Valley Crest Tree Company)

268276-02-9 (Valley Crest Tree Company)

266082-01-5 (Western Star Nursery)

266089-01-0 (Western Star Nursery)

267254-02-7 (Western Star Nursery)

266082-02-3 (Western Star)

266089-02-8 (Western Star)

267254-03-5 (Western Star)

(g) Raw water deliveries from Pilarcitos Reservoir and Crystal Springs Reservoir to Coastside County Water District as measured at the customer meters. These deliveries are considered positive for the purposes of Table 1. Currently, raw water deliveries to Coastside County Water District from both reservoirs are represented under account number 010027-01-9 contained in Form MGT441 prepared by the SFPUC's Customer Service Division:

(h) Crystal Springs Balancing Reservoir. The flow into or out of the Crystal Springs Balancing Reservoir shall be calculated based on the changes in the amounts of water stored in the reservoir. The amounts of water stored shall be determined by the use of water level sensors, and the application of water level readings to a water level-storage capacity table. Decreases in storage, which indicate a flow from the Balancing Reservoir into the system, shall be deemed positive in sign. Increases in storage, which indicate a flow into the Balancing Reservoir from the system, shall be deemed negative in sign. Over the period of a year, the total flows into and out of Crystal Springs Balancing Reservoir are nearly equivalent. As such, total system input from Crystal Springs Reservoir shall be deemed zero for calculating current base rates.

(i) Deliveries to Crystal Springs Reservoir as measured by the overflow weir at the Pulgas Pump Station. Deliveries from the system to Crystal Springs Reservoir ("spills") shall be deemed negative in sign for the purpose of determining "Base system input."

(j) Terminal Reservoirs. The "terminal reservoirs" consist of Sunset Reservoir, University Mound Reservoir, and Merced Manor Reservoir, each located within the City of San Francisco. The flow into or out of the terminal reservoirs shall be calculated based on the changes in the amounts of water stored in them. The amounts of water stored shall be determined by the use of water level sensors, and the application of water levels to water level-storage capacity tables. Over the period of a year, the total flows into and out of terminal reservoirs are nearly equivalent. As such, total system input from the terminal reservoirs shall be deemed zero for calculating base rates.

(k) Other Sources. Other sources of flow into, or from, the Regional Water System, shall be accounted for as "other sources." Examples of other sources of system input would include intertie water deliveries between the Regional System and the Santa Clara Valley Water District, and between the Regional System and the East Bay Municipal Utilities District, and deliveries of raw water from Crystal Springs Reservoir in the event of an emergency. Flows from the system shall be deemed negative in sign for the purpose of determining "Base system input."

(13) "Total base system input" shall equal the sum of the system inputs from the sources described in paragraph B.1.12.

(14) "Joint system loss reduction factor" shall equal "Total system base usage" divided by "Total base system input." "Joint system loss reduction factor" shall not exceed 1.0.

(15) "Daly City reduction factor" shall equal "Net San Francisco base deliveries" divided by "Gross San Francisco County line base deliveries." "Daly City reduction factor" shall not exceed 1.0.

(16) "Total suburban base deliveries" shall equal "Other suburban base deliveries" plus "Total wholesale base usage."

(17) "Suburban reduction factor" shall equal "Wholesale base usage" divided by "Total suburban base deliveries." "Suburban reduction factor" shall not exceed 1.0.

(18) "HHWPD Deliveries above Oakdale" shall equal the total amount of water delivered by the HHWPD to users located above the system input meters in Oakdale. Water users located above the system input meters in Oakdale are currently represented by Groveland Community Services District and the HHWPD facility at Moccasin.

(19) "HH Reduction Factor" is calculated for the purpose of determining the Wholesale Customers' share of the Hetch Hetchy Assessment. The factor shall equal a fraction, the numerator of which is the total system input measured at the Oakdale meters (Table 1, line 12.a) and the denominator of which is the sum of the total system input measured at the Oakdale meters (Table 1, line 12.a) plus the total "HHWPD deliveries above Oakdale" (Table 1, line 18).

SECTION C. DATA REQUIREMENTS AND SCHEDULE

1. Collection and Dissemination of Data

The SFPUC presently compiles daily flow data for the County-line meters, System Input and In-Line Meters, and daily reservoir water level data, and provides copies of that data to the Wholesale Customers (through BAWSCA) on a monthly basis. The SFPUC also provides copies of wholesale "Suburban Resale" and City Retail water usage data to BAWSCA on a monthly basis. Additionally, the SFPUC provides BAWSCA access to flow data for the meters as reported and recorded by the SFPUC's SCADA system.

The SFPUC shall continue to provide the flow and water usage data described above to BAWSCA on a monthly basis, and shall continue to allow BAWSCA access to the SCADA system data, so that a coordinated effort between the SFPUC and BAWSCA will allow for updating Table 1 of this Attachment annually on a timely basis.

It shall continue to be the SFPUC's responsibility to compile the data necessary to update Table 1 of this Attachment annually and the City shall deliver to BAWSCA, for review and approval, copies of the updated Table 1 by September 15 for the fiscal year ending the preceding June 30, as shown by the schedule contained in Section C.3.

Upon reasonable notice to the General Manager of the SFPUC, BAWSCA shall be given access to all water flow and usage records compiled by the SFPUC, including raw data, at reasonable times during business hours and shall have the right to copy such records and data at its expense.

2. Lack of Data

The parties recognize that, because of human error, mechanical failure, or other unplanned events, portions of the data required for the calculation of the usage rates and ratios described in Sections B and C of this Attachment occasionally may be unavailable or incorrect. In the event that such data are unavailable or inaccurate, the SFPUC shall make a reasonable estimate of the unavailable or incorrect data or use the most accurate alternative data that are available, and substitute the estimate therefor.

If the SFPUC uses an estimate of the unavailable or inaccurate data or alternative data, it shall provide BAWSCA with the following:

(1) a description of the unavailable or inaccurate data and the estimation or substitution of data used therefor;

(2) an explanation of the cause of the missing or inaccurate data and the reasons underlying the SFPUC's estimation or substitution of alternate data; and

(3) a statement of how the error or malfunction that caused the unavailability or inaccuracy of the data will be avoided in the future.

The SFPUC shall provide this information to BAWSCA upon calculation by the SFPUC of the usage rates and ratios described in this Attachment for the fiscal year in question.

3. Schedule for Completing the Annual Calculations of Water Usage Rates

The parties recognize the importance of updating Table 1 of this Attachment annually in a timely manner, and that historically, doing so has required a coordinated effort between the SFPUC and BAWSCA. To assure timely completion of the annual calculations of water usage rates and ratios, the parties agree to adhere to the following schedule.

(1) By August 15: The SFPUC shall forward to BAWSCA all data for the fiscal year ending the preceding June 30, necessary to make a determination of the base water usage and base allocation rates for the Wholesale Customers and the City.

(2) By September 15. The City shall deliver to BAWSCA, for review and approval, draft copies of the updated Table 1 for the fiscal year ending the preceding June 30.

(3) Between September 15 and October 15. The SFPUC and BAWSCA shall reconcile any discrepancies or inaccuracies in the draft calculations of water usage rates and shall reach agreement on a final updated Table 1 for the fiscal year ending the preceding June 30.

(4) By November 1. The SFPUC shall deliver to BAWSCA a finalized updated Table 1, signed by the SFPUC General Manager, or appropriate designee, representing the water usage rates agreed upon by the SFPUC and BAWSCA, for the fiscal year ended June 30.

(5) By November 15. BAWSCA shall return the finalized Table 1 to the SFPUC, counter-signed by the BAWSCA General Manager/CEO. If the SFPUC does not receive the countersigned Table 1 from BAWSCA by November 15, it may use the water use data as contained in the Table 1 delivered pursuant to paragraph (4) above, subject to arbitration as provided in section 8.01 of the Agreement.

SECTION D. COUNTY LINE AND IN-CITY TERMINAL RESERVOIR METER CALIBRATION AND MAINTENANCE

1. General

This section refers only to the County-Line and In-City Terminal Reservoir Meters. The term "meter(s)" includes the primary meter itself (most of the primary meters in the SFPUC's water system are Venturi-type flow meters) as well as any and all of the associated equipment used to measure, record, and transmit flow and water level data. The metering equipment associated with the primary metering device (also referred to as the secondary metering equipment) includes differential pressure transmitters, recorders, telecommunications equipment and the portion of the SFPUC's Supervisory Control and Data Acquisition (SCADA) System that is used to transmit flow and water level measurements from the water meter to the computer terminal that records the measured data.

The County-Line and In-City Terminal Reservoir meters, their general locations, and their associated metering equipment are listed in Table 4.

2. Frequency and Type of Work to be Performed

The meters, water level sensors, and associated metering equipment are to be inspected, tested, calibrated, and maintained according to the applicable meter calibration and maintenance frequency specified in Table 5.

3. Components of the Calibration and Maintenance Work

The SFPUC will contract with an independent metering consultant to perform periodic inspections, testing, servicing and calibrations of the meters and metering equipment for the County-line meters and In-City Terminal Reservoirs. The metering consultant's calibration and maintenance work will include the following components:

- Annual Pitot Tube Tests: Pitot tube flow tests shall be performed once a year on all Venturi-type flow meters. See Sections 4.b and 4.c for further detail.

- Quarterly Secondary Meter Equipment Testing and Calibration: The secondary metering equipment shall be tested for accuracy and calibrated quarterly at five input levels (0%, 25%, 50%, 75% and 100% of the full range of flow). See Section 4.a for further detail.

- Cleaning: Clean and remove dust, oils, dirt, etc. from all instruments.

- Flushing: Flush and clean Venturi tube differential pressure (D/P) sensing lines.

- Inspecting: Inspections for mechanical fatigue, leaky pipes and fittings, worn parts, and improper operation of electrical/electronic equipment.

- Lubrication: Mechanical parts shall be lubricated as needed.

4. Calibration Procedures

The metering consultant shall continue to calibrate and maintain the County-line meters and metering equipment listed in Table 4 in accordance with the frequency of work specified in Table 5. The work includes documenting meter readings and accuracy before and after calibration. Specific tasks to be completed by the metering consultant are as follows:

a) Quarterly testing and calibration. The secondary metering equipment shall be tested and calibrated quarterly using NIST Traceable test equipment, and a "dead weight tester."

The system loop error for the secondary metering equipment is determined by connecting its output to the differential pressure transmitter and adjusting the dead weight tester to 5 places over the full range of flow: 0%, 25%, 50%, 75% and 100%, while all instruments in the loop are connected. For water level transmitters, provide simulated test head equal to full range of the transmitter being calibrated, comparing the simulated test head to its 4-20 milliamp output signal to determine transmitter error and calibration requirements. The system loop error for the secondary metering equipment may not exceed +/-2%. The individual components of the secondary metering equipment shall also be tested at the same 5 input levels and calibrated as necessary to ensure the error of the system and individual components does not exceed +/- 2%.

b) Annual Pitot Tube Testing and Calibration. Annual Pitot tube testing shall be conducted for a comparison of flow totalized by the Pitot tube test equipment and the totalizer used by the SFPUC for water measurement and billing purposes. Annual Pitot tube flow testing shall be performed on all flow meters for assessment of Venturi error using the Annubar continuous flow method at 22% of the pipe radius. Pitot tube flow testing must be conducted continuously for a minimum of 30 minutes per test.

The Pitot tube flow tests are first performed before any of the secondary metering instruments are calibrated to determine the total system error (system consisting of the primary metering device and secondary metering equipment). Once the total system loop error has been established, perform secondary loop instrument testing and calibration as per the quarterly testing and calibration procedures described in 4.a above. If the total system error exceeds +/- 2% after calibration of the secondary metering equipment, minor adjustments to the differential pressure transmitter shall be made to correct (calibrate) the error in the Venturi meter. Repeat Pitot tube testing must be performed after the individual instrument calibration and differential pressure transmitter adjustments have been performed to establish that total system loop error is within +/- 2%.

c) Pitot tube testing shall be conducted at a flow rate representing the typical flow for the meter (and, if operationally possible, at three different flows ranging from a minimum to near maximum capacity flow).

d) The metering consultant shall perform the meter testing and calibration procedures utilizing the meter characteristic curves (for example, the pressure drop vs. flow for a Venturi meter) that have been obtained during previous meter calibration and maintenance work.

e) During each quarterly site visit, the metering consultant shall inspect, assess and document the condition of all metering equipment, including meter, gauges, indicators, recorders, transmitters and other instrumentation, used in the measurement and recording of flow rates and cumulative flow totals and shall document all operational problems with the calibration instruments and meters during the calibration process. Problems may include air entrainment, leakage, flow disturbance and unstable meter readings.

f) Prior to each quarterly site visit, the metering consultant shall review prior calibration records and reports for each meter to determine if previously-identified errors or equipment deficiencies were corrected as previously recommended.

g) Each quarter, the metering consultant shall submit a final report (See Section 6) containing all of the calibration results for each meter tested and calibrated during the quarter. The metering consultant's report shall include a narrative description of the work conducted on each meter and meter calibration reports for the individual metering equipment. The quarterly report shall also address deficiencies that were not previously corrected according to the recommendations made in the prior report.

5. Calibration Instruments

The instrument used for flow testing of the primary meter (Venturi) must meet the accuracy standards required by the American Water Works Association (AWWA), and be capable of measuring actual flows with an error of less than +/- 2%. If a particular calibration instrument is not rated for accuracy by the AWWA, its accuracy will be determined by reference to its manufacturer's representations as to accuracy.

6. Calibration Reports

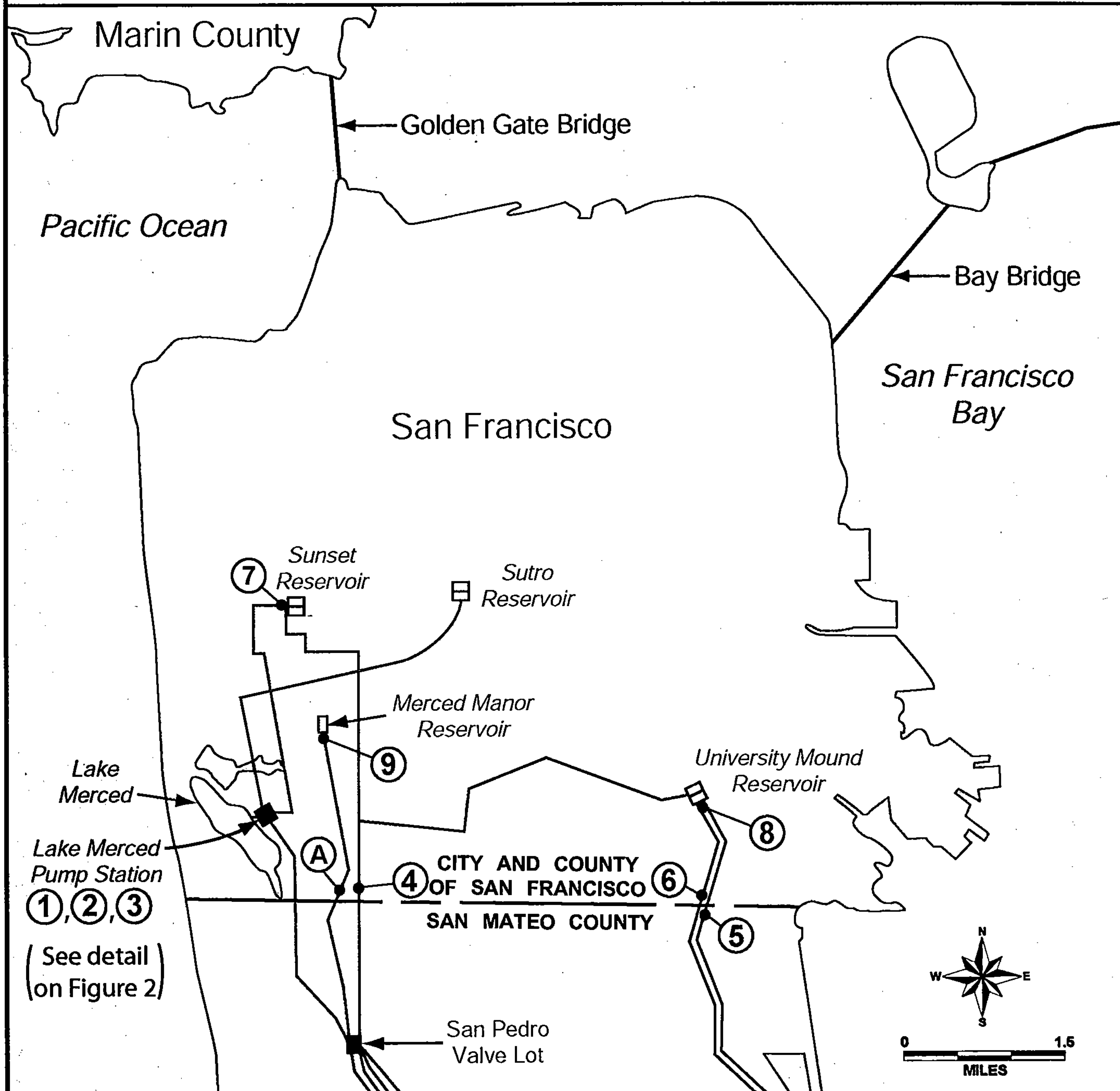
Within fourteen (14) working days after the beginning of each quarter, the metering consultant shall submit a written progress report of the work performed during the previous quarter. Each quarterly report will describe the results of the meter calibrations and any other tasks performed. The report will also include comments regarding any observations of abnormal conditions and any recommendations regarding these meters and their related equipment.

The reports must include complete descriptions and status of meters and related equipment, dates and times of service, all calibration specifics, pipeline dimensions, range of flow rates and totalized volumes, before and after error analysis and accuracy levels achieved, testing equipment used, and the name(s) of the person(s) that performed the work.

When appropriate and necessary, the metering consultant shall provide recommendations for improving the accuracy and reliability of the equipment and/or the methods of data collection. If, in the opinion of the metering consultant, the condition of a meter or its associated metering equipment is found to be defective, damaged, or otherwise in need of immediate repair or replacement, the metering consultant shall: 1) promptly notify the appropriate SFPUC personnel of the problem and recommend a solution to the problem so that the SFPUC can determine how to address it and, 2) include the problem description in its quarterly report.

FIGURE 1

Locations of SFPUC County-Line Meters and In-City Terminal Reservoirs



METER	PIPELINE	LOCATION
1	Sunset	Lake Merced Pump Station
2	Sutro	Lake Merced Pump Station
3	Lake Merced Outfall	Lake Merced Pump Station
4	San Andreas No. 2	Junipero Serra (Hwy. 280) South of Belle Ave.
5	Crystal Springs No. 1	PG&E Martin Service Center Yard
6	Crystal Springs No. 2	Tamasco Ct. South of Sunnydale Ave.
A	San Andreas No. 3 (Planned)	To be determined

METER	RESERVOIR	LOCATION
7	Sunset Reservoir	26th Avenue and Ortega
8	University Mound Reservoir	University Avenue and Bacon
9	Merced Manor Reservoir	23rd Avenue and Ocean

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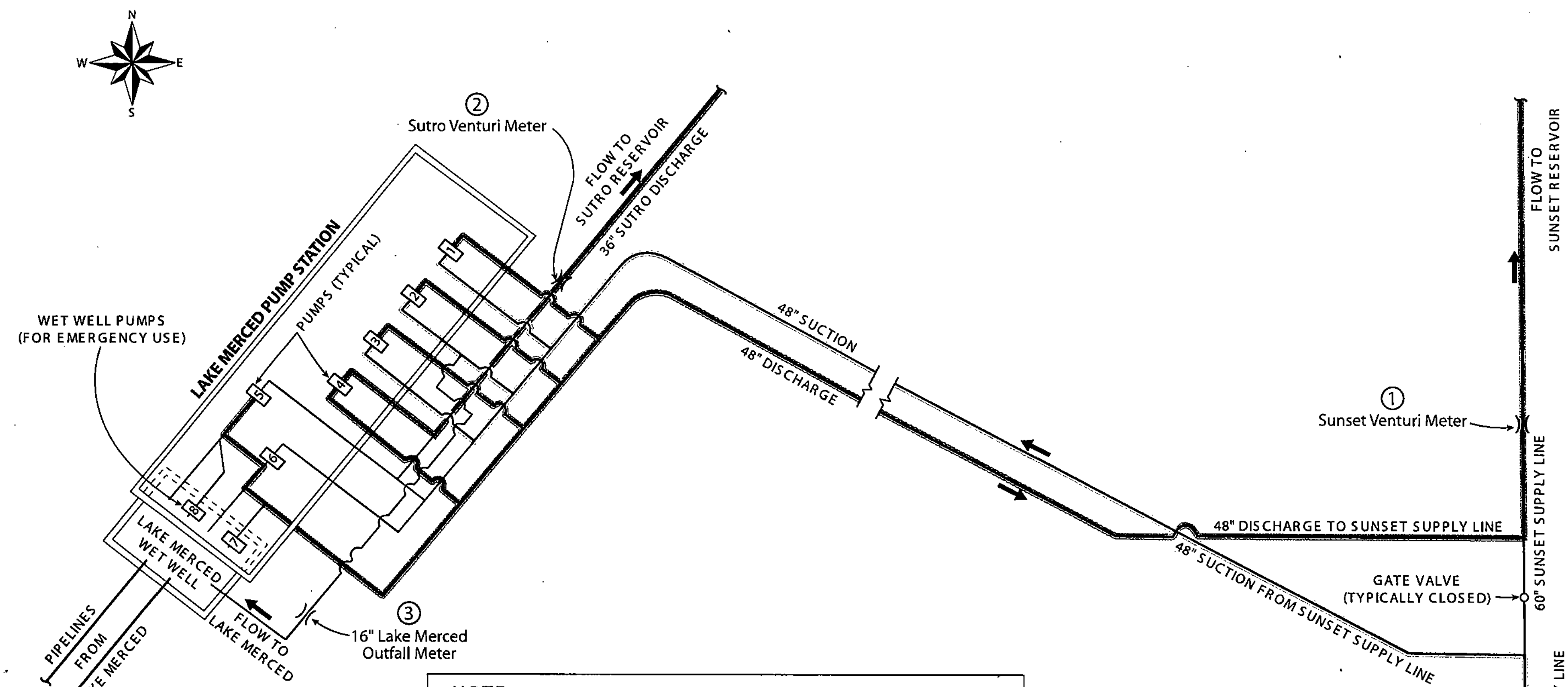
JobFolder/2175/Figure 2(122308)draft.ai

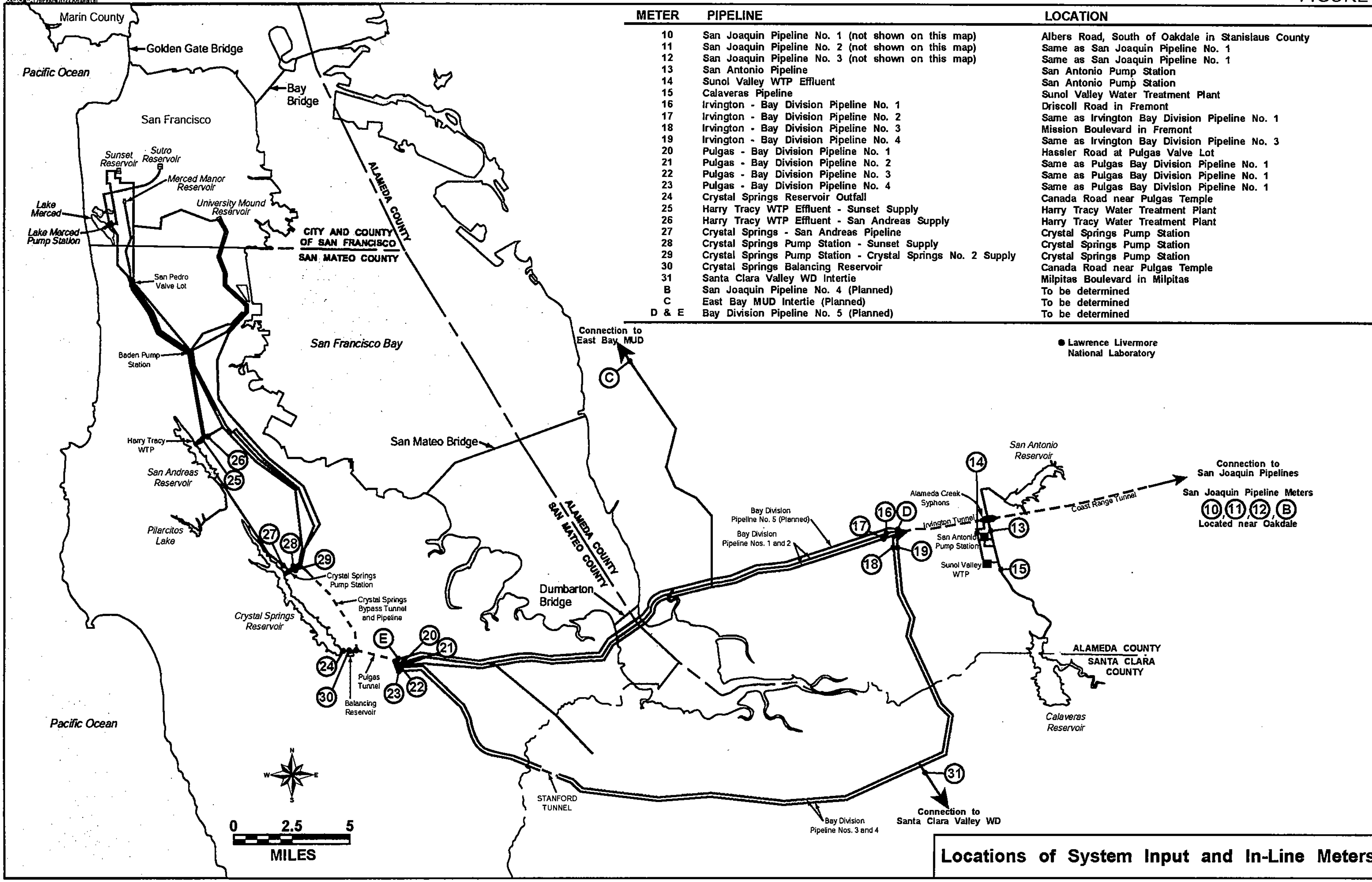


NOTE:
Water enters Lake Merced Pump Station from the Sunset supply line (pipeline highlighted in yellow) and is discharged from the Sunset Pumps (numbered 1, 2, and 3) to Sunset Reservoir located in San Francisco, or to the suction side of the Sutro Pumps (numbered 4, 5, and 6). Sutro Pump Nos. 5 and 6 are typically on standby. Sutro Pump No. 4 delivers water from the pump station to Sutro Reservoir located in San Francisco. Deliveries from the SFPUC water system to Lake Merced are accomplished by gravity through the 16-inch pipeline that connects to the suction side of Sunset Pump No. 2.

Generalized Schematic of Lake Merced Pump Station

FIGURE 2

FIGURE 3



METER	PIPELINE	LOCATION
10	San Joaquin Pipeline No. 1 (not shown on this map)	Albers Road, South of Oakdale in Stanislaus County
11	San Joaquin Pipeline No. 2 (not shown on this map)	Same as San Joaquin Pipeline No. 1
12	San Joaquin Pipeline No. 3 (not shown on this map)	Same as San Joaquin Pipeline No. 1
13	San Antonio Pipeline	San Antonio Pump Station
14	Sunol Valley WTP Effluent	San Antonio Pump Station
15	Calaveras Pipeline	Sunol Valley Water Treatment Plant
16	Irvington - Bay Division Pipeline No. 1	Driscoll Road in Fremont
17	Irvington - Bay Division Pipeline No. 2	Same as Irvington Bay Division Pipeline No. 1
18	Irvington - Bay Division Pipeline No. 3	Mission Boulevard in Fremont
19	Irvington - Bay Division Pipeline No. 4	Same as Irvington Bay Division Pipeline No. 3
20	Pulgas - Bay Division Pipeline No. 1	Hassler Road at Pulgas Valve Lot
21	Pulgas - Bay Division Pipeline No. 2	Same as Pulgas Bay Division Pipeline No. 1
22	Pulgas - Bay Division Pipeline No. 3	Same as Pulgas Bay Division Pipeline No. 1
23	Pulgas - Bay Division Pipeline No. 4	Same as Pulgas Bay Division Pipeline No. 1
24	Crystal Springs Reservoir Outfall	Canada Road near Pulgas Temple
25	Harry Tracy WTP Effluent - Sunset Supply	Harry Tracy Water Treatment Plant
26	Harry Tracy WTP Effluent - San Andreas Supply	Harry Tracy Water Treatment Plant
27	Crystal Springs - San Andreas Pipeline	Crystal Springs Pump Station
28	Crystal Springs Pump Station - Sunset Supply	Crystal Springs Pump Station
29	Crystal Springs Pump Station - Crystal Springs No. 2 Supply	Crystal Springs Pump Station
30	Crystal Springs Balancing Reservoir	Canada Road near Pulgas Temple
31	Santa Clara Valley WD Intertie	Milpitas Boulevard in Milpitas
B	San Joaquin Pipeline No. 4 (Planned)	To be determined
C	East Bay MUD Intertie (Planned)	To be determined
D & E	Bay Division Pipeline No. 5 (Planned)	To be determined

Locations of System Input and In-Line Meters

Table 1
Base Usage (mgd) and Allocation Rates

(1) Usage	(2) Definition	(3) 2004-05	(4) 2005-06	(5) 2006-07	(6) 2007-08	(7) 2008-09	(8) 2009-10
1. Gross S.F. Co. line	B.1	79.5	78.3	75.7			
2. Daly City portion	B.2	0.2	0.2	0.2			
3. Net S.F.	(1-2)	79.3	78.1	75.5			
4. Other suburban raw water	B.4	0.4	0.5	0.7			
5. Other suburban treated water	B.5	4.1	3.4	3.9			
6. Total other suburban	(4+5)	4.5	3.9	4.6			
7. Total City usage	(3+6)	83.8	82.0	80.1			
8. Total wholesale usage	B.8	167.4	164.4	175.8			
9. Total system usage	(7+8)	251.2	246.4	255.9			
10. Wholesale alloc. rate	(8/9)	66.63%	66.72%	68.70%			
11. City alloc. rate	(100%-10)	33.37%	33.28%	31.30%			
12a. HHWPD input (Oakdale)	B.12	194.7	202.6	227.3			
12b. Deliveries to LLNL	B.12	-0.4	-0.9	-0.9			
12c. HH to San Ant. Res.	B.12	-3.8	-1.8	-11.6			
12d. Sunol Valley WTP	B.12	28.5	29.4	17.6			
12e. Harry Tracy WTP	B.12	45.2	40.4	41.2			
12f. Raw water deliveries	B.12	0.4	0.4	0.7			
12g. Deliveries to Coastside Co. WD	B.12	1.8	1.6	2.1			
12h. Crys. Sprs. Bal. Res.	B.12	0.0	0.0	0.0			
12i. Spill to CS Res.	B.12	-19.9	-42.6	-37.1			
12j. Terminal Reservoirs	B.12	0.0	0.0	0.0			
12k. Other sources	B.12	0.0	1.9	3.8			
13. Total system input	B.13	246.5	231.0	243.1			
14. Jt. sys. loss red. fact.	(9/13)	1.0000	1.0000	1.0000			
15. Daly City red. factor	(3/1)	0.9975	0.9974	0.9974			
16. Total suburban	(6+8)	171.9	168.3	180.4			
17. Suburban red. factor	(8/16)	0.9736	0.9768	0.9745			
18. HHWPD Deliveries above Oakdale	B.18						
19. HH Reduction Factor	B.19	99.56%					

Table 2
Locations of SFPUC County-Line Meters and In-City Terminal Reservoirs

County-Line Meters

Meter	Pipeline	Location
1	Sunset	Lake Merced Pump Station
2	Sutro	Lake Merced Pump Station
3	Lake Merced Outfall	Lake Merced Pump Station
4	San Andreas No. 2	Junipero Serra (Hwy. 280) South of Belle Ave.
5	Crystal Springs No. 1	PG&E Martin Service Center Yard
6	Crystal Springs No. 2	Tamasco Ct. South of Sunnydale Ave.
A	San Andreas No. 3 (Planned)	To be determined

In-City Terminal Reservoirs

Meter	Reservoir	Location
7	Sunset Reservoir	26th Avenue and Ortega
8	University Mound Reservoir	University Avenue and Bacon
9	Merced Manor Reservoir	23rd Avenue and Ocean

Table 3
Locations of SFPUC System Input and In-Line Meters

Meter	Pipeline	Location
10	San Joaquin Pipeline No. 1	Albers Road, South of Oakdale in Stanislaus County
11	San Joaquin Pipeline No. 2	Same as San Joaquin Pipeline No. 1
12	San Joaquin Pipeline No. 3	Same as San Joaquin Pipeline No. 1
13	San Antonio Pipeline	San Antonio Pump Station
14	Sunol Valley WTP Effluent	San Antonio Pump Station
15	Calaveras Pipeline	Sunol Valley Water Treatment Plant
16	Irvington – Bay Division Pipeline No. 1	Driscoll Road in Fremont
17	Irvington – Bay Division Pipeline No. 2	Same as Irvington Bay Division Pipeline No.1
18	Irvington – Bay Division Pipeline No. 3	Mission Boulevard in Fremont
19	Irvington – Bay Division Pipeline No. 4	Same as Irvington Bay Division Pipeline No.3
20	Pulgas – Bay Division Pipeline No. 1	Hassler Road at Pulgas Valve Lot
21	Pulgas – Bay Division Pipeline No. 2	Same as Pulgas Bay Division Pipeline No. 1
22	Pulgas – Bay Division Pipeline No. 3	Same as Pulgas Bay Division Pipeline No. 1
23	Pulgas – Bay Division Pipeline No. 4	Same as Pulgas Bay Division Pipeline No. 1
24	Crystal Springs Reservoir Outfall	Canada Road near Pulgas Temple
25	Harry Tracy WTP Effluent – Sunset Supply	Harry Tracy Water Treatment Plant
26	Harry Tracy WTP Effluent – San Andreas Supply	Harry Tracy Water Treatment Plant
27	Crystal Springs – San Andreas Pipeline	Crystal Springs Pump Station
28	Crystal Springs Pump Station – Sunset Supply	Crystal Springs Pump Station
29	Crystal Springs Pump Station – Crystal Springs No. 2 Supply	Crystal Springs Pump Station
30	Crystal Springs Balancing Reservoir	Canada Road near Pulgas Temple
31	Santa Clara Valley WD Intertie	Milpitas Boulevard in Milpitas
B	San Joaquin Pipeline No. 4 (Planned)	To be determined
C	East Bay MUD Intertie (Planned)	To be determined
D&E	Bay Division Pipeline No. 5 (Planned)	To be determined

TABLE 4
SFPUC COUNTY-LINE METERS, IN-CITY TERMINAL RESERVOIRS, AND ASSOCIATED METERING EQUIPMENT

County-Line Meter	Meter Type	Location
1. **Sunset**	60" Venturi	Lake Merced Pump Station
Associated Metering Equipment:	• Rosemount D/P transmitter • Honeywell recorder • SCADA	
2. **Sutro**	36" Venturi	Lake Merced Pump Station
Associated Metering Equipment:	• Rosemount D/P transmitter • Honeywell recorder • SCADA	
3. **Lake Merced Outfall**	16" Mag. Meter	Lake Merced Pump Station
Associated Metering Equipment:	• Honeywell recorder • SCADA	
4. **San Andreas No. 2**	36" Venturi	Junipero Serra (Hwy. 280) south of Belle Avenue
Associated Metering Equipment:	• Yokogawa D/P transmitter • NLS display • AGM electronics • Honeywell recorder • SCADA	
5. **Crystal Springs No. 1**	44" Venturi	PG&E Martin Service Center Yard
Associated Metering Equipment:	• Yokogawa D/P transmitter • NLS display • AGM electronics • Honeywell recorder • SCADA	
6. **Crystal Springs No. 2**	60" Venturi	Tamasco Ct. south of Sunnydale Avenue
Associated Metering Equipment:	• Yokogawa D/P transmitter • NLS display • AGM electronics • SCADA	
In-City Terminal Reservoirs		
1. **Sunset**	Pressure Transducer	26th Avenue and Ortega
Associated Metering Equipment:	• Honeywell recorder • SCADA	
2. **Merced-Manor**	Pressure Transducer	23rd Avenue and Ocean
Associated Metering Equipment:	• Honeywell recorder • SCADA	
3. **University Mound**	Pressure Transducer	University Avenue and Bacon
Associated Metering Equipment:	• Honeywell recorder • SCADA	

TABLE 5
METER CALIBRATION AND MAINTENANCE FREQUENCY

METER/ EQUIPMENT	FREQUENCY			WORK TO BE PERFORMED (See Work Codes Listed Below)					
	Quarterly	Semi-Annual	Annual	CA	CL	FL	IN	LU	PT
Venturi Meters			X	X		X (1)	X (1)		X
Magnetic Meters		X		X (2)	X (2)		X (2)		
Yokagowa D/P Transmitters	X			X	X	X	X		
Rosemount D/P Transmitters	X			X	X	X	X		
Honeywell Recorders	X			X	X		X		
Water Level Sensors (Pressure Transducers)	X			X	X		X		
SCADA Electronics	X			X					
AGM Electronics	X			X					
NLS Digital Displays	X			X					
Electrostatic 24V DC Power Supplies			X				X (3)		
ASCO Solenoids			X		X		X (4)	X	

<u>WORK CODES:</u>
CA = CALIBRATE; CL = CLEAN; FL = FLUSH; IN = INSPECT; LU = LUBRICATE; PT = PITOT TUBE TEST.

<u>NOTES:</u>
(1) Inspection and flushing requirements for Venturi meters refer to the pressure tubing from the meter to the differential pressure transmitter.

(2) May calibrate using clamp-on meter where conditions allow. Inspection and cleaning requirements for magnetic meters refer to the sensors or probes that are inserted through the pipe wall.

(3) Adjust voltage if necessary.

(4) Replace rubber ware as needed.

ATTACHMENT K-1
WHOLESALE CUSTOMERS' SHARE OF NET BOOK VALUE OF EXISTING ASSETS
****PRELIMINARY - TO BE SUBSTITUTED WITH FINAL 6/30/09 VALUES****
(Section 5.03)

	Notes	Projected Value		
		Water	Hetch Hetchy	Total
Regional System Net Plant as of 6/30/08 (Actual)	1	$ 435,639,907	$ 66,135,724	
Less: Projected Depreciation on Regional Assets	2	$ (32,526,143)	$ (3,598,189)	
Plus: Projected FY 2008-09 Capital Additions	3	$ 62,771,153	$ -	
Projected Regional System Net Plant as of 6/30/09		$ 465,884,917	$ 62,537,535	
Plus: Projected Construction Work In Progress (CWIP) as of 6/30/09	4	$ 16,928,503	$ 5,807,023	
Projected Regional System Net Plant and CWIP as of 6/30/09		$ 482,813,420	$ 68,344,558	$ 551,157,978
Allocation Factor:	5	70.1%	64.2%	
Wholesale Share of Projected Regional System Net Plant as of 6/30/09		$ 326,585,327	$ 40,149,098	$ 366,734,424
Plus: Wholesale Share of Projected CWIP as of 6/30/09	6	$ 11,866,881	$ 3,728,109	$ 15,594,989
Wholesale Share of Projected Net Plant and CWIP as 6/30/09		$ 338,452,207	$ 43,877,206	$ 382,329,414
Interest Rate:		5.13%	5.13%	
Term (Yrs):		25	25	
Monthly Principal & Interest		$ 2,004,277	$ 259,836	$ 2,264,113
Annual Wholesale Revenue Requirement Amount		$ 24,051,326	$ 3,118,033	$ 27,169,359

Notes

1 FAACS 120A Report as of 6/30/08

2 SFPUC Estimate

3 SFPUC Estimate based on projects and amounts as follows:

	Water Assets
CUW358 Sunset Reservoir (North Basin)	$ 57,382,744
CUW 365 Cross Connection Controls	$ 3,679,415
CUW 394 Watershed Land Acqusition	$ 1,708,994
Total Additions	$ 62,771,153

4 CWIP based on balance as 6/30/08 plus YTD expenditures (see Attachment K-2)

5 Fixed allocation factors based on dollar weighted 5-year average of J-Table allocation factors (2003-04 through 2007-08)

6 Wholesale share CWIP based on balance as 6/30/08 plus YTD expenditures (see Attachment K-2)

ATTACHMENT K-2
WHOLESALE CUSTOMERS' SHARE OF THE BOOK VALUE OF REVENUE FUNDED CAPITAL EXPENDITURES
PRELIMINARY - TO BE SUBSTITUTED WITH FINAL 6/30/09 VALUES
(Section 5.03)

[1] Project No.	[2] Project Description	[3] Rate Class	[4] CWIP as of 6/30/08	[5] FY 2008-09 Expenditures	[6] Reduction for 02A Funding	[7] CWIP as 6/30/09	[8] Water Related CWIP	[9] Wholesale Share	
A.	Water Enterprise								
1	Regional Projects								
CUW352	Alameda Creek Fishery	Joint	2,007,607	224,582	2,232,189	-		-	
CUW353	Seismic Upgrade @ Hayward Fault	Joint	3,129,234	1,967,625	5,096,859	-		-	
CUW354	LOWER CRYSTAL SPRINGS DAM-REV-SFWD	Joint	7,046,944	1,086,262	8,133,206	-		-	
CUW355	STANDBY POWER FACILITIES	Joint	3,715,276	6,596,849	10,312,125	-		-	
CUW357	Adit Leak Repairs	Joint	783	1,129	1,912	-		-	
CUW359	Irvington Tunnel	Joint	21,391,129	5,176,713	26,567,842	-		-	
CUW359		Joint	7,837,176	-	7,837,176	-		-	
CUW361		Joint	368,057	1,383,959	1,752,016	-		-	
CUW361		Joint	1,255,545	-	1,255,545	-		-	
CUW361	Pulgas Balancing Reservoir	Joint	1,248,002	-	1,248,002	-		-	
CUW361		Joint	570,179	-	570,179	-		-	
CUW361		Joint	712,921	-	712,921	-		-	
CUW363	SCADA Phase II	Joint	1,335,371	1,738,045	3,073,416	-		-	
CUW363		Joint	1,062,050	-	1,062,050	-		-	
CUW365	Cross Connection Control	Joint	3,635,172	547,801	4,182,973	-		-	Capitalized in FY 2008-09
CUW367	HTWTP LT Impr	Joint	8,011,348	2,479,731	10,491,079	-		-	
CUW368		Joint	23,640,601	-	23,640,601	-		-	
CUW368	BDPL Hydraulic Capacity	Joint	17,556,905	4,200,442	21,757,347	-		-	
CUW368		Joint	2,579,847	-	2,579,847	-		-	
CUW370	Pipeline Readiness	Joint	5,320,934	328,070	5,649,004	-		-	
CUW371	CSPS and Pipeline	Joint	11,420,770	3,872,779	15,293,549	-		-	
CUW372	University Mound (N)	Joint	4,624,981	1,068,147	5,693,128	-		-	
CUW373	SJPL	Joint	19,479,341	6,023,849	25,503,190	-		-	
CUW373		Joint	7,199,051	-	7,199,051	-		-	
CUW374	Calaveras Dam	Joint	31,171,669	4,314,430	35,486,099	-		-	
CUW374		Joint	2,366,343	-	2,366,343	-		-	
CUW378	CSPL #2	Joint	7,453,098	913,369	8,366,467	-		-	
CUW379	SAPL #3	Joint	5,728,934	588,346	6,317,280	-		-	
CUW380	BDPK #3&4 Crossovers	Joint	3,855,357	1,083,888	4,939,245	-		-	
CUW381		Joint	5,450,995	-	5,450,995	-		-	
CUW381	SVWTP Expansion	Joint	53,222	3,090,520	3,143,742	-		-	
CUW381		Joint	97,373	-	97,373	-		-	
CUW382	SVWTP Treated Water Reservoir	Joint	5,799,505	575	5,800,080	-		-	
CUW384	Tesla	Joint	6,102,621	7,444,942	13,547,563	-		-	
CUW386	SAPS X-CONNECT & PUMP IMP 96A UEB	Joint	1,374,491	971,625	2,346,116	-		-	
CUW388	PEIR	Joint	896,476	1,641,717	2,538,193	-		-	
CUW388		Joint	1,331,676	-	1,331,676	-		-	
CUW390	Desalination Pilot	Joint	175,165	-	175,165	-		-	
CUW391	Baden/San Pedro Valve Lots	Joint	3,964,642	948,589	4,913,231	-		-	
CUW392	Program Management	Joint	2,452,297	5,081,444	7,533,741	-		-	
CUW393	BDPL #4 Condition Assessment	Joint	25,071	294,634	319,705	-		-	
CUW394	Watershed Enviroment Improvement	Joint	142,924	96,027	238,951	-		-	Capitalized in FY 2008-09
CUW101	SAN ANDREAS PLANT EXPANSION #1	Joint	182	96,027		96,209		67,443	
CUW111	LOWER CRYSTAL SPRINGS DAM-REV-SFWD	Joint	40,436	-		40,436		28,346	
CUW151	Baden PS	Joint	921	26,760		27,681		19,404	
CUW161	Water Treatment Facilities	Joint	75,801	605		76,406		53,561	
CUW178	SAPS X-CONNECT & PUMP IMP 96A UEB	Joint	104,902	-		104,902		73,536	
CUW202		Joint	50,808	-		50,808		35,616	
CUW202	Replace PCCP	Joint	285,003	64,256		349,259		244,831	
CUW202		Joint	2,365	-		2,365		1,658	
CUW127	SCADA	Joint	50,029	2,481,274		2,531,303		1,774,443	
CUW356	New Crystal Springs Bypass Tunnel	Joint	13,992,264	5,560,862	16,028,397	3,524,729		2,470,835	
CUW358	Sunset (N)	Joint	52,494,764	4,887,980	55,806,081	1,576,663		1,105,241	Capitalized in FY 2008-09
CUW387	Tesla Portal Disinfection	Joint	2,377,262	(1,996)	1,223,945	1,151,321		807,076	
CUW135		Joint	45,413	-		45,413		31,835	
CUW135	New Lines and Bypass Valves	Joint	153,983	620,156		774,139		542,671	
CUW135		Joint	8,860	-		8,860		6,211	
CUW143		Joint	5,656	-		5,656		3,965	
CUW143	HH Water Treatment Plan	Joint	709,972	8,817		718,789		503,871	
CUW143		Joint	96,292	-		96,292		67,501	
CUW186	SVWTP IMPROVEMENT PROJECT-CPB-SFWD	Joint	3,604	-		3,604		2,526	
CUW206		Joint	4,365	-		4,365		3,060	
CUW206	Tesla Portal/Thomas Shaft Emergency Disinfection	Joint	283,620	5,665		289,285		202,789	
CUW206		Joint	227,004	-		227,004		159,130	
CUW231	Millbrae Labs	Joint	81,856	34,685		116,541		81,695	
CUW236	TELSA/SJVH WQ MONITORING IMPR	Joint	152,963	-		152,963		107,227	
CUW366		Joint	16,523	-		16,523		11,583	
CUW366	HTWTP ST Improvements	Joint	1,398,798	5,732,626	7,131,424	-		-	
CUW366		Joint	1,452,901	-	1,452,901	-		-	
CUW120	WATER QUALITY PLANNING STUDY	Joint	577	-		577		404	
CUW164	WATER VULNERABILITY STUDY-UEB	Joint	479	-		479		336	
CUW181	STANDBY POWER FACILITIES	Joint	5,905	-		5,905		4,139	
CUW210	Millbrae Administrative Bldg Remodel	Joint	7,803	321,553		329,356		230,879	
CUW220	Calaveras Dam Evaluation	Joint	308,971	-		308,971		216,589	
CUW227	Watershed Facilities and Fencing	Joint	190,552	206,448		397,000		278,297	
CUW228	Watershed Roads	Joint	358,434	85,337		443,771		311,083	
CUW232	Crystal Springs Dam Discharge	Joint	363,823	-		363,823		255,040	
CUW242	Demolition of Unsafe Structures	Joint	311,548	22,741		334,289		234,337	
CUW242		Joint	315	-		315		221	
CUW261	Regional R&R - Storage	Joint	275,694	277,958		553,652		388,110	
CUW262	Regional R&R - Treatement	Joint	1,236,895	409,282		1,646,177		1,153,970	
CUW262		Joint	277,383	-		277,383		194,445	

ATTACHMENT K-2
WHOLESALE CUSTOMERS' SHARE OF THE BOOK VALUE OF REVENUE FUNDED CAPITAL EXPENDITURES
****PRELIMINARY - TO BE SUBSTITUTED WITH FINAL 6/30/09 VALUES****
(Section 5.03)

	[1] Project No.	[2] Project Description	[3] Rate Class	[4] CWIP as of 6/30/08	[5] FY 2008-09 Expenditures	[6] Reduction for 02A Funding	[7] CWIP as 6/30/09	[8] Water Related CWIP	[9] Wholesale Share
	CUW263	Regional R&R - Transmission	Joint	$ 768,422	$ 797,659		$ 1,566,081	[redacted]	$ 1,097,823
	CUW263		Joint	$ 1,224,094	$ -		$ 1,224,094	[redacted]	$ 858,090
	CUW360	PLANNING - WSTD Sunol Quarry Reservoirs	Joint	$ 2,513	$ -		$ 2,513	[redacted]	$ 1,762
	CUW934	BOA/BAW/13/F2/SFWD-CONT PROJ-OPER FD	Joint	$ 59,479	$ (2,210)	$ 998,005	$ (940,736)	[redacted]	$ (659,456)
		TOTAL REGIONAL WATER PROJECTS		$ 313,100,517	$ 84,802,574	$379,397,925	$ 18,505,166	[redacted]	$ 12,972,121
		Less Projects to be Capitalized in FY 2008-09					$ 1,576,663	[redacted]	$ 1,105,241
		ADJUSTED TOTAL REGIONAL WATER PROJECTS					$ 16,928,503	[redacted]	$ 11,866,881
2	Wholesale Direct								
		None							
B.	Hetch Hetchy Water & Power								
	CUH703	Priest Reservoir By-pass	Joint	-	47,164		$ 47,164	$ 21,224	$ 13,626
	CUH762	SJPL Reparis	Water	53,616	255,011		$ 308,627	$ 308,627	$ 198,139
	CUH766	HH Security Improvements	Joint	164,478	261,601		$ 426,079	$ 191,736	$ 123,094
	CUH767	Power Transformers	Power	-	-		$ -	$ -	$ -
	CUH803	Street Lights	Power	-	40,506		$ 40,506	$ -	$ -
	CUH804	HH Roads	Joint	-	341,240		$ 341,240	$ 153,558	$ 98,584
	CUH829	HH SCADA	Joint	-	-		$ -	$ -	$ -
	CUH842	Moccasin Cottages Renovations	Joint	-	-		$ -	$ -	$ -
	CUH846	New Moccasin Penstock	Power	543,073	-		$ 543,073	$ -	$ -
	CUH851	Turbine Generator Renovations	Power	111,755	926,254		$ 1,038,009	$ -	$ -
	CUH868	Moccasin Energy Absorber	Power	-	-		$ -	$ -	$ -
	CUH876	Moccasin Phone System	Joint	-	15,677		$ 15,677	$ 7,055	$ 4,529
	CUH878	O'Shaugnessy Discharge/Toulumne River Channel Impr.	Joint	31,953	168,076		$ 200,029	$ 90,013	$ 57,788
	CUH891	Metering Muni Load	Power	18	4,361		$ 4,379	$ -	$ -
	CUH893	Cherry/Eleanor Pump Upgrade	Power	-	17,012		$ 17,012	$ -	$ -
	CUH896	Street Lights	Power	9,294	568,794		$ 578,088	$ -	$ -
	CUH899	Canyon Tunnel Penstock	Power	6,210	21,804		$ 28,014	$ -	$ -
	CUH915	UG Assessment/Hunters Point	Power	961,755	1,668,663		$ 2,630,418	$ -	$ -
	CUH926	Pipe Purchase	Water	-	13,667		$ 13,667	$ 13,667	$ 8,774
	CUH931	Microwave Replacement	Joint	3,157,491	156,270		$ 3,313,761	$ 1,491,192	$ 957,346
	CUH932	HH SCADA	Joint	-	-		$ -	$ -	$ -
	CUH825	Distribution System	Power	446,419	109,797		$ 556,216	$ -	$ -
	CUH941	HHP SCADA Security & Control, East/O'Shaugnessy	Joint	1,433,974	246,948		$ 1,680,922	$ 756,415	$ 485,618
	CUH942	O'Shaugnessy Dam Discharge Needle Valves	Joint	-	-		$ -	$ -	$ -
	CUH943	Renewable Energy	Power	-	-		$ -	$ -	$ -
	CUH945	SJPL Crossovers	Water	-	-		$ -	$ -	$ -
	CUH946	Facility Maintenance	Joint	-	239		$ 239	$ 108	$ 69
	CUH947	Sustainable Energy Account	Power	441,226	1,838,396		$ 2,279,622	$ -	$ -
	CUH948	Facility Maintenance - Transmission Lines	Power	70,631	101,295		$ 171,926	$ -	$ -
	CUH949	POW Maintenance	Power	-	-		$ -	$ -	$ -
	CUH950	HPH/KPH/MPH	Power	1,236,853	1,167,621		$ 2,404,474	$ -	$ -
	CUH955	Solar Monitoring	Power	222	-		$ 222	$ -	$ -
	CUH956	Facility Maintenance - Gate Valves	Water	275,213	-		$ 275,213	$ 275,213	$ 176,687
	CUH957	Moccasin Corrison Control	Joint	48,023	110,986		$ 159,009	$ 71,554	$ 45,938
	CUH958	Generation Metering	Power	-	18,811		$ 18,811	$ -	$ -
	CUH959	Moccasin Reservoir Water Quality	Water	109,379	-		$ 109,379	$ 109,379	$ 70,221
	CUH960	Solar Power Project	Power	6,480	(5,333)		$ 1,147	$ -	$ -
	CUH861	MECA Solar	Power	-	26,369		$ 26,369	$ -	$ -
	CUH962	SF Electrical Reliability	Power	9,672,565	2,653		$ 9,675,218	$ -	$ -
	CUH964	Watershed Lan Purchase	Water	-	75,756		$ 75,756	$ 75,756	$ 48,635
	CUH966	MECA - Demand Reduction	Power	-	-		$ -	$ -	$ -
	CUH969	SFIA SCADA	Power	-	-		$ -	$ -	$ -
	CUH971	Neward - CCSF Tranmission Project	Power	235,120	54,602		$ 289,722	$ -	$ -
	CUH972	Load Metering	Power	145,039	1,274		$ 146,313	$ -	$ -
	CUH973	Distribution Assessment	Power	-	-		$ -	$ -	$ -
	CUH975	Hetch Hetchy Water R&R	Power	-	130,100		$ 130,100	$ -	$ -
	CUH975	Hetch Hetchy Water R&R	Water	52,613	516,524		$ 569,137	$ 569,137	$ 365,386
	CUH975	Hetch Hetchy Water R&R	Joint	999,854	887,864		$ 1,887,718	$ 849,473	$ 545,362
	CUH976	KPH Rewind	Power	1,053,295	1,417,914		$ 2,471,209	$ -	$ -
	CUH977	Facilities Maintenance - Water	Joint	770,839	1,049,878		$ 1,820,717	$ 819,323	$ 526,005
	CUH978	Community Choice Aggregation	Power	5,571	101,075		$ 106,646	$ -	$ -
	CUH979	Hunters Point Distribution	Power	1,926,977	532,011		$ 2,458,988	$ -	$ -
	CUH981	Shore Power for Cruise Ships	Power	2,690	-		$ 2,690	$ -	$ -
	CUH986	SEA - Energy Efficiency	Power	15,262	-		$ 15,262	$ -	$ -
	CUW687	525 Golden Gate	Joint	-	4,105		$ 4,105	$ 1,847	$ 1,186
	IUH004	Auto Maintenance	Joint	-	3,882		$ 3,882	$ 1,747	$ 1,122
	PUH501	SF Environment Energy/Green Power	Power	-	66,107		$ 66,107	$ -	$ -
	PYEAES	Youth Employment	Joint	-	-		$ -	$ -	$ -
		TOTAL HHWP PROJECTS		23,987,888	12,964,974	-	36,952,862	5,807,023	$ 3,728,109
C		TOTAL COMBINED WATER AND HHWP		$ 337,088,405	$ 97,767,548	$379,397,925	$ 55,458,028		$ 15,594,990

Notes
1. 6/30/08 CWIP per FAMIS
2. FY 2008-09 Expenditures posted through 3/20/09 per FAMIS
3. Wholesale share of CWIP 70.1% (see Note 5 Attachment K-1)
4. Water Related HHWP CWIP includes 100% of Water and 45% of Joint
5. Wholesale share of CWIP 64.2% (see Note 5 Attachment K-1)
6. Fund 2A expenditures are funded by Series 2006A bond proceeds, proceeds of commercial paper redeemed from 2006A proceeds and earnings on such proceeds, as applicable.

ATTACHMENT K-3
25 YEAR PAYOFF SCHEDULE FOR EXISITING RATE BASE
WATER ENTERPRISE REGIONAL ASSETS AND ONE DIRECT WHOLESALE ASSET
****PRELIMINARY - TO BE SUBSTITUTED WITH FINAL 6/30/09 VALUES****
(Section 5.03)

	Water Assets
6/30/09 Wholesale Share of Net Plant & CWIP (Attachment K-1)	338,452,207
Interest Rate:	5.13%
Term:	25
Monthly Principal & Interest Calculation:	2,004,277
Annual Wholesale Revenue Requirement:	24,051,326

Fiscal Yr Ending	Principal	Interest	**Annual Payment (Wtr)**	Year End Balance
Jun-10	6,848,259	17,203,067	**24,051,326**	331,603,948
Jun-11	7,207,954	16,843,372	**24,051,326**	324,395,994
Jun-12	7,586,541	16,464,785	**24,051,326**	316,809,453
Jun-13	7,985,013	16,066,313	**24,051,326**	308,824,439
Jun-14	8,404,415	15,646,911	**24,051,326**	300,420,024
Jun-15	8,845,844	15,205,482	**24,051,326**	291,574,180
Jun-16	9,310,459	14,740,867	**24,051,326**	282,263,721
Jun-17	9,799,478	14,251,848	**24,051,326**	272,464,243
Jun-18	10,314,181	13,737,145	**24,051,326**	262,150,062
Jun-19	10,855,919	13,195,407	**24,051,326**	251,294,143
Jun-20	11,426,110	12,625,216	**24,051,326**	239,868,033
Jun-21	12,026,250	12,025,076	**24,051,326**	227,841,784
Jun-22	12,657,911	11,393,415	**24,051,326**	215,183,873
Jun-23	13,322,749	10,728,577	**24,051,326**	201,861,123
Jun-24	14,022,507	10,028,819	**24,051,326**	187,838,616
Jun-25	14,759,019	9,292,307	**24,051,326**	173,079,597
Jun-26	15,534,215	8,517,111	**24,051,326**	157,545,382
Jun-27	16,350,127	7,701,199	**24,051,326**	141,195,254
Jun-28	17,208,894	6,842,432	**24,051,326**	123,986,361
Jun-29	18,112,766	5,938,560	**24,051,326**	105,873,594
Jun-30	19,064,113	4,987,213	**24,051,326**	86,809,482
Jun-31	20,065,428	3,985,898	**24,051,326**	66,744,054
Jun-32	21,119,335	2,931,991	**24,051,326**	45,624,719
Jun-33	22,228,597	1,822,729	**24,051,326**	23,396,122
Jun-34	23,396,122	655,204	**24,051,326**	0
Totals:	338,452,207	262,830,943	601,283,150	

ATTACHMENT K-4
25 YEAR PAYOFF SCHEDULE FOR EXISTING RATE BASE
HETCH HETCHY WATER ASSETS AND WATER-RELATED PORTION OF JOINT ASSETS
****PRELIMINARY - TO BE SUBSTITUTED WITH FINAL 6/30/09 VALUES****
(Section 5.03)

	Hetch Hetchy
6/30/09 Wholesale Share of Net Plant & CWIP (Attachment K-1)	43,877,206
Interest Rate:	5.13%
Term:	25
Monthly Principal & Interest Calculation:	259,836
Annual Wholesale Revenue Requirement:	3,118,033

Fiscal Yr Ending	Principal	Interest	**Annual Payment (HH)**	Year End Balance
Jun-10	887,814	2,230,219	**3,118,033**	42,989,393
Jun-11	934,445	2,183,588	**3,118,033**	42,054,948
Jun-12	983,525	2,134,507	**3,118,033**	41,071,423
Jun-13	1,035,183	2,082,849	**3,118,033**	40,036,239
Jun-14	1,089,555	2,028,478	**3,118,033**	38,946,685
Jun-15	1,146,782	1,971,250	**3,118,033**	37,799,903
Jun-16	1,207,015	1,911,017	**3,118,033**	36,592,887
Jun-17	1,270,412	1,847,621	**3,118,033**	35,322,475
Jun-18	1,337,138	1,780,894	**3,118,033**	33,985,337
Jun-19	1,407,370	1,710,663	**3,118,033**	32,577,967
Jun-20	1,481,290	1,636,743	**3,118,033**	31,096,678
Jun-21	1,559,092	1,558,940	**3,118,033**	29,537,585
Jun-22	1,640,981	1,477,051	**3,118,033**	27,896,604
Jun-23	1,727,172	1,390,861	**3,118,033**	26,169,432
Jun-24	1,817,889	1,300,144	**3,118,033**	24,351,544
Jun-25	1,913,371	1,204,662	**3,118,033**	22,438,173
Jun-26	2,013,868	1,104,165	**3,118,033**	20,424,305
Jun-27	2,119,643	998,389	**3,118,033**	18,304,662
Jun-28	2,230,974	887,058	**3,118,033**	16,073,688
Jun-29	2,348,153	769,880	**3,118,033**	13,725,535
Jun-30	2,471,486	646,546	**3,118,033**	11,254,048
Jun-31	2,601,298	516,735	**3,118,033**	8,652,751
Jun-32	2,737,927	380,106	**3,118,033**	5,914,824
Jun-33	2,881,733	236,300	**3,118,033**	3,033,091
Jun-34	3,033,091	84,941	**3,118,033**	0
	43,877,206	34,073,607	77,950,813	

ATTACHMENT K-5
UNEXPENDED APPROPRIATIONS FOR REVENUE-FUNDED REGIONAL ASSETS
CONSTRUCTION WORK IN PROGRESS AS OF MARCH 30, 2009
(Section 5.04)

Project	Project Title	Fund Type	Subfund	Classification	Appropriation	YTD Expenditures	PTD Expenditures	Encumbrances	Available Balances	Notes
				Water Assets						
CUW257	WATERSHED PROTECTION	5W	AAAACP	REGIONAL	1,448,720	29,653	413,529	141,643	893,548	
CUW250	WATERSHED TRAILS&RECREATION IMPRO\	5W	AAAACP	REGIONAL	387,639	9,431	112,689	6,675	268,275	
CUW261	REGIONAL WATER STORAGE RNR -BUDGE1	5W	AAAACP	REGIONAL	1,750,000	250,970	526,664	26,687	1,196,648	Annual R&R
CUW242	DEMOLITION UNSAFE STRUCTURES	5W	AAAACP	REGIONAL	1,000,000	22,647	407,820	21,524	570,656	
CUW263	CONVEYANCE/TRANSMISSION - BUDGET	5W	AAAACP	REGIONAL	7,825,000	763,603	3,378,543	125,990	4,320,466	Annual R&R
CUW264	WATERSHED ROADS - BUDGET	5W	AAAACP	REGIONAL	3,000,000	77,074	1,391,500	162,401	1,446,099	Annual R&R
CUW262	TREATMENT FACS/WQ IMPROVE-BUDGET	5W	AAAACP	REGIONAL	4,801,000	399,073	2,704,204	349,016	1,747,780	Annual R&R
CUW168	ALAMEDA CREEK FISH RELEASE	5W	AAAACP	REGIONAL	1,537,398	46,624	1,040,919	152,647	343,832	
CUW231	MILLBRAE LAB CAPITAL IMPROVEMENTS	5W	AAAACP	REGIONAL	770,000	19,119	532,135	0	237,865	
CUW227	WATERSHED FENCES/FACILITES	5W	AAAACP	REGIONAL	3,000,000	206,222	2,223,776	581,926	194,298	
CUW253	FACILITIES SECURITY PROJECT	5W	AAAACP	REGIONAL	5,300,000	73,048	4,146,944	113,124	1,039,931	
CUW210	MILLBRAE ADMIN BLDG INTERIM REMODEL	5W	AAAACP	REGIONAL	2,407,700	284,902	1,935,204	160	472,337	
CUW228	WATERSHED ROADS RECONSTRUCTION	5W	AAAACP	REGIONAL	5,170,000	82,992	4,413,061	18,598	738,340	
CUW202	SAN ANTONIO PIPELINE EMERGENCY REPA	5W	AAAACP	REGIONAL	1,400,000	6,012	1,269,190	61,727	69,083	
CUW148	ENVIRONMENTAL & REGULATORY COMP	5W	AAAACP	REGIONAL	3,241,279	0	3,014,995	184,774	41,510	
CUW135	NEW LINE & BYPASS VALVES	5W	AAAACP	REGIONAL	4,829,680	2,103	4,689,067	0	140,613	
CUW143	HETCH HETCHY WATER TREATMENT PLAN	5W	AAAACP	REGIONAL	18,821,529	0	18,452,053	47,947	321,529	
CUW161	TREATMENT FACILITIES IMPROVEMENTS	5W	AAAACP	REGIONAL	15,028,319	334	14,747,873	0	280,446	
CUW241	FACILITIES MAINT SUPPORT STRUCTURES	5W	AAAACP	REGIONAL	5,000,000	8,390	4,988,882	0	11,118	
CUW392	PROGRAM MANAGEMENT SERVICES - WSIF	5W	AAAACP	LOCAL/REGIONAL	1,837,000	(98,519)	751,659	71,973	1,013,368	
CUW127	INST SCADA SYSTEM	5W	AAAACP	LOCAL/REGIONAL	13,156,681	2,481,274	8,653,641	0	4,503,040	
CUW710	OCIP PROJECT CONTROL	5W	AAAACP	LOCAL/REGIONAL	2,497,881	235,706	2,496,959	0	922	
	TOTAL ALL PROJECTS				104,209,826	4,900,661	82,291,307	2,066,813	19,851,706	
	LOCAL PROJECTS			LOCAL	0	0	0	0	0	
	JOINT LOCAL AND REGIONAL PROJECTS			LOCAL/REGIONAL	17,491,562	2,618,462	11,902,259	71,973	5,517,330	
	REGIONAL PROJECTS			REGIONAL	86,718,264	2,282,199	70,389,048	1,994,840	14,334,376	
	TOTAL ALL PROJECTS				104,209,826	4,900,661	82,291,307	2,066,813	19,851,706	
				Hetchy Hetchy Assets						
CUH975	WATER INFRASTRUCTURE - BUDGET	5T	AAAACP	WATER	9,000,000	1,534,488	2,806,592	3,565,023	2,628,385	
CUH964	WATERSHED PROPERTY PURCHASES	5T	AAAACP	WATER	800,000	75,756	454,756	0	345,244	
CUH957	FAC MAINTENANCE-WATER TRANSPORTAT	5T	AAAACP	WATER	3,400,000	110,986	2,885,394	209,138	305,469	
CUH703	PRIEST RESERVOIR DIVERSION CHANNEL	5T	AAAACP	WATER	21,210,344	47,164	20,166,993	0	1,043,351	
CUH926	PIPELINE PURCHASE REPLACEMENT PIPE	5T	AAAACP	WATER	159,860	13,667	157,489	0	2,371	
CUH762	SAN JOAQUIN PIPELINE REPAIRS	5T	AAAACP	WATER	41,469,206	255,011	41,215,761	134,652	118,792	
CUW687	525 GOLDEN GATE	5T	AAAACP	JOINT	280,600	4,105	26,437	0	254,163	
CUH977	FACILITIES MAINTENANCE - BUDGET	5T	AAAACP	JOINT	9,300,000	1,049,878	3,578,478	803,231	4,918,290	
CUH931	HH MICROWAVE REPLACEMENT	5T	AAAACP	JOINT	4,767,000	156,270	3,313,761	1,227,242	225,997	
CUH941	HH SCADA SECURITY & CONTROL, EAST	5T	AAAACP	JOINT	2,068,180	246,948	1,680,922	256,198	131,060	
CUH804	HETCH-HETCHY ROADS REBUILDING	5T	AAAACP	JOINT	4,175,027	341,240	3,544,483	113,314	517,230	
CUH766	HETCHY FACILITIES SECURITY IMPROV.	5T	AAAACP	JOINT	2,086,692	261,601	1,960,386	62,470	63,836	
CUH876	MOCCASIN PHONE SYSTEM	5T	AAAACP	JOINT	1,610,000	15,677	1,528,780	0	81,220	
CUH878	O'SHAUGENESSY DIS.REPAIRS	5T	AAAACP	JOINT	7,179,009	33,750	7,101,644	9,297	68,068	
CUH810	VARIOUS OLD JOB	5T	AAAACP	JOINT	7,613,638	18,690	7,538,034	1,561	74,044	
CUH946	FAC MAINTENANCE-SUPPORT STRUCTURE	5T	AAAACP	JOINT	2,281,454	239	2,273,485	0	7,969	
CUH949	RIGHT OF WAY MAINTENANCE	5T	AAAACP	JOINT	815,000	0	814,208	166	626	
	TOTAL ALL PROJECTS				118,216,010	4,165,470	101,047,602	6,382,292	10,786,117	
	POWER PROJECTS			POWER	0	0	0	0	0	
	WATER PROJECTS			WATER	76,039,410	2,037,072	67,686,985	3,908,812	4,443,613	
	JOINT PROJECTS			JOINT	42,176,600	2,128,397	33,360,617	2,473,480	6,342,504	
	TOTAL ALL PROJECTS				118,216,010	4,165,470	101,047,602	6,382,292	10,786,117	

ATTACHMENT L-1
IDENTIFICATION OF WSIP PROJECTS AS REGIONAL/RETAIL
(Section 5.04)

Project Number		Project Description
REGIONAL		
		San Joaquin Region
CUW373	Regional	San Joaquin Pipeline System Rehabilitation
CUW384	Regional	Tesla Advance Disinfection
CUW387	Regional	Tesla Portal Disinfection
		Sunol Valley Region
CUW352	Regional	Alameda Creek Fishery Enhancement
CUW355	Regional	Stand-by Power - Various Locations
CUW359	Regional	New Irvington Tunnel/Alameda Siphon No. 4
CUW370	Regional	Pipeline Readiness Improvements
CUW374	Regional	Calaveras Dam Replacement
CUW381	Regional	SVWTP 40 mgd Addition
CUW382	Regional	SVWTP Finished Water Reservoir
CUW386	Regional	San Antonio Pump Station Upgrade
		Bay Division Region
CUW353	Regional	Seismic Upgrade BDPL 3 & 4
CUW363	Regional	SCADA Phase II/Security Upgrades
CUW368	Regional	BDPL Reliability Upgrades
CUW380	Regional	BDPL 3 & 4 Crossover
CUW389	Regional	EBMUD Intertie
CUW393	Regional	BDPL 4 Slipline
		Peninsula Region
CUW354	Regional	Lower Crystal Springs Dam Improvement
CUW356	Regional	Crystal Springs Bypass Tunnel
CUW357	Regional	Adit Leak Repairs
CUW361	Regional	Pulgas Balancing Reservoir Rehabilitation and Improvements
CUW365	Regional	Cross Connection Control
CUW366	Regional	HTWTP Short Term Improvemetns
CUW367	Regional	HTWTP Long Term Improvements
CUW369	Regional	Capuchino Valve Lot Improvements
CUW371	Regional	Crystal Springs/San Andreas Transmission
CUW378	Regional	Crystal Springs Pipleine 2 Replacement
CUW379	Regional	San Andreas Pipeline 3 Installation
CUW390	Regional	Desalination
CUW391	Regional	Baden & San Pedro Valve Lots Improvements

ATTACHMENT L-1
IDENTIFICATION OF WSIP PROJECTS AS REGIONAL/RETAIL
(Section 5.04)

Project Number		Project Description
		San Francisco Region
CUW358	Regional	Sunset Reservoir Upgrades - North Basin
CUW372	Regional	University Mound Reservoir Upgrades - North Basin
		System-Wide
CUW388	Regional	PEIR
CUW392	Regional	Program Management Services
CUW394	Regional	Watershed Land Acquisition
RETAIL		
		Reservoirs
CUW307	Local	Summit Reservoir Rehabilitation
CUW310	Local	New Northwest Reservoir
CUW319	Local	Hunters Point Reservoir Rehabilitation
CUW334	Local	Stanford Heights Reservoir Rehabilitation
CUW335	Local	Potrero Heights Reservoir Rehabiliation
CUW337	Local	Sutro Reservoir Rehabilitation
		Pump Stations/Tanks
CUW306	Local	Crocker Amazon Pump Station Upgrade
CUW309	Local	Lake Merced Pump Station Upgrade
CUW314	Local	La Grande Tank Upgrade
CUW318	Local	Forest Hill Tank Rehabilitation
CUW320	Local	Forest Hilll Pump Station Upgrade
CUW321	Local	Forest Knoll Pump Station Upgrade
CUW322	Local	Lincoln Park Pump Station Upgrade
CUW323	Local	Alemany Pump Station Upgrade
CUW324	Local	Mount Davidson Pump Station Upgrade
CUW326	Local	Palo Alto Pump Station Upgrade
CUW326	Local	Sktview-AquaVista Pump Station Upgrade
CUW327	Local	Summit Pump Station Upgrade
CUW328	Local	McLaren #1 Tank Rehabilitation
CUW329	Local	Potrero Heights Tank Seismic Upgrade
CUW330	Local	Forest Knoll Tank Seismic Upgrade
CUW331	Local	Lincoln Park Tank Seismic Upgrade
CUW332	Local	McLaren #2 Tank Rehabilitation
CUW333	Local	Mount Davidson Tank Seismic Upgrade
CUW338	Local	La Grande Pump Station Upgrade
CUW339	Local	Potrero Heights Pump Station Upgrade
CUW340	Local	Vista Francisco Pump Station Upgrade

ATTACHMENT L-1
IDENTIFICATION OF WSIP PROJECTS AS REGIONAL/RETAIL
(Section 5.04)

Project Number		Project Description
		Pipelines/Valves
CUW304	Local	North University Mound System Upgrade
CUW308	Local	Motorize Key Valves
CUW311	Local	Sunset Circulation Improvements
CUW312	Local	Lincoln Way Transmission Line
CUW313	Local	Noe Valley Transmission Main, Phase 2
CUW315	Local	East/West Transmission Main
CUW316	Local	Fulton @ Sixthe Ave Main Replacement
		Water Supply/Water Quality
CUW301	Local	Groundwater
CUW302	Local	Recycled Water
CUW364	Local	Lawrence-Livermore National Laboratory Water Quality Improvements
		Miscellaneous
CUW303	Local	Vehicle Service Facility Upgrade
CUW305	Local	Fire Protection at CCD

03/13/06

$507,815,000
PUBLIC UTILITIES COMMISSION
OF THE CITY AND COUNTY OF SAN FRANCISCO
SAN FRANCISCO WATER REVENUE BONDS, 2006 SERIES A

$110,065,000
PUBLIC UTILITIES COMMISSION
OF THE CITY AND COUNTY OF SAN FRANCISCO
SAN FRANCISCO WATER REVENUE BONDS, 2006 REFUNDING SERIES B

CERTIFICATE REGARDING USE OF PROCEEDS

The undersigned hereby states and certifies as follows:

(i) The undersigned is the General Manager of the Public Utilities Commission of the City and County of San Francisco (the "Commission"), and is authorized to execute this certificate on behalf of the Commission and is knowledgeable with respect to the matters set forth herein.

(ii) On the date hereof, the Commission is issuing the two series of bonds captioned above (the "2006 Series A Bonds," the "2006 Refunding Series B Bonds" and, together, the "Bonds") pursuant to an Amended and Restated Indenture dated as of August 1, 2002 and the First Supplemental Indenture dated as of March 1, 2006 (collectively, the "Indenture"), both by and between the Commission and U.S. Bank National Association, as trustee (the "Trustee").

(iii) The Trustee will transfer and deposit the proceeds of the 2006 Series A Bonds received by the Trustee on the date hereof as follows:

(1) $48,212,528.32 will be deposited in the 2006 Series A Capitalized Interest Account established within the Interest Fund;

(2) $15,958,031.25 will be deposited in the 2006 Series A Reserve Account of the Bond Reserve Fund;

(3) $623,906.09 will be deposited in the 2006 Series A Costs of Issuance Fund;

(4) $120,622,352.19 will be deposited in the 2006 Series A Refunding Fund and transferred pursuant to Irrevocable Refunding Instructions of the Commission dated the date hereof; and

(5) the remaining $338,600,816.86 will be transferred to the Treasurer for deposit to the 2006 Series A Project Fund.

(iv) The proceeds of the 2006 Series A Bonds transferred pursuant to the Irrevocable Refunding Instructions of the Commission will be used to defease and refund the Commission's Commercial Paper Notes (Water Series) on a current basis. The Notes were issued to finance a portion of the facilities described in Exhibit A hereto.

(v) The proceeds of the Bonds deposited in the 2006 Series A Project Fund will be used to finance a portion of the facilities described in Exhibit A hereto.

(vi) The Trustee will transfer and deposit the proceeds of the 2006 Refunding Series B Bonds received by the Trustee on the date hereof as follows:

(1) $192,498.04 will be deposited in the 2006 Refunding Series B Costs of Issuance Fund; and

(2) $111,178,241.95 will be deposited in the 2006 Refunding Series B Refunding Fund.

(vii) The proceeds of the Bonds deposited in the 2006 Refunding Series B Refunding Fund, together with amounts on deposit in the funds and accounts established under the Indenture for the Commission's San Francisco Water Revenue Bonds, 1996 Series A (the "1996 Series A Bonds") and its San Francisco Water Revenue Bonds, 2001 Series A (the "2001 Series A Bonds"), will be used to refund on an advance basis a portion of the outstanding 1996 Series A Bonds and a portion of the outstanding 2001 Series A Bonds. The portion of the 1996 Series A Bonds being refunded were issued to finance the facilities (the "1996 Project") described in Exhibit B hereto, and the portion of the 2001 Series A Bonds being refunded were used to finance the facilities (the "2001 Project") described in Exhibit B hereto.

(viii) Exhibit C hereto attached describes (A) each use to be made by any person of the Project, the 1996 Project and the 2001 Project other than use by the Commission and other non-federal governmental units and other than use by members of the public generally, and (B) payments (if any) directly or indirectly in respect of such use which are to be made after the date hereof;

(ix) Other than as set forth in Exhibit A and Exhibit B, no portion of the proceeds of the Bonds will be used, directly or indirectly, to make or finance a loan to any person (other than a State or local government unit) or to acquire property which will be sold or leased to any person (other than a State or local government unit) on an installment a sale basis except as referenced in Exhibit C.

(x) The Commission expects to use the Project for the purposes referenced and discussed in Exhibit A, Exhibit B, Exhibit C and Exhibit D or for other governmental purposes of the Commission during the entire term of the Bonds.

(xi) Set forth on Exhibit D is the Commission's methodology for determining governmental use and private use with respect to the water enterprise.

(xii) To the best knowledge of the undersigned, the above statements are reasonable and there are no other facts, estimates or circumstances, other than those set forth herein, that would materially affect the statements made herein.

Capitalized terms used but not defined herein have the meanings set forth in the Indenture.

IN WITNESS WHEREOF, I have hereunto set my name this 15th day of March, 2006.

PUBLIC UTILITIES COMMISSION OF THE
CITY AND COUNTY OF SAN FRANCISCO

By:________________________
General Manager

ATTACHMENT L-2 (CONTINUED)
WATER ENTERPRISE REVENUE BOND 2006 SERIES A
SUMMARY OF SOURCES AND USES OF FUNDS
(Section 5.04)

Source: Closing Documents (Certificate Regarding Use of Proceeds)

Proceeds		
Principal	507,815,000.00	
Plus Premium	19,109,138.35	
Minus Underwriter's Discount	(932,940.06)	
Minus Insurance	(1,973,563.58)	
Net Proceeds	524,017,634.71	
Use of Proceeds		
Capitalized Interest Fund	48,212,528.32	
Bond Reserve Fund	15,958,031.25	
Insurance Fund	623,906.09	
Series A Refunding Fund	120,622,352.19	459,223,169.05
Series A Project Fund	338,600,816.86	
Total Uses	524,017,634.71	

	Commercial Paper	**Project Fund**	**Total**
Hetch Hetchy			
Tesla Portal Disinfection	251,262.58	1,147,302.42	1,398,565.00
Advance Disinfection	429,714.76	5,611,554.24	6,041,269.00
SJPL	4,737,937.28	17,784,667.72	22,522,605.00
Total Hetch Hetchy	5,418,914.62	24,543,524.38	29,962,439.00
SF Regional			
University Mound - North	55,728.10	5,964,279.90	6,020,008.00
Sunset - North	7,525,896.84	28,782,094.16	36,307,991.00
Groundwater	3,400,973.67	2,963,110.33	6,364,084.00
Recycled Water	1,548,036.76	11,316,958.24	12,864,995.00
Total SF Regiona1	12,530,635.37	49,026,442.63	61,557,078.00
SF Local	45,405,787.71	106,407,313.30	151,813,101.01
Sunol Valley Subregional			
Calaveras Dam	9,065,945.51	15,993,818.49	25,059,764.00
Stand-by Power	556,398.67	1,207,319.33	1,763,718.00
Pipeline Readiness	649,566.31	4,942,205.69	5,591,772.00
SAPS Upgrade	213,423.44	1,748,134.56	1,961,558.00
SVWTP Finished Water Res	3,317,203.82	7,838,383.18	11,155,587.00
Irvington Tunnel	4,084,139.65	18,247,176.35	22,331,316.00
Alameda Creek Fishery	656,765.00	1,327,119.00	1,983,884.00
SVWTP 40 mgd Addition	25,378.75	3,474,585.25	3,499,964.00
Total Sunol Valley Subregional	18,568,821.15	54,778,741.85	73,347,563.00

ATTACHMENT L-2 (CONTINUED)
WATER ENTERPRISE REVENUE BOND 2006 SERIES A
SUMMARY OF SOURCES AND USES OF FUNDS
(Section 5.04)

Miscellaneous				
PEIR	3,204,177.44	5,103,872.56	8,308,050.00	
PPPCMS Services	2,964,786.31	10,358,811.69	13,323,598.00	
Watershed Land Acquisition	-	502,660.00	502,660.00	
Total Miscellaneous	6,168,963.75	15,965,344.25	22,134,308.00	
LLNL	133,156.60	282,702.40	415,859.00	
Bay Division Subregional				
Seismic Upgrade BDPL 3 & 4	4,758,306.54	16,481,539.46	21,239,846.00	
BDPL Reliability	4,360,664.44	40,874,800.56	45,235,465.00	
BDPL 3 & 4 Crossover	802,494.94	493,817.06	1,296,312.00	
SCADA Phase II	65,497.37	1,247,963.63	1,313,461.00	
EBMUD Intertie	6,668,906.37	4,075,015.63	10,743,922.00	
BDPL 4 Slipline	-	1,219,251.00	1,219,251.00	
Total Bay Division Subregional	16,655,869.66	64,392,387.34	81,048,257.00	
Peninsula Subregional				
Capuchino Valve Lot	162,584.69	753,779.31	916,364.00	
CS/SA Transmission	2,288,853.10	3,448,975.90	5,737,829.00	
Adit Leak Repair	255,334.99	1,650,368.01	1,905,703.00	
HTWTP Short Term	2,874,763.69	3,582,860.31	6,457,624.00	
Cross Connection Control	1,150,559.48	324,549.52	1,475,109.00	
CS Bypass Tunnel	2,873,475.22	15,532,584.78	18,406,060.00	
LCS Dam Improvement	931,587.07	3,278,932.93	4,210,520.00	
Pulgas Balancing Reservoir	1,218,341.39	2,706,284.61	3,924,626.00	
HTWTP Long Term	1,107,185.77	2,549,793.23	3,656,979.00	
Baden & San Pedro Valve Lots	60,203.48	2,963,540.52	3,023,744.00	
Total Peninsula Subregional	12,922,888.88	36,791,669.12	49,714,558.00	
San Francisco Subregional				
CSPL 2 Replacement	1,269,111.95	5,019,824.05	6,288,936.00	
SAPL 3	1,492,584.40	1,942,479.60	3,435,064.00	
Desalination	55,618.10	596,473.90	652,092.00	
Total San Francisco Subregional	2,817,314.45	7,558,777.55	10,376,092.00	
Grand Total	120,622,352.19	359,746,902.82	480,369,255.01	
Regional			328,140,295.00	68.31%
Local			152,228,960.01	31.69%
			480,369,255.01	

This certificate is for illustration only. It was prepared in 2006 and shown groundwater and recycled water projects as regional instead of local. In addition, it does not reflect expenditures for the portions of regional assets which in rate base as of June 30, 2008 nor what is expected to be added to rate base through June 30, 2009. For these reasons, the percentages shown for regional and local projects are not accurate.

ATTACHMENT L-3
WATER ENTERPRISE REVENUE BOND 2006 SERIES A
ANNUAL REPORT ON EXPENDITURES OF AND EARNINGS ON PROCEEDS
AS OF JUNE 30, 2009
(Section 5.04 A)

Project Number		Project Description	Net Financing Proceeds[1]	Appropriated Interest Earnings[2]	Adjusted Project Funding	Expenditures Thru 6/30/09[3]	Remaining Balance
REGIONAL PROGRAM							
		San Joaquin Region					
CUW373	Regional	San Joaquin Pipeline System Rehabilitation	1,398,565				
CUW384	Regional	Tesla Advance Disinfection	6,041,269				
CUW387	Regional	Tesla Portal Disinfection	22,522,605				
		Total San Joaquin Region	29,962,439				
		Sunol Valley Region					
CUW352	Regional	Alameda Creek Fishery Enhancement	1,983,884				
CUW355	Regional	Stand-by Power - Various Locations	1,763,718				
CUW359	Regional	New Irvington Tunnel/Alameda Siphon No. 4	22,331,316				
CUW370	Regional	Pipeline Readiness Improvements	5,591,772				
CUW374	Regional	Calaveras Dam Replacement	25,059,764				
CUW381	Regional	SVWTP 40 mgd Addition	3,499,964				
CUW382	Regional	SVWTP Finished Water Reservoir	11,155,587				
CUW386	Regional	San Antonio Pump Station Upgrade	1,961,558				
		Total Sunol Valley Region	73,347,563				
		Bay Division Region					
CUW353	Regional	Seismic Upgrade BDPL 3 & 4	21,234,846				
CUW363	Regional	SCADA Phase II/Security Upgrades	1,313,461				
CUW368	Regional	BDPL Reliability Upgrades	45,235,465				
CUW380	Regional	BDPL 3 & 4 Crossover	21,239,846				
CUW389	Regional	EBMUD Intertie	10,743,922				
CUW393	Regional	BDPL 4 Slipline	1,219,251				
		Total Bay Division Region	100,986,791				
		Peninsula Region					
CUW354	Regional	Lower Crystal Springs Dam Improvement	4,210,520				
CUW356	Regional	Crystal Springs Bypass Tunnel	18,406,060				
CUW357	Regional	Adit Leak Repairs	1,905,703				
CUW361	Regional	Pulgas Balancing Reservoir Rehabilitation and Improvements	3,924,626				
CUW365	Regional	Cross Connection Control	1,475,109				
CUW366	Regional	HTWTP Short Term Improvemetns	6,457,624				
CUW367	Regional	HTWTP Long Term Improvements	3,656,979				
CUW369	Regional	Capuchino Valve Lot Improvements	916,364				
CUW371	Regional	Crystal Springs/San Andreas Transmission	5,737,829				
CUW378	Regional	Crystal Springs Pipleine 2 Replacement	6,288,936				
CUW379	Regional	San Andreas Pipeline 3 Installation	3,435,064				
CUW390	Regional	Desalination	652,092				
CUW391	Regional	Baden & San Pedro Valve Lots Improvements	3,023,744				
		Total Peninsula Region	60,090,650				
		San Francisco Region					
CUW358	Regional	Sunset Reservoir Upgrades - North Basin	6,020,008				
CUW372	Regional	University Mound Reservoir Upgrades - North Basin	36,307,991				
		Total San Francisco Region	42,327,999				
		System-Wide					
CUW388	Regional	PEIR	8,308,050				
CUW392	Regional	Program Management Services	13,323,598				
CUW394	Regional	Watershed Land Acquisition	502,660				
		Total System-Wide	22,134,308				
		Total Regional Program	328,849,750				
LOCAL PROGRAM							
		Reservoirs					
CUW307	Local	Summit Reservoir Rehabilitation					
CUW310	Local	New Northwest Reservoir					
CUW319	Local	Hunters Point Reservoir Rehabilitation					
CUW334	Local	Stanford Heights Reservoir Rehabilitation					
CUW335	Local	Potrero Heights Reservoir Rehabilitation					
CUW337	Local	Sutro Reservoir Rehabilitation					
		Total Reservoirs					
		Pump Stations/Tanks					
CUW306	Local	Crocker Amazon Pump Station Upgrade					
CUW309	Local	Lake Merced Pump Station Upgrade					
CUW314	Local	La Grande Tank Upgrade					
CUW318	Local	Forest Hill Tank Rehabilitation					
CUW320	Local	Forest Hilll Pump Station Upgrade					
CUW321	Local	Forest Knoll Pump Station Upgrade					
CUW322	Local	Lincoln Park Pump Station Upgrade					
CUW323	Local	Alemany Pump Station Upgrade					
CUW324	Local	Mount Davidson Pump Station Upgrade					

WATER ENTERPRISE REVENUE BOND 2006 SERIES A
ANNUAL REPORT ON EXPENDITURES OF AND EARNINGS ON PROCEEDS
AS OF JUNE 30, 2009
(Section 5.04 A)

Project Number		Project Description	Net Financing Proceeds[1]	Appropriated Interest Earnings[2]	Adjusted Project Funding	Expenditures Thru 6/30/09[3]	Remaining Balance
CUW326	Local	Palo Alto Pump Station Upgrade					
CUW326	Local	Sktview-AquaVista Pump Station Upgrade					
CUW327	Local	Summit Pump Station Upgrade					
CUW328	Local	McLaren #1 Tank Rehabilitation					
CUW329	Local	Potrero Heights Tank Seismic Upgrade					
CUW330	Local	Forest Knoll Tank Seismic Upgrade					
CUW331	Local	Lincoln Park Tank Seismic Upgrade					
CUW332	Local	McLaren #2 Tank Rehabilitation					
CUW333	Local	Mount Davidson Tank Seismic Upgrade					
CUW338	Local	La Grande Pump Station Upgrade					
CUW339	Local	Potrero Heights Pump Station Upgrade					
CUW340	Local	Vista Francisco Pump Station Upgrade					
		Total Pump Stations/Tanks					
		Pipelines/Valves					
CUW304	Local	North University Mound System Upgrade					
CUW308	Local	Motorize Key Valves					
CUW311	Local	Sunset Circulation Improvements					
CUW312	Local	Lincoln Way Transmission Line					
CUW313	Local	Noe Valley Transmission Main, Phase 2					
CUW315	Local	East/West Transmission Main					
CUW316	Local	Fulton @ Sixth Ave Main Replacement					
		TtoalPipelines/Valves					
		Water Supply/Water Quality					
CUW301	Local	Groundwater					
CUW302	Local	Recycled Water					
CUW364	Local	Lawrence-Livermore National Laboratory Water Quality Improvements					
		Total Water Supply/Water Quality					
		Miscellaneous					
CUW303	Local	Vehicle Service Facility Upgrade					
CUW305	Local	Fire Protection at CCD					
		Total Miscellaneous					
		Total Local Program					
		Grand Total Regional and Local Programs					
		Unappropriated Interest Earnings					
		Percent of Net Proceeds[4]					
		Percent of Net Proceeds and Earnings[4]					

[1]Net financing proceeds available on date of issue (i.e. deposit to project fund)
[2]Cumulative net of arbitrage rebate liability
[3]Cumulative
[4]If financing sources Substantially Expended, proceed allocations are then fixed

REVENUE-FUNDED CAPITAL ADDITIONS (Section 5.04.B)
Subfund: 5W CPF WCF - Wholesale Customer Capital Fund (Water)

Projected FAMIS as of July 1, 2009 (Day 1 of New Budget Year)

Based on Proportionate Annual Water Deliveries of ... 68.7%

Project	Title	A FY 2009-10 Approved Budget* - Total Regional	B FY 2009-10 Approved Budget - WHOLESALE SHARE	C Total Appropriation - All Years^	D All Years Actual Expenditures^	E Fiscal Year 2009-10 Actual Expenditures^	F Encumbered But Not Expended^	G=C-D-F Appropriated, Unencumbered Balance^	H Projected Expended & Encumbered through 6/30/2010	I=G-H Projected Surplus / (Shortfall)
			Wholesale Customer Capital Fund (5W CPF WCF)							
CUW262	Regional Water RnR - Treatment Facilities	$ 1,000,000	$ 687,000	$ 687,000	$ -	$ -	$ -	$ 687,000	$ 229,000	$ 458,000
CUW263	Regional Water RnR - Conveyance/Transmission Systems	$ 7,000,000	$ 4,809,000	$ 4,809,000	$ -	$ -	$ -	$ 4,809,000	$ 1,603,000	$ 3,206,000
CUW264	Regional Water - Watersheds / ROW Management	$ 500,000	$ 343,500	$ 343,500	$ -	$ -	$ -	$ 343,500	$ 114,000	$ 229,500
FUW100	Regional Water - Facilities Maintenance	$ 3,700,000	$ 2,541,900	$ 2,541,900	$ -	$ -	$ -	$ 2,541,900	$ 847,000	$ 1,694,900
CUW261	Regional Water - Storage									
	Regional Total	$ 12,200,000	$ 8,381,400	$ 8,381,400	$ -	$ -	$ -	$ 8,381,400	$ 2,793,000	$ 5,588,400

Source: * SFPUC Commission Approved Budget, February 2009, Same Format
^ FAMIS - City's Official Financial System of Record

Ties to Budget Hearing Materials

REVENUE-FUNDED CAPITAL ADDITIONS (Section 5.04.B)
Subfund: 5W CPF WCF - Wholesale Customer Capital Fund (Water)

Projected FAMIS as of June 30, 2010 (Last Day of Budget Year)

Based on Proportionate Annual Water Deliveries of ... 68.7%

Project	Title	FY 2009-10 Approved Budget* - Total Regional	FY 2009-10 Approved Budget - WHOLESALE SHARE	Total Appropriation - All Years^	All Years Actual Expenditures^	Fiscal Year 2009-10 Actual Expenditures^	Encumbered But Not Expended^	Appropriated, Unencumbered Balance^	Projected Expended & Encumbered through 6/30/2011	Projected Surplus / (Shortfall)
			Wholesale Customer Capital Fund (5W CPF WCF)							
CUW262	Regional Water RnR - Treatment Facilities	$ 1,000,000	$ 687,000	$ 687,000	$ 235,000	$ 235,000	$ -	$ 452,000	$ 409,000	$ 43,000
CUW263	Regional Water RnR - Conveyance/Transmission Systems	$ 7,000,000	$ 4,809,000	$ 4,809,000	$ 1,395,000	$ 1,395,000	$ 25,000	$ 3,389,000	$ 1,589,000	$ 1,800,000
CUW264	Regional Water - Watersheds / ROW Management	$ 500,000	$ 343,500	$ 343,500	$ 115,000	$ 115,000	$ 50,000	$ 178,500	$ 35,500	$ 143,000
FUW100	Regional Water - Facilities Maintenance	$ 3,700,000	$ 2,541,900	$ 2,541,900	$ 850,000	$ 850,000	$ 123,000	$ 1,568,900	$ 768,900	$ 800,000
CUW261	Regional Water - Storage	$ -	$ -							
	Regional Total	$ 12,200,000	$ 8,381,400	$ 8,381,400	$ 2,595,000	$ 2,595,000	$ 198,000	$ 5,588,400	$ 2,802,400	$ 2,786,000

Source: * SFPUC Commission Approved Budget, February 2009, Same Format
^ FAMIS - City's Official Financial System of Record

Ties to Budget Hearing Materials
Shown on Attachment N-2, Schedule 3

Shown On Attachment N-2, Schedule 3
Revenue Capital - Actual Expenditures

Shown on Attachement N-2, Schedule 3
Continuing Appropriation
Needed for Mulit-Year
Revenue Funded Capital

REVENUE-FUNDED CAPTIAL ADDITIONS (Section 5.04.B)
Subfund: 5T CPF WCF - Wholesale Customer Capital Fund (Hetch Hetchy)

Projected FAMIS as of July 1, 2009 (Day 1 of New Budget Year)

Based on Proportionate Annual Water Deliveries of ...

		A		B	C	D	E	F	G=C-D-F	H	I=G-H
				Wholesale Customer Capital Fund (5W CPF WCF)							
				68.1%							
Project	Title	FY 2009-10 Approved Budget* - Total Regional		FY 2009-10 Approved Budget - WHOLESALE SHARE	Total Appropriation - All Years^	All Years Actual Expenditures^	Fiscal Year 2009-10 Actual Expenditures^	Encumbered But Not Expended^	Appropriated, Unencumbered Balance^	Projected Expended & Encumbered through 6/30/2010	Projected Surplus / (Shortfall)
CUH931	HH Microwave Replacement	$ 4,000,000	J	$ 1,224,900	$ 1,224,900	$ -	$ -	$ -	$ 1,224,900	$ 408,000	$ 816,900
CUH977	HH Water R&R - Facilities Maintenance	$ 3,500,000	J	$ 1,071,788	$ 1,071,788	$ -	$ -	$ -	$ 1,071,788	$ 357,000	$ 714,788
CUH947	SEA - Go Solar Incentive Porject	$ 4,000,000	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH971	Alternative Transmission Studies	$ 1,000,000	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH976	HH Water R&R - Power Infrastructure	$ 16,700,000	P	$ -	$ -					$ -	
CUH979	Hunters Point Municipal Power	$ -	P	$ -	$ -					$ -	
CUH983	Civic Center Sustainability District	$ 1,090,000	P	$ -	$ -					$ -	
CUH986	General Fund Dept - Energy Efficiency	$ 7,365,158	P	$ -	$ -					$ -	
	Renewable/Generation	$ 3,501,307	P	$ -	$ -					$ -	
	Treasure Island Improvement Project	$ 2,700,000	P	$ -	$ -					$ -	
	Enterprise Fund Dept - Energy Efficiency	$ 325,722	P	$ -	$ -					$ -	
CUH975	HH Water R&R - Water Infrastructure	$ 6,000,000	W	$ 4,083,000	$ 4,083,000					$ 1,361,000	
	Toulumne River Watershed Protection	$ 2,000,000	W	$ 1,361,000	$ 1,361,000					$ 454,000	
	Regional Total	$ 52,182,187		$ 7,740,688	$ 7,740,688	$ -	$ -	$ -	$ 2,296,688	$ 2,580,000	$ 1,531,688

Ties to Budget Hearing Materials

Source: * SFPUC Commission Approved Budget, February 2009, Same Format
^ FAMIS - City's Official Financial System of Record

REVENUE-FUNDED CAPTIAL ADDITIONS (Section 5.04.B)
Subfund: 5T CPF WCF - Wholesale Customer Capital Fund (Hetch Hetchy)

Projected FAMIS as of June 30, 2010 (Last Day of Budget Year)

Based on Proportionate Annual Water Deliveries of ...

				Wholesale Customer Capital Fund (5W CPF WCF)							
				68.1%							
Project	Title	FY 2009-10 Approved Budget* - Total Regional		FY 2009-10 Approved Budget - WHOLESALE SHARE	Total Appropriation - All Years^	All Years Actual Expenditures^	Fiscal Year 2009-10 Actual Expenditures^	Encumbered But Not Expended^	Appropriated, Unencumbered Balance^	Projected Expended & Encumbered through 6/30/2011	Projected Surplus / (Shortfall)
CUH931	HH Microwave Replacement	$ 4,000,000	J	$ 1,224,900	$ 1,224,900	$ 1,224,900	$ 1,224,900	$ -	$ -	$ -	$ -
CUH977	HH Water R&R - Facilities Maintenance	$ 3,500,000	J	$ 1,071,788	$ 1,071,788	$ 1,071,788	$ 1,071,788	$ -	$ (1)	$ (1)	$ -
CUH947	SEA - Go Solar Incentive Porject	$ 4,000,000	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH971	Alternative Transmission Studies	$ 1,000,000	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH976	HH Water R&R - Power Infrastructure	$ 16,700,000	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH979	Hunters Point Municipal Power	$ -	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH983	Civic Center Sustainability District	$ 1,090,000	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH986	General Fund Dept - Energy Efficiency	$ 7,365,158	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Renewable/Generation	$ 3,501,307	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Treasure Island Improvement Project	$ 2,700,000	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Enterprise Fund Dept - Energy Efficiency	$ 325,722	P	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CUH975	HH Water R&R - Water Infrastructure	$ 6,000,000	W	$ 4,083,000	$ 4,083,000	$ 4,083,000	$ 4,083,000	$ -	$ -	$ -	$ -
	Toulumne River Watershed Protection	$ 2,000,000	W	$ 1,361,000	$ 1,361,000	$ 1,361,000	$ 1,361,000	$ -	$ -	$ -	$ -
	Regional Total	$ 52,182,187		$ 7,740,688	$ 7,740,688	$ 7,740,688	$ 7,740,688	$ -	$ (1)	$ (1)	$ -

Shown On Attachment N-2, Schedule 6
Revenue Capital - Actual Expenditures

Show on Attachment N-2, Schedule 6
Continuing Appropriation
Needed for Mulit-Year
Revenue Funded Capital

Ties to Budget Hearing Materials
Shown on Attachment N-2, Schedule 6

Source: * SFPUC Commission Approved Budget, February 2009, Same Format
^ FAMIS - City's Official Financial System of Record

ATTACHMENT M-2

REVENUE FUNDED CAPITAL
ANNUAL REPORTING REQUIREMENTS
(Section 5.04B)

Part A. Updated Actual Information Through Most Recent Fiscal Year (Due in November)

Each year, the SFPUC will provide a report on the status of the regional revenue funded projects with the following information:

Project-level information (through close-out)

1 Scope of project
2 Current cost estimate/budget.
3 Expected milestone dates (ie, design, environmental, construction period, close-out, etc.)
4 Contract status
5 Reasons for status changes from prior report.
6 Other information relevant to whether project is on time/on budget.
7 For most recently completed fiscal year and estimated for current year:
8 Total expenditures (capital and operating); amounts paid from other sources.
9 Amount of encumbered and unencumbered appropriations
10 Application of any unused appropriations

Wholesale Capital Fund

11 Beginning balance, deposits, capital expenditures (by project), earnings, ending balance.
12 Components of ending balance; wholesale portion of:
13 Appropriated and encumbered
14 Appropriated but unencumbered

Part B. Proposed Appropriations for Upcoming Year (Due in March)

15 Project information, to the extent not provided in Part A
16 Expected funding needs for regional projects
17 Unused or excess appropropriations carried over.
18 Proposed appropriation for upcoming fiscal year.

ATTACHMENT M-3
WHOLESALE REVENUE-FUNDED CAPITAL FUND - BALANCING ACCOUNT ADJUSTMENT
**** EXAMPLE REPORTING FORMAT ****
(Section 6.08)

	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)
	FY 2009-10	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
a. Beginning balance	$0	$5,671,414	$8,960,834	$9,669,194	$10,420,781	$11,217,991	$5,498,801	$6,198,022	$6,944,933	$7,742,299	$8,593,037
b. Transfer to Balancing Account	$0					($6,467,533)					($2,574,995)
Year 1											
c. Budgeted appropriation	$8,381,400					$10,697,026					$13,652,417
d. Encumbrance/Expenditure	($2,793,800)	($2,793,800)	($2,793,800)			($3,565,675)	($3,565,675)	($3,565,675)			($4,550,806)
Year 2											
e. Budgeted appropriation		$8,800,470					$11,231,878				
f. Encumbrance/Expenditure		($2,933,490)	($2,933,490)	($2,933,490)			($3,743,959)	($3,743,959)	($3,743,959)		
Year 3											
g. Budgeted appropriation			$9,240,494					$11,793,471			
h. Encumbrance/Expenditure			($3,080,165)	($3,080,165)	($3,080,165)			($3,931,157)	($3,931,157)	($3,931,157)	
Year 4											
i. Budgeted appropriation				$9,702,518					$12,383,145		
j. Encumbrance/Expenditure				($3,234,173)	($3,234,173)	($3,234,173)			($4,127,715)	($4,127,715)	($4,127,715)
Year 5											
k. Budgeted appropriation					$10,187,644					$13,002,302	
l. Encumbrance/Expenditure					($3,395,881)	($3,395,881)	($3,395,881)			($4,334,101)	($4,334,101)
m. Subtotal	$5,587,600	$8,744,594	$9,393,873	$10,123,885	$10,898,206	$5,251,755	$6,025,163	$6,750,702	$7,525,246	$8,351,628	$6,657,838
n. Interest earnings (e.g., 3%)	$83,814	$216,240	$275,321	$296,896	$319,785	$247,046	$172,859	$194,231	$217,053	$241,409	$228,763
o. Ending fund balance (unencumbered, unexpende	$5,671,414	$8,960,834	$9,669,194	$10,420,781	$11,217,991	$5,498,801	$6,198,022	$6,944,933	$7,742,299	$8,593,037	$6,886,601
p. Five Year Cumulative Appropriations w/ interest					$47,504,581					$60,180,421	
q. 10% of Cumulative Appropriations w/ interest					$4,750,458					$6,018,042	
r. Ending fund balance					$11,217,991					$8,593,037	
s. Excess balance transferred to Balancing Account*					($6,467,533)					($2,574,995)	

*Test: Any balance in excess of 10% of the cumulative five-year appropriation total is credited to the balancing account.

BALANCING ACCOUNT / RATE SETTING CALCULATION
REFERENCE SECTION 6.03.A.3.a

	FY 2007-08	FY 2008-09	FY 2009-10
Step 1:			
A. Balancing Account as of June 30, 2007	$12,882,000		
B. Interest on Balancing Account at Pooled Investment Rate for Fiscal Year	$554,000		
C. Wholesale Revenues for Fiscal Year	($113,932,000)		
D. Wholesale Revenue Requirement for Fiscal Year	$119,224,000		
E. Settlement Credits or Other Adjustments	$2,448,614		
F. 1984 Agreement Balancing Account Credits	$0		
G. Balancing Account as of June 30, 2008	$21,176,614		
Step 2:			
A. Balancing Account as of June 30, 2008		$21,176,614	
B. Interest on Balancing Account at Pooled Investment Rate for Fiscal Year		$529,000	
C. Wholesale Revenues for Fiscal Year		-$123,604,000	
D. Wholesale Revenue Requirement for Fiscal Year		$120,562,000	
E. Settlement Credits or Other Adjustments		$21,000	
F. 1984 Agreement Balancing Account Credits		$0	
G. Balancing Account as of June 30, 2009		$18,684,614	
Step 3:			
A. Balancing Account as of June 30, 2009			$0
B. Interest on Balancing Account at Pooled Investment Rate for Fiscal Year			$0
C. Wholesale Revenues for Fiscal Year			-$127,485,900
D. Wholesale Revenue Requirement for Fiscal Year			$140,994,733
E. Settlement Credits or Other Adjustments			$21,000
F. 1984 Agreement Balancing Account Credits			$1,997,220
G. Balancing Account as of June 30, 2010			$15,527,053
H. Net Change in Wholesale Revenue Coverage			$4,488,233
I. Total Revenue Deficiency or Surplus			$20,015,286
J. Projected Water Sales in Ccf	84,621,240	83,205,600	85,920,000
K. Deficiency or (Surplus) $/Ccf			$0.23
L. Deficiency or (Surplus) Ccf as a Percentage of Revenues			15.7%

Note: Dollar amounts are for illustrative purposes only. The Parties have not agreed on the amount of the balancing account as of June 30, 2007, revenue requirement for FY 2007-08, settlement credits for FY 2007-08, and the amount of the balancing account as of June 30, 2009.

BALANCING ACCOUNT / RATE SETTING CALCULATION
METHOD OF CALCULATION
REFERENCE SECTION 6.03.A.3.a

N = The year for which rates are being set

N-1 = The current year

N-2 = The most recently completed year for which actual results are available

Calculation Method:

Step 1 Determine the actual revenue differential for year N-2
- A. Enter the beginning amount of the Balancing Account
- B. Calculate the interest earned at the Pooled Investment Account Rate for (A)
- C. Enter the actual Wholesale revenues billed
- D. Enter the Wholesale Revenue Requirement
- E. Enter settlement credits or adjustments, if any
- F. Enter carry-over 1984 Agreement credits owed the City, if any
- G. Calculate the ending amount of the Balancing Account

Step 2 Determine the projected revenue differential for year N-1
- A. Enter the beginning amount of the Balancing Account; this is the same amount as G in Step 1
- B. Calculate the interest earned at the Pooled Investment Account Rate for (A)
- C. Enter the actual Wholesale revenues billed
- D. Enter the Wholesale Revenue Requirement
- E. Enter settlement credits or adjustments, if any
- F. Enter carry-over 1984 Agreement credits owed the City, if any
- G. Calculate the ending amount of the Balancing Account

Step 3 Determine the projected revenue differential for year N
- A. Enter the beginning amount of the Balancing Account; this is the same amount as G in Step 2
- B. Calculate the interest earned at the Pooled Investment Account Rate for (A)
- C. Enter the actual Wholesale revenues billed
- D. Enter the Wholesale Revenue Requirement
- E. Enter settlement credits or adjustments, if any
- F. Enter carry-over 1984 Agreement credits owed the City, if any
- G. Calculate the ending amount of the Balancing Account
- H. Enter the net change in the Wholesale Revenue Coverage, if applicable
- I. Calculate the total revenue deficiency or surplus (G) + (H)
- J. Enter the projected water sales to Wholesale Customers in Ccf
- K. Calculate the required increase in the commodity portion of the rate by dividing (I) by (J)
- L. Calculate the required increase in revenues by dividing (I) by (C)

WHOLESALE REVENUE REQUIREMENT SCHEDULES
CALCULATION OF WHOLESALE REVENUE REQUIREMENT
FISCAL YEAR 2009-10
REFERENCE ARTICLE 5

EXPENSE CATEGORY	CONTRACT REFERENCE	SCHEDULE REFERENCE	TOTAL	DIRECT RETAIL	DIRECT WHOLESALE	REGIONAL	JOINT EXPENSE ALLOCATION FACTOR	WHOLESALE SHARE
OPERATING AND MAINTENANCE EXPENSE:								
SOURCE OF SUPPLY	5.05 (A)	SCH 8.1	$ 14,943,953	$ 1,251,062	$ -	$ 13,692,891	ANNUAL USE[1]	$ 9,364,568
PUMPING	5.05 (B)	SCH 8.1	$ 4,342,682	$ 3,854,000	$ -	$ 488,682	ANNUAL USE[1]	$ 334,210
TREATMENT	5.05 (C)	SCH 8.1	$ 30,445,053	$ -	$ -	$ 30,445,053	ANNUAL USE[1]	$ 20,821,372
TRANSMISSION & DISTRIBUTION	5.05 (D)	SCH 8.1	$ 53,416,232	$ 30,163,286	$ -	$ 23,252,946	ANNUAL USE[1]	$ 15,902,690
CUSTOMER ACCOUNTS[2]	5.05 (E)	SCH 8.1	$ 7,552,213	$ 7,401,169	$ 151,044	$ -	2%	$ 151,044
TOTAL O&M			$ 110,700,133	$ 42,669,517	$ 151,044	$ 67,879,572		46,573,883
COMPOSITE % (WHOLESALE SHARE / TOTAL O&M)	5.06 (C)							42.07%
ADMINISTRATIVE AND GENERAL EXPENSES:								
COWCAP	5.06 (A)	SCH 8.1	$ 1,238,009	$ -	$ -	$ 1,238,009	COMPOSITE O&M	$ 520,857
SERVICES OF SFPUC BUREAUS	5.06 (B)	SCH 7	$ 22,465,291	$ 8,178,424	$ -	$ 14,286,867	ANNUAL USE[1]	$ 9,770,788
OTHER A&G	5.06 (C)	SCH 8.1	$ 12,972,477	$ 4,009,891	$ -	$ 8,962,586	COMPOSITE O&M	$ 3,770,749
COMPLIANCE AUDIT	5.06 (D)	SCH 8.1	$ 200,000	$ -	$ -	$ 200,000	50%	$ 100,000
TOTAL A&G			$ 36,875,777	$ 12,188,315	$ -	$ 24,687,462		$ 14,162,394
PROPERTY TAXES	5.07	SCH 8.1	$ 1,417,293	$ -	$ -	$ 1,417,293	ANNUAL USE[1]	$ 969,287
CAPITAL COST RECOVERY								
PRE-2009 ASSETS	5.03	ATT K						$ 24,051,326
DEBT SERVICE ON NEW ASSETS	5.04 (A)	SCH 2						$ 17,952,931
REVENUE FUNDED ASSETS - APPROPRIATED TO WHOLESALE CAPITAL FUND	5.04 (B)	SCH 3						$ 8,381,400
TOTAL CAPITAL COST RECOVERY								$ 50,385,657
WHOLESALE SHARE HETCH HETCHY WATER & POWER	5.04	SCH 4						$ 28,903,512
WHOLESALE REVENUE REQUIREMENT								$ 140,994,733
WHOLESALE REVENUE COVERAGE[3]								$ 4,488,233

[1]Proportional Annual Use (68.39%)
[2]Water Enterprise Share of Customer Accounts Expenses (62% of Total Customer Accounts Expenses)
[3]25% of Wholesale Share of Debt Service

WHOLESALE REVENUE REQUIREMENT SCHEDULES
WATER ENTERPRISE CAPITAL COST RECOVERY - ANNUAL DEBT SERVICE
FISCAL YEAR 2009-10
REFERENCE SECTION 5.04.A

ATTACHMENT N-2
SCHEDULE 2

	2006 BOND ISSUE SERIES A	2008 BOND ISSUE ALL SERIES	2009 BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	TOTAL ALL OUTSTANDING BONDS
USE OF BOND PROCEEDS								
RETAIL PROJECTS	31.61%	22.95%	19.42%	XX.XX%	XX.XX%	XX.XX%	XX.XX%	[redacted]
REGIONAL PROJECTS	68.39%	77.05%	80.58%	YY.YY%	YY.YY%	YY.YY%	YY.YY%	
PRINCIPAL PAYMENT	$ 8,765,000	-	-	-			-	$ 8,765,000
RETAIL PROJECTS	$ 2,770,617	-	-			-	-	$ 2,770,617
REGIONAL PROJECTS	$ 5,994,384	-	-			-	-	$ 5,994,384
INTEREST PAYMENT (GROSS)	$ 23,353,388	$ 5,561,386	$ 56,181,932		-	-	-	$ 85,096,706
RETAIL PROJECTS	$ 7,382,006	$ 1,276,338	$ 10,910,531	-	-	-	-	$ 19,568,875
REGIONAL PROJECTS	$ 15,971,382	$ 4,285,048	$ 45,271,401	-	-	-	-	$ 65,527,831
INTEREST PAYMENT (CAPITALIZED)	-	-	$ 56,181,932					
RETAIL PROJECTS	-	-	$ 10,910,531					
REGIONAL PROJECTS	-	-	$ 45,271,401					
INTEREST PAYMENT (NET)	$ 23,353,388	$ 5,561,386	-					
RETAIL PROJECTS	$ 7,382,006	$ 1,276,338	-					
REGIONAL PROJECTS	$ 15,971,382	$ 4,285,048	-					
TOTAL PRINCIPAL AND INTEREST PAYMENT	32,118,388	5,561,386	-	-	-	-	-	$ 37,679,774
RETAIL PROJECTS	10,152,622	1,276,338	-	-	-	-	-	$ 11,428,961
REGIONAL PROJECTS	21,965,766	4,285,048	-	-	-	-	-	$ 26,250,813
PROPORTIONAL ANNUAL USE	68.39%	68.39%	68.39%	ZZ.ZZ%	ZZ.ZZ%	ZZ.ZZ%	ZZ.ZZ%	[redacted]
WHOLESALE SHARE	$ 15,022,387	$ 2,930,544	-	-	-	-	-	$ 17,952,931 (TO SCHEDULE 1)

Note: Allocation of bond proceeds shown are for illustrative purposes only. Regional projects will not include bond proceeds used to construct or acquire assets capitalized prior to 7/1/09. Regional projects also will not include in-city groundwater or in-city recycled water projects.

WHOLESALE REVENUE REQUIREMENT SCHEDULES
WATER ENTERPRISE CAPITAL COST RECOVERY - REVENUE FUNDED CAPITAL PROJECTS
FISCAL YEAR 2009-10
REFERENCE SECTION 5.04.B

ATTACHMENT N-2
SCHEDULE 3

		PROJECT APPROPRIATION	CLASSIFICATION	ALLOCATION FACTOR	WHOLESALE SHARE	TOTAL APPROPRIATION ALL YEARS	ALL YEARS ACTUAL EXPENDITURES	FY 2009-10 ACTUAL EXPENDITURES	ENCUMBERED, NOT EXPENDED	APPROPRIATED, UNENCUMBERED BALANCE
CUH980	Treasure Island Improvement Project	3,800,000	RETAIL	0.0%	$ -	$ -	$ -	$ -	$ -	$ -
CUW253	Facilities Security	500,000	RETAIL	0.0%	$ -	$ -	$ -	$ -	$ -	$ -
CUW260	Local Water R&R	22,347,520	RETAIL	0.0%	$ -	$ -	$ -	$ -	$ -	$ -
CUW686	Automated Meter Reading System	36,001,000	RETAIL	0.0%	$ -	$ -	$ -	$ -	$ -	$ -
	Total Local	62,648,520			$ -	$ -	$ -	$ -	$ -	$ -
CUW202	Replace Prestressed Concrete Cylr Pipe	-	REGIONAL	68.7%	$ -	$ -	$ -	$ -	$ -	$ -
CUW261	Regional Water R&R - Storage	-	REGIONAL	68.7%	$ -	$ -	$ -	$ -	$ -	$ -
CUW262	Regional Water R&R -Treatment Facilities	1,000,000	REGIONAL	68.7%	$ 687,000	$ 687,000	$ 235,000	$ 235,000	$ -	$ 452,000
CUW263	Regional Water R&R Conveyance/Transmission	7,000,000	REGIONAL	68.7%	$ 4,809,000	$ 4,809,000	$ 1,395,000	$ 1,395,000	$ 25,000	$ 3,389,000
CUW264	Regional Watersheds/ROW Management	500,000	REGIONAL	68.7%	$ 343,500	$ 343,500	$ 115,000	$ 115,000	$ 50,000	$ 178,500
FUW100	Regional Facilities Maintenance	3,700,000	REGIONAL	68.7%	$ 2,541,900	$ 2,541,900	$ 850,000	$ 850,000	$ 123,000	$ 1,568,900
	Total Regional	12,200,000			$ 8,381,400	$ 8,381,400	$ 2,595,000	$ 2,595,000	$ 198,000	$ 5,588,400
	TOTAL ALL PROJECTS	74,848,520			$ 8,381,400	$ 8,381,400	$ 2,595,000	$ 2,595,000	$ 198,000	$ 5,588,400
								(TO SCHEDULE 1)	(TO SCHEDULE 1)	(TO SCHEDULE 1)

WHOLESALE REVENUE REQUIREMENT SCHEDULES
CALCULATION OF WHOLESALE SHARE OF HETCH HETCHY WATER & POWER
FISCAL YEAR 2009-10
REFERENCE ARTICLE 5

ATTACHMENT N-2
SCHEDULE 4

EXPENSE CATEGORY	CONTRACT REFERENCE	SCHEDULE REFERENCE	TOTAL	POWER SPECIFIC	WATER SPECIFIC	JOINT	JOINT ALLOCATION PERCENTAGE	WATER-RELATED TOTAL	WHOLESALE ALLOCATION FACTOR	WHOLESALE SHARE
OPERATION AND MAINTENANCE										
OPERATION	5.08 B 1	SCH 8.2	$ 44,612,220	$ 31,853,965	$ 9,557,861	$ 3,200,394	45%	$ 10,998,038	ADJUSTED PROPORTIONAL ANNUAL USE	$ 7,484,165
MAINTENANCE	5.08 B 1	SCH 8.2	$ 16,868,612	$ 5,048,039	$ 3,238,622	$ 8,581,951	45%	$ 7,100,500	ADJUSTED PROPORTIONAL ANNUAL USE	$ 4,831,890
TOTAL OPERATION AND MAINTENANCE			$ 61,480,832	$ 36,902,004	$ 12,796,483	$ 11,782,345		$ 18,098,538		$ 12,316,055
ADMINISTRATIVE AND GENERAL										$ -
COWCAP	5.08 B 2	SCH 8.2	$ 1,139,579	$ -	$ -	$ 1,139,579	45%	$ 512,811	ADJUSTED PROPORTIONAL ANNUAL USE	$ 348,968
SERVICES OF SFPUC BUREAUS	5.08 B 2	SCH 7	$ 8,255,307	$ 5,375,656	$ 2,879,651	$ -	45%	$ 2,879,651	ADJUSTED PROPORTIONAL ANNUAL USE	$ 1,959,603
OTHER A&G	5.08 B 2	SCH 8.2	$ 25,581,481	$ 14,913,071	$ 36,070	$ 10,632,340	45%	$ 4,820,623	ADJUSTED PROPORTIONAL ANNUAL USE	$ 3,280,434
CUSTOMER ACCOUNTS	5.08 B 2	SCH 8.2	$ 347,403	$ 347,403	$ -	$ -	45%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -
TOTAL ADMINISTRATIVE AND GENERAL			$ 35,323,770	$ 20,636,130	$ 2,915,721	$ 11,771,919		$ 8,213,085		$ 5,589,004
PROPERTY TAXES	5.08 B 3	SCH 8.2	$ 452,000	$ -	$ -	$ 456,305	45%	$ 205,337	ADJUSTED PROPORTIONAL ANNUAL USE	$ 139,732
CAPITAL COST RECOVERY										
PRE-2009 ASSETS	5.09 B 1	ATT K-4								$ 3,118,033
DEBT SERVICE ON NEW ASSETS	5.09 B 2	SCH 5								$ -
REVENUE FUNDED ASSETS-APPROPRIATIONS TO WHOLESALE CAPITAL FUND	5.09 B 3	SCH 6								$ 7,740,688
TOTAL CAPITAL COST RECOVERY										$ 10,858,721
WHOLESALE SHARE OF HETCH HETCHY WATER & POWER										$ 28,903,512 (TO SCHEDULE 1)
WHOLESALE REVENUE COVERAGE[1]										$ -

[1]Adjusted Proportional Annual Use (68.39% X 99.50% = 68.05%)
[2]25% of Wholesale Share of Debt Service

WHOLESALE REVENUE REQUIREMENT SCHEDULES
HETCH HETCHY CAPITAL COST RECOVERY - ANNUAL DEBT SERVICE
FISCAL YEAR 2009-10
REFERENCE SECTION 5.09.B.1

ATTACHMENT N-2
SCHEDULE 5

	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	XXXX BOND ISSUE ALL SERIES	TOTAL ALL OUTSTANDING BONDS
USE OF BOND PROCEEDS								
POWER PROJECTS	XX.XX%	XX.XX%	XX.XX%	XX.XX%	XX.XX%	XX.XX%	XX.XX%	[redacted]
WATER PROJECTS	YY.YY%	YY.YY%	YY.YY%	YY.YY%	YY.YY%	YY.YY%	YY.YY%	
JOINT PROJECTS	ZZ.ZZ%	ZZ.ZZ%	ZZ.ZZ%	ZZ.ZZ%	ZZ.ZZ%	ZZ.ZZ%	ZZ.ZZ%	
PRINCIPAL PAYMENT	-	-	-	-	-	-	-	-
POWER SHARE	-	-	-	-	-	-	-	-
WATER SHARE	-	-	-	-	-	-	-	-
JOINT SHARE	-	-	-	-	-	-	-	
INTEREST PAYMENT (NET)	-	-	-	-	-	-	-	-
POWER SHARE	-	-	-	-	-	-	-	-
WATER SHARE	-	-	-	-	-	-	-	-
JOINT SHARE								
TOTAL PRINCIPAL AND INTEREST PAYMENT	-	-	-	-	-	-	-	-
POWER SHARE	-	-	-	-	-	-	-	-
WATER SHARE	-	-	-	-	-	-	-	-
JOINT SHARE								
WATER RELATED PRINCIPAL AND INTEREST PAYMENT[1]								
ADJUSTED PROPORTIONAL ANNUAL USE	68.05%	68.05%	68.05%	68.05%	68.05%	68.05%	68.05%	[redacted]
WHOLESALE SHARE	-	-	-	-	-	-	-	-
								(TO SCHEDULE 4)

[1]Water Related = 100% of Water Share + 45% of Joint Share

WHOLESALE REVENUE REQUIREMENT SCHEDULES
HETCH HETCHY CAPITAL COST RECOVERY - REVENUE FUNDED CAPITAL PROJECTS
FISCAL YEAR 2009-10
REFERENCE SECTION 5.04.B

		PROJECT APPROPRIATION	CLASSIFICATION	WATER RELATED PERCENTAGE	WATER RELATED SHARE	ALLOCATION FACTOR	WHOLESALE SHARE	TOTAL APPROPRIATION ALL YEARS	ALL YEARS ACTUAL EXPENDITURES	FY 2009-10 ACTUAL EXPENDITURES	ENCUMBERED, NOT EXPENDED	APPROPRIATED, UNENCUMBERED BALANCE
CUH931	HH Microwave Replacement	$ 4,000,000	JOINT	45%	$ 1,800,000	ADJUSTED PROPORTIONAL ANNUAL USE	$ 1,224,900	$ 1,224,900	$ 1,224,900	$ 1,224,900	$ -	$
CUH977	HH Water R&R - Facilities Maintenance	$ 3,500,000	JOINT	45%	$ 1,575,000	ADJUSTED PROPORTIONAL ANNUAL USE	$ 1,071,788	$ 1,071,788	$ 1,071,788	$ 1,071,788	$ -	$
	Total Joint	$ 7,500,000			$ 3,375,000		$ 2,296,688	$ 2,296,688	$ 2,296,688	$ 2,296,688	$ -	$
CUH947	SEA - Go Solar Incentive Project	$ 4,000,000	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
CUH971	Alternative Transmission Studies	$ 1,000,000	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
CUH976	HH Water R&R - Power Infrastructure	$ 16,700,000	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
CUH979	Hunters Point Municipal Power	$ -	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
CUH983	Civic Center Sustainability District	$ 1,090,000	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
CUH986	General Fund Dept - Energy Efficiency	$ 7,365,158	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
	Renewable/Generation	$ 3,501,307	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
	Treasure Island Improvement Project	$ 2,700,000	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
	Enterprise Fund Dept - Energy Efficiency	$ 325,722	POWER	0%	$ -	ADJUSTED PROPORTIONAL ANNUAL USE	$ -					
	Total Power	$ 36,682,187			$ -		$ -					
CUH975	HH Water R&R - Water Infrastructure	$ 6,000,000	WATER	100%	$ 6,000,000	ADJUSTED PROPORTIONAL ANNUAL USE	$ 4,083,000	$ 4,083,000	$ 4,083,000	$ 4,083,000	$ -	$
	Toulumne River Watershed Protection	$ 2,000,000	WATER	100%	$ 2,000,000	ADJUSTED PROPORTIONAL ANNUAL USE	$ 1,361,000	$ 1,361,000	$ 1,361,000	$ 1,361,000	$ -	$
	Total Water	$ 8,000,000			$ 8,000,000		$ 5,444,000	$ 5,444,000	$ 5,444,000	$ 5,444,000	$ -	$
	TOTAL ALL WATER RELATED PROJECTS	$ 96,364,374			$ 11,375,000		$ 7,740,688	$ 7,740,688	$ 7,740,688	$ 7,740,688 (TO SCHEDULE 4)	$ - (TO SCHEDULE 4)	$ - (TO SCHEDULE 4)

WHOLESALE REVENUE REQUIREMENT SCHEDULES
SERVICES OF SFPUC BUREAUS - ALLOCATION TO ENTERPRISES
FISCAL YEAR 2009-10
REFERENCE SECTION 5.05.B

ATTACHMENT N-2
SCHEDULE 7

		EXPENDITURES	ADJUSTMENTS	ADJUSTED EXPENDITURES	HETCH HETCHY POWER	HETCH HETCHY WATER	WATER RETAIL	WATER REGIONAL	WASTEWATER	TOTAL
ALLOCATION FACTORS (SCHEDULE N-7.1)					11.13%	5.96%	16.94%	29.59%	36.37%	
PUC01	General Manager	$ 7,609,114	$ -	$ 7,609,114	$ 847,180	$ 453,820	$ 1,288,884	$ 2,251,548	$ 2,767,682	$ 7,609,114
PUC1101	BizServ-Administration	$ 4,081,981	$ -	$ 4,081,981	$ 454,478	$ 243,456	$ 691,434	$ 1,207,864	$ 1,484,749	$ 4,081,981
PUC1102	Finance	$ 8,817,687	$ -	$ 8,817,687	$ 981,739	$ 525,902	$ 1,493,600	$ 2,609,166	$ 3,207,280	$ 8,817,687
PUC1103	ITS[1]	$ 18,048,158	$ (1,835,357)	$ 16,212,801	$ 1,805,093	$ 966,959	$ 2,746,235	$ 4,797,391	$ 5,897,123	$ 16,212,801
PUC1106	Human Resources	$ 7,678,483	$ -	$ 7,678,483	$ 854,903	$ 457,958	$ 1,300,634	$ 2,272,074	$ 2,792,914	$ 7,678,483
PUC1108	Customer Services	$ 12,262,428	$ (12,262,428)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PUC12	External Affairs	$ 3,882,455	$ -	$ 3,882,455	$ 432,263	$ 231,556	$ 657,637	$ 1,148,824	$ 1,412,175	$ 3,882,455
	TOTAL	$ 34,752,000	$ (12,731,000)	$ 48,282,521	$ 5,375,656	$ 2,879,651	$ 8,178,424	$ 14,286,867	$ 17,561,923	$ 48,282,521
					(TO SCHEDULE 4)	(TO SCHEDULE 4)	(TO SCHEDULE 1)	(TO SCHEDULE 1)		

[1]Adjustment for Transfer of SCADA Expenditures to T&D Joint ($1,730,000)

WHOLESALE REVENUE REQUIREMENT SCHEDULES
SERVICES OF SFPUC BUREAUS - ANNUAL SALARIES
FISCAL YEAR 2009-10
REFERENCE SECTION 5.05.B

ATTACHMENT N-2
SCHEDULE 7.1

DEPARTMENT/DIVISION	ALLOCATION FACTOR	GROUP CODE	SALARIES	PERCENTAGE	
HETCH HETCHY					
POWER		1	$ 6,677,939	6.27%	
WATER		2	$ 1,775,910	1.67%	
JOINT			$ 9,428,450		
WATER SHARE	45%	2	$ 4,242,803	3.98%	
POWER SHARE	55%	1	$ 5,185,648	4.87%	
WATER					
ADMINISTRATION (WTR01)			$ 1,009,246		
RETAIL SHARE	33.4%	3	$ 336,415	0.32%	
REGIONAL SHARE	33.3%	4	$ 336,415	0.32%	
HETCH HETCHY WATER SHARE	33.3%	2	$ 336,416	0.32%	
CDD (WTR03)		3	$ 17,356,922	16.29%	
WATER QUALITY (WTR04)		4	$ 7,282,589	6.83%	
WATER SUPPLY & TREATMENT (WTR05)		4	$ 18,164,689	17.05%	
NATURAL RESOURCES (WTR06)		4	$ 4,682,073	4.39%	
WATER RESOURCE PLANNING			$ 1,419,760		
WATER CONSERVATION		3	$ 355,703	0.33%	
RETAIL WATER RESOURCE PLANNING		3	$ -		
REGIONAL SHARE (NET SALARIES)		4	$ 1,064,057	1.00%	
WASTEWATER		5	$ 38,757,578	36.37%	
SALARIES BY GROUP CODE					
HETCH HETCHY - POWER		1	$ 11,863,587	11.13%	(TO SCHEDULE 7)
HETCH HETCHY - WATER		2	$ 6,355,129	5.96%	(TO SCHEDULE 7)
WATER - RETAIL		3	$ 18,049,040	16.94%	(TO SCHEDULE 7)
WATER- REGIONAL		4	$ 31,529,823	29.59%	(TO SCHEDULE 7)
WASTEWATER		5	$ 38,757,578	36.37%	(TO SCHEDULE 7)
TOTAL SALARIES			$ 106,555,156	100.00%	

WHOLESALE REVENUE REQUIREMENT SCHEDULES
CALCULATION OF THE WHOLESALE REVENUE REQUIREMENT
FISCAL YEAR 2009-10
WATER ENTERPRISE SUMMARY OF OPERATING EXPENSES

	Retail	Wholesale	Regional	Total
Operating Expenses				
Transmission & Distributions	$ 30,163,286	$ -	$ 23,252,946	$ 53,416,232
Adjustments to Transmission & Distribution	$ -	$ -	$ -	$ -
Adjusted Transmission & Distribution	$ 30,163,286	$ -	$ 23,252,946	$ 53,416,232
Source of Supply	$ 1,251,062	$ -	$ 13,692,891	$ 14,943,953
Adjustments to Source of Supply	$ -	$ -	$ -	$ -
Adjusted Source of Supply	$ 1,251,062	$ -	$ 13,692,891	$ 14,943,953
Pumping	$ 3,854,000	$ -	$ 488,682	$ 4,342,682
Adjustments to Pumping	$ -	$ -	$ -	$ -
Adjusted Pumping	$ 3,854,000	$ -	$ 488,682	$ 4,342,682
Treatment	$ -	$ -	$ 30,445,053	$ 30,445,053
Adjustments to Treatment	$ -	$ -	$ -	$ -
Adjusted Treatment	$ -	$ -	$ 30,445,053	$ 30,445,053
Customer Accounts	$ 7,401,169	$ 151,044	$ -	$ 7,552,213
Adjustments to Customer Accounts	$ -	$ -	$ -	$ -
Adjusted Customer Accounts	$ 7,401,169	$ 151,044	$ -	$ 7,552,213
Total Adjusted Operating Expense	$ 42,669,517	$ 151,044	$ 67,879,572	$ 110,700,133
General & Administrative Expense				
COWCAP	$ -	$ -	$ 1,238,009	$ 1,238,009
Services of SFPUC Bureaus	$ 8,178,424	$ -	$ 14,286,867	$ 22,465,291
Other General & Administrative	$ 4,009,891	$ -	$ 8,962,586	$ 12,972,477
Adjustments to General & Administrative	$ -	$ -	$ -	$ -
Adjusted General & Administrative	$ 4,009,891	$ -	$ 8,962,586	$ 12,972,477
Compliance Audit	$ 100,000	$ 100,000	$ -	$ 200,000
Total General & Administrative	$ 12,288,315	$ 100,000	$ 24,487,462	$ 36,875,777
Property Taxes	$ -	$ -	$ 1,417,293	$ 1,417,293
Total	$ 54,957,832	$ 251,044	$ 93,784,327	$ 148,993,203

Source: FAMIS/EIS
Note: All adjustments to be separately identified above

WHOLESALE REVENUE REQUIREMENT SCHEDULES
CALCULATION OF THE WHOLESALE REVENUE REQUIREMENT
FISCAL YEAR 2009-10
HETCHY HETCHY WATER & POWER SUMMARY OF OPERATING EXPENSES

ATTACHMENT N-2
SCHEDULE 8.2

	Power	Water	Joint	Total
Operating Expenses				
Purchased Power & Wheeling	$ 28,953,676	[redacted]		$ 28,953,676
Adjustments to Purchased Power & Wheeling	$ -	[redacted]		$ -
Adjusted Purchased Power & Wheeling	$ 28,953,676	[redacted]		$ 28,953,676
Operations				
Hydraulic Generation	$ 2,900,291	$ -	$ 3,200,394	$ 6,100,685
Transmission & Distribution	$ -	$ -	$	$
Water Quality Expense	$ -	$ 9,557,862	$	$ 9,557,862
Adjustments to Operations	$ -	$ -	$ -	$ -
Adjusted Operations	$ 2,900,291	$ 9,557,862	$ 3,200,394	$ 15,658,547
Maintenance				
Hydraulic Generation	$ 1,840,096	$ 3,238,622	$ 8,581,952	$ 13,660,670
Transmission & Distribution	$ 3,359,385	$	$ -	$ 3,359,385
Water Quality Expense	$	$	$ -	$ -
Adjustments to Maintenance	$ (151,442)	$ -	$ -	$ (151,442)
Adjusted Maintenance	$ 5,048,039	$ 3,238,622	$ 8,581,952	$ 16,868,613
Total Adjusted Operating Expense	$ 36,902,006	$ 12,796,484	$ 11,782,346	$ 61,480,836
General & Administrative Expense				
COWCAP	$ -	$ -	$ 1,139,579	$ 1,139,579
Services of SFPUC Bureaus	$ 5,375,656	$ 2,879,651	$ -	$ 8,255,307
Customer Accounts	$ 347,403	$ -	$ -	$ 347,403
Adjustments to Customer Accounts	$ -	$ -	$ -	$ -
Adjusted Customer Accounts	$ 347,403	$ -	$ -	$ 347,403
Other General & Administrative	$ 14,913,071	$ 36,070	$ 10,632,340	$ 25,581,481
Adjustments to General & Administrative	$ -	$ -	$ -	$ -
Adjusted General & Administrative	$ 14,913,071	$ 36,070	$ 10,632,340	$ 25,581,481
Total General & Administrative	$ 20,636,130	$ 2,915,721	$ 11,771,919	$ 35,323,770
Property Taxes	$ -	$ -	$ 452,000	$ 452,000
Total	$ 57,538,136	$ 15,712,205	$ 24,006,265	$ 97,256,606

Source: FAMIS/EIS
Note: All adjustments to be separately identified above

ATTACHMENT N-3

SCHEDULE OF PROJECTED WATER SALES, WHOLESALE REVENUE REQUIREMENTS, AND WHOLESALE RATES
CONTRACT REFERENCE: ARTICLE 6.03.A.3

	FISCAL YEAR N	N+1	N+2	N+3	N+4
OPERATION AND MAINTENANCE EXPENSES					
SOURCE OF SUPPLY	$ 9,364,568	$ -	$ -	$ -	$ -
PUMPING	$ 334,210	$ -	$ -	$ -	$ -
TREATMENT	$ 20,821,372	$ -	$ -	$ -	$ -
TRANSMISSION & DISTRIBUTION	$ 15,902,690	$ -	$ -	$ -	$ -
CUSTOMER ACCOUNTS	$ 151,044	$ -	$ -	$ -	$ -
TOTAL OPERATION AND MAINTENANCE EXPENSES	$ 46,573,884	$ -	$ -	$ -	$ -
ADMINISTRATIVE AND GENERAL EXPENSES					
COWCAP	$ 520,857	$ -	$ -	$ -	$ -
SF PUBLIC UTILITIES COMMISSION	$ 9,770,788	$ -	$ -	$ -	$ -
OTHER A&G	$ 3,770,749	$ -	$ -	$ -	$ -
COMPLIANCE AUDIT	$ 100,000	$ -	$ -	$ -	$ -
TOTAL ADMINISTRATIVE AND GENERAL EXPENSES	$ 14,162,394	$ -	$ -	$ -	$ -
PROPERTY TAXES	$ 969,287	$ -	$ -	$ -	$ -
CAPITAL COST RECOVERY					
PRE 2009 ASSETS	$ 24,051,326	$ -	$ -	$ -	$ -
DEBT SERVICE ON NEW ASSETS	$ 17,952,931	$ -	$ -	$ -	$ -
REVENUE FUNDED CAPITAL	$ 8,381,400	$ -	$ -	$ -	$ -
TOTAL CAPITAL COST RECOVERY	$ 50,385,657	$ -	$ -	$ -	$ -
WHOLESALE SHARE HHW&P	$ 28,903,512	$ -	$ -	$ -	$ -
WHOLESALE REVENUE REQUIREMENT	$ 140,994,734	$ -	$ -	$ -	$ -
BALANCING ACCOUNT AS OF JUNE 30	$ -	$ -	$ -	$ -	$ -
INTEREST ON BALANCING ACCOUNT	$ -	$ -	$ -	$ -	$ -
WHOLESALE REVENUES AT EXSITING RATE	$ (127,485,900)	$ -	$ -	$ -	$ -
WHOLESALE EXCESS USE CHARGES	$ -	$ -	$ -	$ -	$ -
SETTLEMENT CREDITS AND OTHER ADJUSTMENTS	$ 21,000	$ -	$ -	$ -	$ -
1984 AGREEMENT BALANCING ACCOUNT CREDITS	$ 1,997,220	$ -	$ -	$ -	$ -
WHOLESALE DEBIT SERVICE COVERAGE RESERVE	$ 4,488,233	$ -	$ -	$ -	$ -
WHOLESALE DEFICIENCY OR CREDIT	$ 20,015,287	$ -	$ -	$ -	$ -
PERCENT WHOLESALE DEFICIENCY OR CREDIT OF REVENUES AND EXCESS USE CHARGES	15.7%				
PROJECTED WATER SALES (CCF)	85,920,000	0	0	0	0
WHOLESALE DEFICIENCY OR CREDIT ($/CCF)	0.23	0	0	0	0
PROJECTED WHOLESALE RATE (UNIT COST ($/CCF)	1.66	0	0	0	0
PROJECTED SERVICE CHARGE REVENUES	$ 4,620,300				
PROJECTED VOLUME CHARGE REVENUES	$ 142,627,200				
TOTAL WHOLESALE REVENUES	$ 147,247,500				

ATTACHMENT O
STATEMENT OF WHOLESALE REVENUE REQUIREMENT/ CHANGES IN BALANCING ACCOUNT
YEAR ENDED JUNE 30
(Section 7.02.B)

	FY 2008-09 Allocation to Wholesale Customers	FY 2009-10 Allocation to Wholesale Customers	Difference
Wholesale Revenue Requirement Calculation:			
Operating and maintenance (O&M) expense:			
San Francisco Water Enterprise:			
Source of supply	$ 9,133,025	$ 9,364,568	$ 231,543
Pumping	$ 325,946	$ 334,210	$ 8,264
Purification	$ 20,437,460	$ 20,821,372	$ 383,912
Transmission and distribution	$ 9,350,279	$ 15,902,690	$ 6,552,411
Customer Accounts	$ 224,255	$ 151,044	$ (73,211)
Total SFWE operating and maintenance	$ 39,470,965	$ 46,573,884	$ 7,102,919
Hetch Hetchy Water and Power (HHWP):			
Operating expenses	$ 10,359,786	$ 7,484,165	$ (2,875,621)
Maintenance expenses	$ 4,526,240	$ 4,831,890	$ 305,650
Total HHWP operating and maintenance	$ 14,886,026	$ 12,316,055	$ (2,569,971)
Administrative and general (A&G) expenses:			
COWCAP			
SFWE	$ 512,438	$ 520,857	$ 8,419
HHWP	$ 162,364	$ 348,968	$ 186,604
SF Public Utilities Commission:			
SFWE	$ 7,461,835	$ 9,770,788	$ 2,308,953
HHWP	$ 2,357,622	$ 1,959,603	$ (398,019)
Other A&G – SFWE	$ 8,234,799	$ 3,770,749	$ (4,464,050)
Other A&G – HHWP	$ -	$ 3,280,434	$ 3,280,434
Compliance audit	$ 95,338	$ 100,000	$ 4,662
Total administrative and general expenses	$ 18,824,396	$ 19,751,399	$ 927,003
Property taxes (outside city only):			
SFWE	$ 964,040	$ 969,287	$ 5,247
HHWP	$ 120,923	$ 139,732	$ 18,809
Total property taxes	$ 1,084,963	$ 1,109,019	$ 24,056
Capital Cost Recovery			
Pre-2009 Assets			
SFWE		$ 24,051,326	
HHWP		$ 3,118,033	
Debt Service on New Assets			
SFWE		$ 17,952,931	
HHWP		$ -	
Revenue Funded Assets			
SFWE		$ 8,381,400	
HHWP		$ 7,740,688	
Total Capital Cost Recovery	$ 46,378,941	$ 61,244,378	$14,865,437
Total Wholesale Revenue Requirement	$ 120,645,291	$ 140,994,735	$20,349,444
Balancing Account July 1	$ 21,176,614	$ -	
Interest on adjusted beginning balance	$ 529,415	$ -	
Wholesale revenues billed	$ (123,604,000)	$ (147,247,500)	
Excess use charges billed	$ -	$ -	
Wholesale Revenue Coverage Reserve	$ -	$ 4,488,233	
Other adjustments	$ -	$ -	
Settlement adjustments	$ 21,006	$ 21,006	
1984 Agreement Balancing Account Credits	$ -	$ 1,997,220	
Balancing Account June 30	$ 18,768,326	$ 253,694	

Attachment P

REPRESENTATION LETTER

Certification Pursuant to Water Sales Agreement (the Agreement) between the City and County of San Francisco (San Francisco) and certain wholesale customers in the counties of San Mateo, Santa Clara, and Alameda (the Wholesale Customers) effective July 1, 2009.

Each of the undersigned certifies that:

1. I have reviewed San Francisco Water Department and Hetch Hetchy Water & Power Department Report on the Calculation of the Wholesale Revenue Requirement and Statement of Changes in the Balancing Account (the Statement) for the year ended June 30, 200X;

Based on my knowledge, this report and Statement do not contain any untrue statements of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by the report;

Based on my knowledge, the Statement and other financial information included in the report, fairly presents in all material respects the proper costs incurred and allocated to the Wholesale Customers in accordance with the provisions of the Agreement.

The below certifying officers and I are responsible for establishing and maintaining internal control over financial reporting and have:

Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting for purposes of the preparation of the Statement.

Evaluated the effectiveness of the allocation procedures to ensure compliance with the terms of the Agreement.

The Statement fully complies with the contractual requirements of the Agreement and fairly presents, in all material respects, the allocation of costs to the Wholesale Customers in accordance with the Agreement.

General Manager, SFPUC — Date

Assistant General Manager & Chief Financial Officer, SFPUC — Date

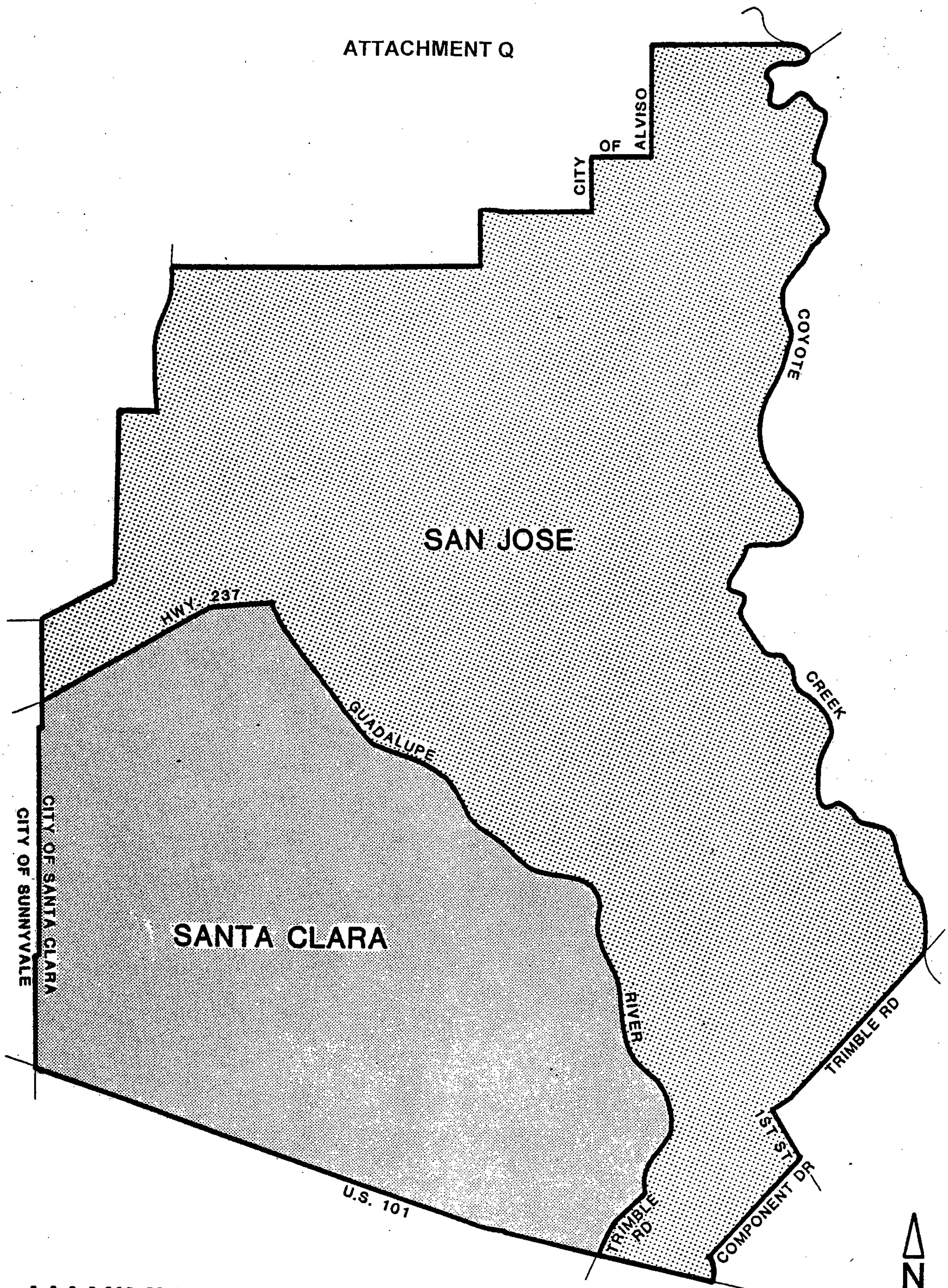
Finance Director, SFPUC — Date

Accounting Manager, SFPUC — Date

Financial Planning Manager, SFPUC — Date

Senior Rates Administrator, SFPUC — Date

ATTACHMENT Q



MAXIMUM
SERVICE AREAS

Appendix 2:
Conservation Ordinances, Chapters 17.04 and 13.24.330-450

City of East Palo Alto Municipal Code Chapters 17.04 and 13.24.330-450 Water Conservation Measures

City of East Palo Alto Municipal Code
Water Conservation
Title 17 ENVIRONMENTAL CONTROL
Chapter 17.04 WATER CONSERVATION

Article I. Purpose and Definitions

17.04.010 Purpose.

This chapter is intended to promote reasonable conservation of water in the city consistent with maintaining a comfortable standard of living and a healthy economy. It provides a framework for the orderly and timely implementation of reasonable water conservation measures by the different elements of the city's economy. This chapter also carries out certain provisions of the Water Code of the state as embodied in Article XIV, Section 3 of the Constitution of the state which states that maximum beneficial use of the water resources of the state is necessary to prevent the waste or unreasonable use, or unreasonable method of use, of water. This chapter further implements the provisions of the conservation element of the comprehensive water resources management plan for San Mateo County as adopted by the San Mateo County board of supervisors on June 20, 1978.

It is recognized that stricter water conservation measures may be necessary during a future drought or water shortage emergency. Such further measures should not penalize water users for past conservation practices, nor should implementation of water conservation measures constitute a new basis to determine future reduction in case of a declared water shortage emergency. No provision in this chapter is intended to supersede any rule or regulation of the Public Utilities Commission of the state.

Sections 17.04.030, 17.04.040, 17.04.050 and 17.04.140 shall apply only to water agencies administered by the city council of East Palo Alto. (Prior code § 6-7.101)

17.04.020 Definitions.

The following words and terms as used in this chapter shall have the following meanings:

"Applied water" means water delivered to a user; also called delivered water. Applied water may be used for either inside uses or for outside watering. It does not include precipitations or distribution losses. It may apply to metered or unmetered deliveries.

"Commercial establishment" means establishments providing services, engaged in the fabrication of structures or other fixed improvements, or otherwise occupied in nonmanufacturing profit motivated activities. Examples are retail stores, restaurants, entertainment facilities and home building concerns.

"Commercial water use" means water used by a commercial establishment.

"Domestic use" means all inside and outside uses of water associated with residential use; water used by commercial and industrial establishments other than in their product manufacture.

"Establishment" means an economic unit which produces goods or services, such as a farm, a factory or a store. In most instances, the establishment is in a single physical location, and is engaged in only one, or predominantly one, type of economic activity.

"Evapotranspiration (ET)" means the process of water returning to the atmosphere through evaporation from land and water surfaces and through transpiration of plants.

"Farm ditch efficiency" means the percent of the total volume of water supplied to the farm which is applied to the fields (a measure of distribution losses.)

"Flat rate water" means water sold to customers at a fixed rate irrespective of quantity used.

"Industrial establishment" means an establishment engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plant, factories or mills, which characteristically use power-driven machines and materials-handling equipment. Establishments engaged in assembling component parts of manufactured products are also considered manufacturing establishments if the new product is neither a structure nor other fixed improvement.

"Industrial water use" means water used by an industrial establishment in the process of their product manufacture.

"Inside water use" means that part of the water delivery used within a home, commercial establishment, or manufacturing establishment for any purpose; also called "internal water use."

"Leaching requirement (LR)" means the fraction of the irrigation water that must pass through the root zone in order to prevent soil salinity from reaching a level that would result in reduced growth to crops, trees, gardens or landscape plants.

"Metered water" means water sold to customers on the basis of actual measured use; does not include losses in distribution.

"Net water use" means the sum of delivered water consumptively used or otherwise not recoverable.

"Outside water use" means the use of water for irrigation of gardens, lawns, and other ornamentals, and for replenishing swimming pools, fountains, ponds, car washing, etc., also called external water use.

"Pool cover" means an installation over or on a swimming pool and hot tubs which is used to minimize water evaporation.

"Precipitation" means the total measurable supply of all natural forms of water falling on the land area, including dew, rain, mist, snow, hail and sleet; usually expressed as depth of liquid water on a horizontal surface on a daily, monthly or yearly basis.

"Public facilities" means all structures, parks and public places, other than open space, engaged either in serving the public or in providing a public use.

"Public water use" means water use associated with public facilities.

Reasonable Use. "Reasonable use" of water involves the application of sufficient applied water to meet demands of a designated beneficial use in a manner consistent with efficiency, public health and sanitation concerns, current technology and local economic conditions. During dry years, practical and economically feasible means should be taken to minimize applied water use and incidental losses. During periods of normal water supplies, reasonable urban water uses include, but are not limited to, the following beneficial uses:

1. The use of water for interior household purposes to maintain personal standards of cleanliness and sanitation;
2. The use of water for exterior household purposes to maintain personal standards of exterior cleanliness, landscaping and recreational facilities;
3. The use of water for commercial purposes to maintain the services offered and to satisfy the health, esthetic and safety needs of both employees and the public;
4. The use of water for industrial purposes, including cooling, processing and other production related needs, and to satisfy health, esthetic and safety needs of the employees;
5. The use of sufficient water to maintain community services including, but not limited to, public safety, including fire fighting; schools and institutions; transportation systems; public streets and buildings; water supplies; sewage and garbage disposals; recreational and esthetic enjoyment areas such as parks, swimming pools, lakes, streams, golf courses and landscaping.

"Recirculation" means the reuse of water within a partially or completely closed system of pipes and appliances without the benefit of treatment, where its quality, other than its temperature, may not be altered.

"Reclaimed water" means the collection and appropriate treatment of used water to bring it to a quality suitable for reuse.

"Recycle" means the recovery of water suitable for reuse without treatment.

"Residential water use" means all inside and outside uses of water associated with residential areas.

"Service area" means the area of land included in the distribution system of a water agency.

"Type of water use" means a distinction of water use based on either a kind of land use (recreational, residential, commercial, etc.) or a kind of water use (outside use, personal use, swimming pool use, dishwashing use, etc.)

"Unaccounted for water" means the difference between the quantity of water introduced into the system and the quantity delivered to the eventual consumer; usually expressed as a percentage of water introduced into the system.

"Unit water use" means the average quantity of water used per person, acre, etc., over a specified period of time.

"Unreasonable use (waste)" means failure to take appropriate measures to minimize excess application and incidental losses of water. Examples of waste are excessive runoff from irrigation or from broken plumbing.

"Unreclaimable water" means used water which is uneconomical to reclaim due to its location, or physical or chemical quality.

"Urban water use" means the use of water for urban purposes, including residential, municipal, commercial, industrial, recreational, military and institutional classes. The term is applied in the sense that it is a kind of use rather than a place of use; includes delivered water and unaccounted for water.

"Water agency" means the City of East Palo Alto; water agency organized, founded or established to produce and distribute water directly or indirectly to customers.

"Water application efficiency" means the percentage of the volume of water delivered to the farm or farms by a conveyance system to the volume of water delivered to the conveyance system at the supply source.

"Water produced" means the total water introduced into a system or the sum of applied water and unaccounted for water. (Prior code § 6-7.102)

Article II. Implementation

17.04.030 Metering.

On or after adoption of the ordinance codified in this chapter, all new water service connections provided by the water agency, including detector check meters on private fire protection services, shall be metered. (Prior code § 6-7.201)

17.04.040 Public assistance.

Water saving devices and information shall be made available by the water agency. However, the cost of any water saving device or devices shall be borne by the consumer requesting the device. The water agency shall also reasonably assist customers to detect leaks and increase the efficiency of applied water. (Prior code § 6-7.202)

17.04.050 Waste.

Unreasonable use of water is prohibited. Upon written notification to the user by the water agency, all unreasonable use of water shall be terminated and any required repairs to broken or defective plumbing, sprinkler, watering or irrigation devices shall be made within five calendar days or water service to the use may be terminated until corrective measures are taken. (Prior code § 6-7.203)

17.04.060 Pool and hot tub covers.

Covers shall be required for all new swimming pools and hot tubs and encouraged to be installed for existing pools. (Prior code § 6-7.204)

17.04.070 Residential water pressure.

Except for fire protection service lines, a pressure reducing valve, or valves, that will limit the static water pressure to any internal water outlet of the structure to eighty (80) pounds per square inch gauge, shall be installed in all new residential structures or those existing residential structures requiring a plumbing permit for modification of, or addition to, the existing plumbing. (Prior code § 6-7.205)

17.04.080 New or remodeled structures.

The following shall be installed in all new or remodeled residential, commercial or industrial structures:

A. Insulation of newly installed hot water pipes where such piping is located in attics, garages, crawl spaces or unheated spaces other than between floors or in interior walls, to provide a maximum heat loss of fifty (50) British Thermal Units per hour per linear foot for piping up to and including two inches in diameter, and one hundred (100) British Thermal Units per hour per linear foot for all sizes greater than two inches in diameter;
B. If newly installed or replaced, tank toilets utilizing not more than three and one-half gallons of water per flush action;
C. If newly installed or replaced, pressure reducing devices, or flow restrictors to limit the flow of water consistent with the intended use. (Prior code § 6-7.206)

17.04.090 Pressure reducing valve.

In new or remodeled commercial or industrial structures requiring a plumbing permit, a pressure reducing valve, or valves, to limit the static water pressure to eighty (80) pounds per square inch gauge to the upper floor of the structure, shall be installed only if no supplemental internal pumping is anticipated. The intent of this section is to limit available water pressure to the structure consistent with uses of water on the premises. (Prior code § 6-7.207)

17.04.100 Vehicle washing.

Any new or remodeled vehicle washing facility requiring a plumbing permit, which utilizes more than twenty-five (25) gallons of water per vehicle, shall have a waste wash water recycling system. (Prior code § 6-7.208)

17.04.110 Recirculation.

Two years from the effective date of the ordinance codified in this chapter, no use of water will be permitted where recirculation of the water is economically, technically and hygienically feasible in all new, commercial or industrial structures.

An "economically feasible recirculation installation" is defined as, over the useful life of the equipment to be installed, a system where the present worth of the cost of the water saved is more than the present worth of both the capital, and the annual operation and maintenance costs. Such economic and technical feasibility shall be prepared by the user with the determination of feasibility made by the city building official. (Prior code § 6-7.209)

17.04.120 Landscaping.

A. Purpose. The ordinance codified in this section shall be known and referred to as the Water Efficient Landscaping Ordinance and is adopted for the following purposes:

    1. To promote the values and benefits of landscaping while recognizing the need to invest water and other resources as efficiently as possible;

    2. To establish a structure for designing, installing and maintaining water efficient landscapes in new projects; and

    3. To establish provisions for water management practices and water waste prevention for established landscapes.

B. Applicability. This section shall apply to the following types of projects, except as provided in subsection C of this section:

    1. All projects where the entire property is being developed or redeveloped with one or more new structures, other than accessory structures. For purposes of this section, "new structures" are defined as those which have completely new foundations, walls and roofs;

    2. All projects where the existing structures are remodeled, renovated and/or expanded in size and where the project includes the relandscaping or loss due to damage or neglect during construction of fifty (50) percent, or more of the remaining landscape area. In such cases, only the newly landscaped areas and/or damaged areas shall be subject to this section;

    3. All landscaping projects, other than the construction of decks, patios, barbecues, play equipment and swimming pools, which require a planning approval or building permit.

C. Exemptions. This section shall not apply to the following types of projects:

    1. Cemeteries;

    2. Properties with an historical site designation;

    3. Ecological restoration projects that do not require a permanent irrigation system;

4. Land reclamation projects that do not require a permanent irrigation system; or

5. Any project with a landscaped area and/or existing landscaped area loss due to damage or neglect less than two thousand five hundred (2,500) square feet in area.

D. Review and Approval of Landscape Plans.

1. A landscape plan shall be submitted to the city which shall include all of the documentation listed in subsection E of this section.

2. Applicants must choose one of the following methods for submitting a landscape plan:

   a. Prior to submittal to the city, the landscape plan and all supporting documentation shall be reviewed by an independent certified landscape architect to ensure that all components of the landscape plan adhere to this section. The certified landscape architect shall sign the plans as verification that the landscape plans comply with this section.

   b. Applicants may submit a landscape plan to the city for review and at the time of submittal, inform the city that they wish to use the city's official landscape and irrigation specialist for the review and verification that the plans comply with this section. In this case, the applicant shall pay a fee to the city in an amount sufficient to cover the cost of all related reviews, inspections and verifications.

3. Verification by either an independent certified landscape architect or the city's official landscape and irrigation specialist shall be completed prior to issuance of a building permit for the project.

4. Prior to final building inspection of the project, the irrigation and landscaping shall be installed and the certified professional who reviewed the landscape plans shall verify that the installation was completed in compliance with the approved landscape plans and this section.

5. Prior to final building inspection of the project, a deed restriction shall be filed with the San Mateo County recorder's office stating that the property is subject to the requirements of this section and that any relandscaping of the property by the present or future property owners shall adhere to this section.

E. Landscape Plan Components. Landscape plans shall include the following information:

1. Landscape Area. The "landscape area" is defined as the gross lot area less the building footprint, driveway, parking areas, decks, patio, porches, walkways and grasscrete areas;

2. Description of Water Delivery Elements. The description of the water delivery elements shall include the following:

   a. The location, type and size of equipment such as meters, controllers, main and lateral lines, moisture sensors, valves, sprinkler heads, backflow devices and quick-couplers.

   b. Flowrate and static water pressure at the point of connection (POC),

   c. Flowrate and precipitation rate in inches per hour at each valve station,

   d. Projected water use to maintain adequate plant health and growth;

3. Soil Care Before Planting. Information on soil characteristics and preparation, including horticultural suitability of the soil and recommendations for amending and preparing the soil for planting;

4. Soil Care After Planting. A minimum of two inches of mulch shall be used in nonturf areas after planting. Visqueen, sheet plastic, or other nonporous materials shall not be placed under mulch;

5. Turf. The following shall apply:

    a. Turf area includes turf and water areas such as ponds, fountains, swimming pools and outdoor spas.

    b. No trees shall be planted in turf areas.

    c. No turf shall be allowed in areas eight feet wide or less, or on slopes exceeding fifteen (15) percent (6.6:1).

    d. Turf areas shall be limited to twenty-five (25) percent of landscape area or, for residential areas, five hundred (500) square feet per dwelling unit, whichever is greater.

    e. Drought tolerant turf species are encouraged.

6. Valves. The following shall apply:

    a. Sprinkler head check valves shall be used to prevent low head drainage.

    b. Separate valves for turf and nonturf areas shall be provided. Each valve shall service only plant materials of similar watering needs as well as similar micro-climates created within the project.

7. Sprinkler Heads. The following shall apply:

    a. Sprinkler heads shall be spaced at a maximum of fifty (50) percent of the diameter of throw for square spacing and sixty (60) percent for triangular spacing.

    b. Sprinkler heads shall have matched precipitation rates within each control valve circuit.

    c. Pop-up sprinklers in turf areas shall have at least a four-inch pop-up height.

8. Controllers. The following shall apply:

    a. Controllers shall be automatic and capable of dual programming, such that they may be set for separation of turf and nonturf areas.

    b. Controllers shall have multiple cycle capability.

    c. Controllers shall have percentage switches which should be able to be set for one season or one month and have switches that will easily increase or decrease the time programmed by a certain percentage. All stations should have their time increased/ decreased with only one entry.

9. Irrigation Schedule and Characteristics. The following shall apply:

    a. A schedule shall be developed which allows for plant material to be established. This shall have a maximum two-year time period. Once established, a revised schedule shall be developed for maintenance of the plant material. The schedule presently in effect shall be posted at the controller.

    b. The schedule shall include run times and frequency, an application rate which is less than one-quarter inch per cycle on all irrigation, a minimum one hour time interval between all applications, and provisions for irrigation only between the hours of ten p.m. and seven a.m.

    c. Drip, bubbler or mini-spray irrigation shall be provided for trees and shrubs.

    d. Backflow prevention units shall comply with all applicable health and safety standards.

    e. The irrigation system shall not deliver spray or run-off onto paved area or streets.

    f. Rain sensing override devices shall be required on all irrigation systems.

    g. Soil moisture sensing devices should be considered where appropriate.

10. Plant Selection. Water conserving or drought tolerant plant materials are recommended.

11. Water Features. All decorative pools, ponds, streams and fountains shall be equipped to recirculate water.

12. Maintenance Schedule. A maintenance schedule shall be prepared which provides for checking, adjusting and repairing irrigation equipment, aerating and dethatching turf areas, replenishing mulch, and fertilizing, pruning, weeding and removing litter. (Ord. 152 §§ 1--5, 1993: Ord. 99, 1988: Ord. 91, 1988: prior code § 6-7.210)

17.04.130 Agriculture.

In determining the reasonable beneficial use of irrigation water for field agriculture, local custom should be considered, and perhaps modified, according to evapotranspiration rates for different crops, infiltration rates of applied water on different soil types and land areas with varying degrees of slope, and water application efficiency and the types of distribution systems available. The development and utilization, within legal constraints, of the following water saving techniques shall be encouraged with consideration given to the economics of the various agricultural enterprises. These concepts shall be encouraged by advisory and regulatory agencies as follows:

A. Field Agriculture.

    1. Utilization of an efficient irrigation system suited to the conditions with the scheduling of irrigation according to plant requirements,

    2. Use of reclaimed wastewater to irrigate field grown flowers and ornamentals when water quality, environmental conditions, public health and economic considerations permit such use,

    3. Adjustment of planting schedules and amounts to projected water supply,

4. Construction of on-farm reservoirs to collect winter runoff and increase water storage,

5. Collection and recycling of runoff water where possible,

6. Encouragement of cooperation between riparian and nonriparian users who share a stream water supply;

B. Greenhouse Culture.

1. Utilization of an efficient irrigation system suited to the conditions,

2. Construction of reservoirs to catch runoff water from greenhouse roofs and adjoining areas,

3. Construction of catch basins with return pumping systems to collect and recycle drainage water from plants grown inside the greenhouse, if the quality is satisfactory,

4. Collection and use of rainfall and runoff from adjoining farm lands. (Prior code § 6-7.211)

17.04.140 Shortages.

Notwithstanding the foregoing relating to conservation of water supplies, it is apparent that in times of a declared water shortage emergency pursuant to Section 350 et seq. of the Water Code of the state, certain additional mandatory water conservation practices will be necessary. It is the intent of this chapter that after allocation and setting aside the amount of water needed for domestic use, sanitation and fire protection, the emergency regulations shall establish priorities in the use of water for other purposes and shall provide for the allocation, distribution, and delivery of water for such other purposes, without discrimination between consumers using water for the same purpose or purposes. Regulations so adopted shall not penalize water users for past conservation practices. (Prior code § 6-7.212)

City of East Palo Alto Municipal Code, Water System
Title 13 PUBLIC SERVICES
Chapter 13.24 WATER SYSTEM

Article VII. Landscape and Irrigation Standards

13.24.330 Landscape and irrigation.

No building permit is issued for buildings until the public works superintendent or designee reviews and approves a landscape plan for the project. A certificate of occupancy is issued only if landscaping and an irrigation system is installed in compliance with the approved landscape plan consisting of the elements set forth below. The landscape plan shall include the following elements: a calculation of water consumption for the landscaped area; a planting scheme; an irrigation plan; and a grading plan if found to be necessary by the community development director. Projects that must adhere to these standards are: apartments; condominiums; any multiple-unit residential developments; commercial developments; industrial developments; single-family residential and recreational developments. (Ord. 253 §7.1, 2001)

13.24.340 General requirements.

A. The standards described in this article are intended to be minimum requirements of development. Property enhancements beyond these standards are encouraged as they will further the goal of a more beautiful overall environment in which to live and work. Certain conditions outlined in this article may be waived or changed upon formal request and accepted by the superintendent of public works or designee, but in no case will any condition be modified in a manner which will adversely effect the intent of these standards.

B. Prior to any work at the project site, landscape and irrigation plans must be approved and signed by the superintendent of public works. These drawings shall contain all planting and irrigation work to be constructed as a part of the development. If the plans meet or exceed the requirements, the superintendent of public works or designee will approve them. If corrections to the plans are required, the deficiencies will be noted and the plans will have to be corrected by the developer and resubmitted. Compliance with the letter and intent of these standards is the superintendent's responsibility during construction and the property owner's responsibility for the life of the project. The superintendent of public works or designee has the responsibility to interpret and enforce these standards. (Ord. 253 §7.2, 2001)

13.24.350 Special requirements.

Areas of projects that will be dedicated to the city such as median islands, maintenance districts, parks, etc., shall be clearly delineated on the plans. Special requirements in addition to these standards may be required for those areas. Any special requirements will be noted after initial submittal of plans. Any questions regarding projects with special requirements are directed to the community development department. (Ord. 253 §7.3, 2001)

13.24.360 Submittal requirements.

A. The project developer, with the exception of a developer of only one residential unit, is required to submit two sets of planting and irrigation plans prepared by a state-licensed landscape architect or landscape contractor to the community development department concurrent with submittal of a building construction plan. The landscape improvement plans are checked and approved by the public works department in accordance with these standards and any conditions of approval required by the city. Approval of the plans by the superintendent of public works or designee is required prior to any construction at the project site.

B. The plans shall contain the required information in a clear and understandable format on sheets that are either twenty-four (24) inches by thirty-six (36) inches or thirty (30) inches by forty-two (42) inches and must include a title sheet, irrigation plan including general design criteria and information as specified below.

C. Title sheets must include: project name and address; developer's name, address and telephone number; landscape architect's or landscape contractor's name, address, telephone number, state registration stamp and signature; signature line for approval by superintendent of public works; site map with property lines and adjacent land uses identified; vicinity map indicating the location of the project within the city; sheet index, if applicable. (Ord. 253 §7.4, 2001)

13.24.370 Irrigation plans--General design criteria--Information.

The plan shall indicate irrigation systems designed to be water efficient and water conserving. Devices and equipment that aid in water conservation are encouraged and may be required on large projects. The irrigation system shall be compatible with the types of plantings specified and the specific requirements of the various planting area on the project site. The irrigation plan shall clearly note on plans the following information: north arrow; scale; point of connection, including static pressure; pipe size and types; water consumption; and servicing meter location and size.

A. All irrigation systems are to be controlled by a clock specifically designed for irrigation system control, connected to a permanent source of power.

B. Controllers must have multiple cycles start capacity and a flexible calendar program. An automatic rain shutoff valve is required.

C. All systems shall contain an appropriate testable backflow device. Reduced pressure devices are encouraged for all projects but are mandatory for meter box protections.

D. All piping, heads, valves, meters and other equipment shall be clearly located, sized and specified on the plan.

E. All pipes and wires installed under drives, walks or other paving shall be in PVC sleeves.

F. The system shall be valved to ensure variations in water requirements are considered. In no case are lawn and shrub areas allowed on the same valve.

G. All pressure tines two and one-half inches and smaller shall be PVC Schedule 40. Pressure lines over two and one-half inches shall be Class 315.

H. Notes, specifications and details are required on the installation of all items to be constructed.

I. Pop-up heads are required adjacent to areas where foot or vehicular traffic is anticipated except where drip-irrigation systems are installed.

J. Drip or bubbler irrigation systems are required for trees within parkways.

K. Sprinklers and sprays shall not be used in areas less than four inches wide. Drip and bubblers shall be used that do not exceed 1.5 gallons per minute per device.

L. Sprinkler heads with a precipitation rate of .85 inches per hour or less shall be used on slopes exceeding fifteen percent (15%) to minimize runoff, or exceeding ten percent within ten feet of hardscape.

M. Sprinkler head spacing shall be designed for head to head coverage. The system should be designed for minimum runoff and overspray onto non-irrigated areas.

N. Valves and circuits shall be separated based on water use.

O. Sprinkler heads must have matched precipitation rates within each control valve circuit.

P. Serviceable check valves are required where elevation differential may cause low head drainage.

Q. Estimated water consumption shall be calculated in gallons per year. (Ord. 253 §7.5, 2001)

13.24.380 Planting plans.

A. All planting designs submitted shall be sensitive towards the project site and neighboring developments. All plans should consider water efficiency, practicality of maintenance and enhancement of the site and immediate area of the project. Considerations of the plants' mature size and their appropriateness for the site and climate conditions must be considered. As used in this article, "hydrozone" means a portion of the landscaped area having plants with similar water needs that are served by a value or set of values with the same schedule. The city encourages the use of trees appropriate for East Palo Alto's hydrozone.

B. The city is located in a climate region classified as Mediterranean.

C. As part of any development, all areas not devoted to paving, building, improved recreational or open space structures shall be landscaped and permanently maintained by the property owner. This includes all parkway areas not devoted to sidewalks.

D. Approved landscaping shall be maintained on a scheduled basis.

E. The irrigation plan shall include an annual irrigation program. A monthly irrigation schedule is required for the plant establishment period, for the established landscape, and for any temporarily irrigated areas. (Ord. 253 §7.6, 2001)

13.24.390 Soil conditioning and maintaining.

A. A minimum of two inches of mulch shall be added in non-turf areas to the soil surface after planting. Nonporous material shall not be placed under the mulch.

B. Existing soil shall be scarified to a minimum depth of six inches. (Ord. 253 §7.7, 2001)

13.24.400 Turf selection and limitations.

A. No more than fifty percent (50%) of the total area not covered by structures for multifamily residential projects shall be covered by a combination of turf, pools, spas, and other improved recreational areas. Of this area, no more than seventy-five percent (75%) shall be covered with turf.

B. For single-family residential projects, no more than forty percent (40%) of the front yard may be covered with turf.

C. For nonresidential projects, no more than twenty-five percent (25%) of the total landscaping area shall be covered with turf and/or water (i.e., pools, ponds, and fountains). For such projects irrigated with reclaimed water, turf areas may not exceed forty percent (40%) of the total landscaped area. Turf limitation is excluded for public parks, golf courses, cemeteries and recreation areas.

D. No turf is allowed in areas less than four feet wide.

E. Shrubs shall be minimum five gallons.

F. Ground cover areas will be planted from flats or containers with a maximum spacing of twelve (12) inches on center.

G. Existing plant material to be saved must be healthy and growing. Existing trees and shrubs shall be trimmed in an aesthetically pleasing manner (place noted on plans). (Ord. 253 §7.8, 2001)

13.24.410 Street trees.

The public works department at the current rate of cost may fulfill a parkway tree-planting requirement Street trees are required for every development project. Every street in the city has a designated street tree. One specified minimum gallon size tree must be installed for every thirty-five (35) feet of property frontage. Trees may be clumped or spaced on a maximum of sixty-five (65) feet on center and planted according to these standards. General design criteria and information required for street trees are indicated below:

A. Trees shall be a minimum fifteen (15) gallon size with the planting of at least one twenty-four (24) inch box tree for every three fifteen (15) gallon trees planted, or one twenty-four (24) inch box tree per thirty-five (35) feet of lineal footage, whichever results in a greater number on on-site planting.

B. Spacing of trees in on-site planters shall be one tree per five parking spaces.

C. Palm tree sizes shall be of a minimum of eighteen (18) to twenty (20) feet of brown trunk. (Ord. 253 §7.9, 2001)

13.24.420 General requirements.

Safety and maintenance shall be considered in the placement of all plantings with the following specific guidelines:

A. Twenty (20) feet from the curb returns at street intersections.

B. Ten feet from light standard power poles.

C. Ten feet from fire hydrants.

D. Five feet from service walks, driveways, buildings, walls and permanent structure.

E. Ten feet from water and sewer lines.

F. Botanical name, common name, variety, sizes and quantity shall designate all plants specified.

G. All trees and shrubs shall be installed per standard details. The rootball shall be one inch above finished grade set in a temporary water basin with amended backfill. The shrub shall be planted in a plant basin two times the size of the rootball.

H. All trees shall be installed per the standard details. Two ten foot by two inch stakes with #12 gauge galvanized wire in rubber hose placed three feet and seven feet from the ground are required for all trees. A root barrier is required. A one-inch by four-inch croostie water basin shall be included in tree planting. The tree shall be planted with amended backfill in a plant basin one and one-half times the size of the rootball.

I. Plant design shall incorporate water saving materials; plants with similar water requirements shall be grouped together.

J. Not more than one-half of the planting areas shall be turf grass.

K. All turf areas for a total aggregate area of two thousand (2,000) square feet shall be sod. Any area greater than this may be hydroseed.

L. All turf areas should be mounded where possible at a minimum slope of one-foot to three-foot ratio. Maximum height of three feet.

M. At least one-half of the trees shall be canopy/shade trees.

N. An agricultural suitability soil test is recommended for all projects and may be required by the city.

O. Tree selection shall be in accordance with the East Palo Alto hydrozone. A list of plants, shrubs, and trees appropriate for the city shall be made available through the public works department and the water department. (Ord. 253 §7.10, 2001)

13.24.430 Parking areas.

A. Parking lots of fifteen (15) or more spaces must devote at least two percent of the total area, excluding perimeter landscaping, to landscape planting. This landscaping shall not be concentrated in any one area.

B. A three-foot wide (minimum) planting buffer is required along the perimeter of any parking area. This landscaping area shall not be considered as part of any required interior landscaping. (Ord. 253 §7.11, 2001)

13.24.440 Model homes.

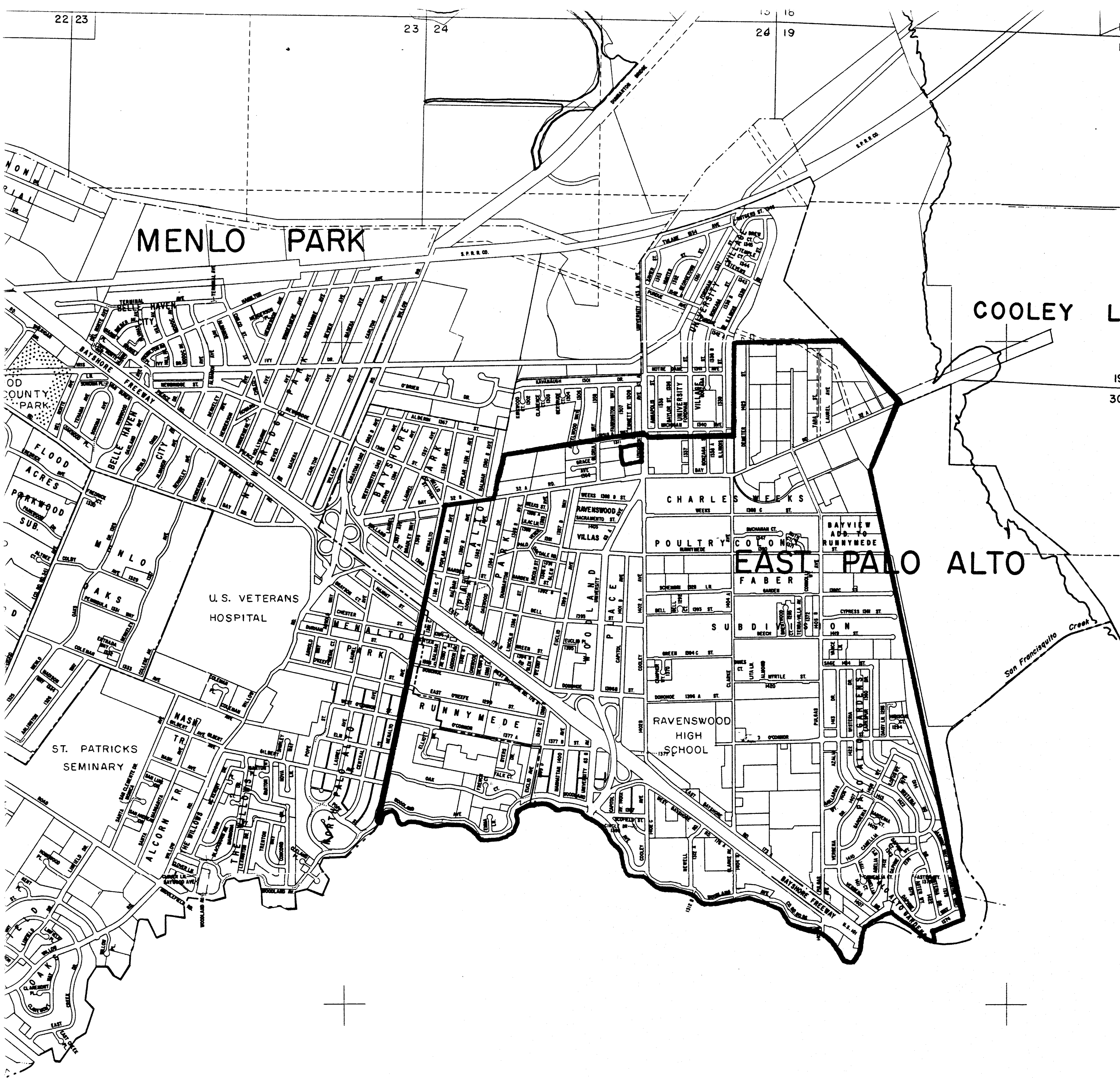
Any residential development that has model homes shall include at least one model furnished with water efficient landscaping. Signs shall be used to identify the model as an example of water effect landscape and feature elements such as hydrozones and irrigation equipment that contribute to water efficiency. Information shall be provided by the seller about designing, installing, and maintaining water efficient landscapes and the requirements of this chapter. (Ord. 253 §7.12, 2001)

13.24.450 Exemptions.

This chapter does not apply to landscaping that is part of a registered historical site or to cemeteries. However, the city will encourage the efficient use of water and long-term landscape water conservation practices for such property. (Ord. 253 §7.13, 2001)

Source: City of East Palo Alto Municipal Code.

Appendix 3:
East Palo Alto Sanitary District and West Bay Sanitary District Service Territory



EAST PALO ALTO
SANITARY DISTRICT

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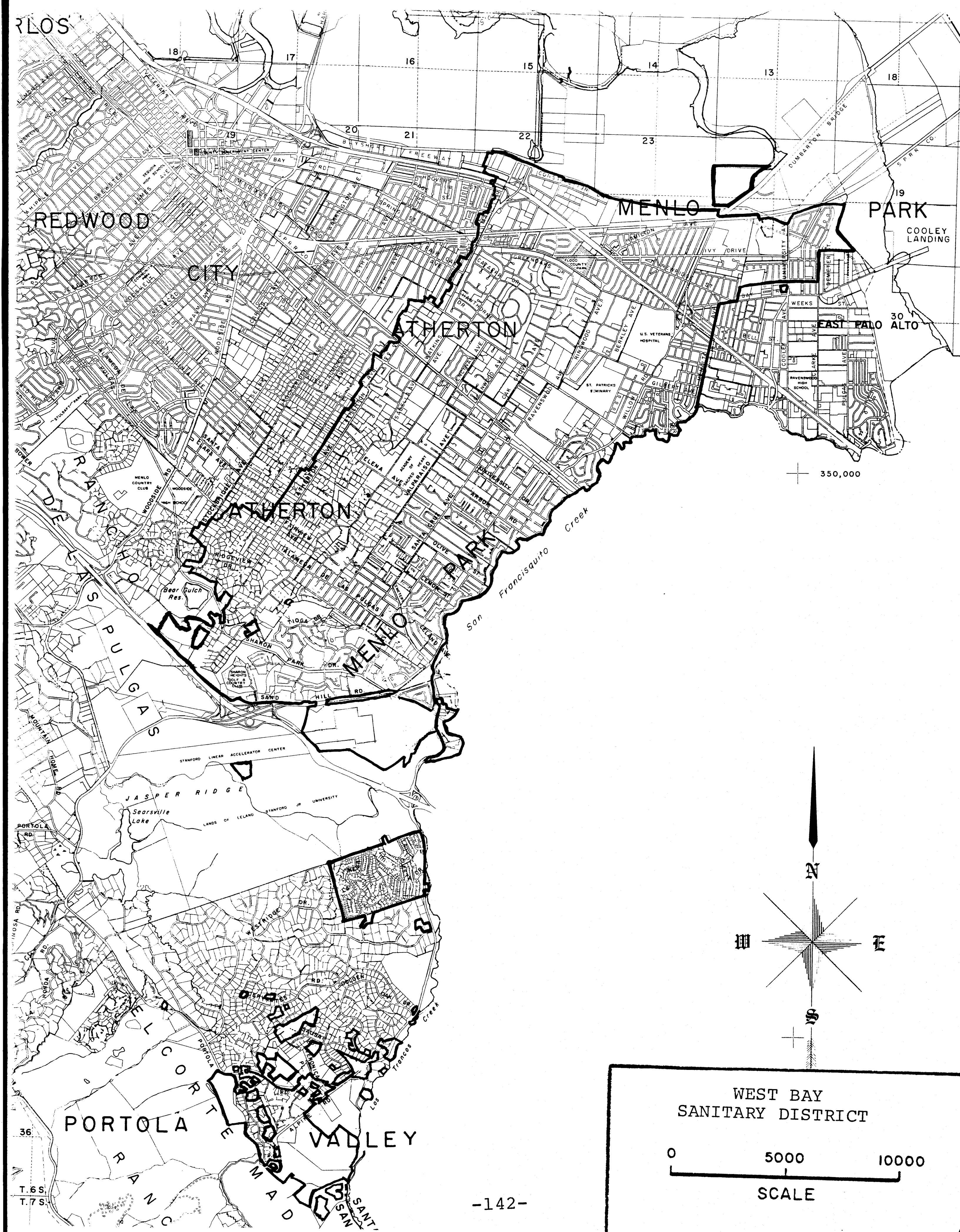
REDWOOD
CITY
ATHERTON
MENLO
PARK
EAST PALO ALTO
COOLEY LANDING
RANCHO DE LAS PULGAS
PORTOLA VALLEY
EL CORTE MADERA
STANFORD LINEAR ACCELERATOR CENTER
JASPER RIDGE
Searsville Lake
San Francisquito Creek
350,000
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S
WEST BAY
SANITARY DISTRICT
0
5000
10000
SCALE

Appendix 4:
Demands

4.1:
City of East Palo Alto 3 Month Billing Report

Month------------>	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June
Billed CCF-05-06 Approx	**101219**	**110815**	**93108**	**73837**	**62431**	**70087**	**59036**	**61513**	**66433**	**68814**	**96740**	**130327**
Billed CCF - 06-07	98572	114246	84014	85681	61782	70073	62304	64616	89246	89120	111722	106151
Billed CCF-07-08	**110628**	**106628**	**91938**	**82192**	**67812**	**67370**	**72314**	**59900**	**84005**	**94597**	**109490**	**108950**

	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09
Billed CCF 08-09	108950	105743	106032	98017	77308	58112	72610	61321	57900	71555		

4.2:
Additional Services Bi-Monthly Billing Reports

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AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 408573-4 ~~Woodland Creek H.O.A.~~
Premises # 920030876 W Bayshore Rd, 1982
Meter # 70093525
Utility W

A ddress'

CCF.

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
5/20/2009	W	70093525	R	5/18/2009	15622.00	692.00
3/16/2009	W	70093525	R	3/13/2009	14930.00	686.00
1/20/2009	W	70093525	R	1/16/2009	14244.00	694.00
11/17/2008	W	70093525	R	11/12/2008	13550.00	689.00
9/15/2008	W	70093525	R	9/10/2008	12861.00	596.00
7/15/2008	W	70093525	R	7/10/2008	12265.00	638.00
5/15/2008	W	70093525	R	5/09/2008	11627.00	675.00
3/17/2008	W	70093525	R	3/03/2008	10952.00	523.00
1/15/2008	W	70093525	R	1/11/2008	10429.00	604.00
11/26/2007	W	70093525	R	11/08/2007	9825.00	485.00
9/19/2007	W	70093525	R	9/14/2007	9340.00	590.00
7/31/2007	W	70093525	R	7/11/2007	8750.00	650.00
5/15/2007	W	70093525	R	5/03/2007	8100.00	524.00
3/15/2007	W	70093525	R	2/28/2007	7576.00	291.00
1/15/2007	W	70093525	R	1/15/2007	7285.00	393.00
11/13/2006	W	70093525	R	11/02/2006	6892.00	698.00
9/18/2006	W	70093525	R	9/18/2006	6194.00	88.00
7/17/2006	W	70093525	R	7/14/2006	6106.00	754.00
5/15/2006	W	70093525	R	5/05/2006	5352.00	689.00
3/17/2006	W	70093525	R	3/07/2006	4663.00	349.00
2/15/2006	W	70093525	R	2/08/2006	4314.00	1123.00
11/17/2005	W	70093525	R	11/09/2005	3191.00	469.00
10/10/2005	W	70093525	R	10/10/2005		
9/15/2005	W	70093525	R	9/09/2005	2562.00	90680.00
7/25/2005	W	70093525	R	7/25/2005	11882.00	822.00
5/17/2005	W	70093525	R	5/09/2005	11060.00	1227.00
5/17/2005	W	70093525	U	3/15/2005	395.80	
3/16/2005	W	70093525	U			562.80
1/19/2005	W	70093525	R	1/11/2005	9833.00	763.00
11/17/2004	W	70093525	R	11/04/2004	9070.00	776.00
9/17/2004	W	70093525	R	9/13/2004	8294.00	532.00
7/15/2004	W	70093525	R	7/09/2004	7762.00	636.00
5/14/2004	W	70093525	R	5/10/2004	7126.00	629.00
3/16/2004	W	70093525	R	3/08/2004	6497.00	536.00
1/15/2004	W	70093525	R	1/08/2004	5961.00	527.00
11/14/2003	W	70093525	R	11/10/2003	5434.00	556.00
9/18/2003	W	70093525	R	9/10/2003	4878.00	645.00
7/17/2003	W	70093525	R	7/09/2003	4233.00	638.00
5/19/2003	W	70093525	R	5/08/2003	3595.00	574.00
3/20/2003	W	70093525	R	3/06/2003	3021.00	512.00
1/21/2003	W	70093525	R	1/08/2003	2509.00	581.00
11/18/2002	W	70093525	R	11/06/2002	1928.00	562.00
9/16/2002	W	70093525	R	9/06/2002	1366.00	540.00

53.87

AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 408573-4 Woodland Creek H.O.A.
Premises # 920030876 W Bayshore Rd, 1982
Meter # 70093525
Utility W

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
7/18/2002	W	70093525	R	7/03/2002	826.00	370.00
5/16/2002	W	70093525	R	5/06/2002	456.00	148.00

AMERICAN WATER SERVICES, INC. - East Palo Alto

Usage Information Report

Account # 409912-3 ~~L.P. Nugent Squar~~ Partner
Premises # 920027494 University Av, 2361
Meter # 60294943
Utility W

CCF

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
5/20/2009	W	60294943	R	5/04/2009	11483.00	480.00
3/16/2009	W	60294943	R	3/02/2009	11003.00	456.00
1/20/2009	W	60294943	R	1/02/2009	10547.00	436.00
11/14/2008	W	60294943	R	11/07/2008	10111.00	470.00
9/15/2008	W	60294943	R	9/05/2008	9641.00	461.00
7/15/2008	W	60294943	R	7/07/2008	9180.00	478.00
5/15/2008	W	60294943	R	5/06/2008	8702.00	409.00
3/17/2008	W	60294943	R	3/11/2008	8293.00	426.00
1/15/2008	W	60294943	R	1/09/2008	7867.00	480.00
11/26/2007	W	60294943	R	10/31/2007	7387.00	395.00
9/19/2007	W	60294943	R	9/06/2007	6992.00	550.00
7/13/2007	W	60294943	R	6/29/2007	6442.00	441.00
5/15/2007	W	60294943	R	5/04/2007	6001.00	421.00
3/15/2007	W	60294943	R	3/09/2007	5580.00	418.00
1/15/2007	W	60294943	R	1/09/2007	5162.00	385.00
11/13/2006	W	60294943	R	11/06/2006	4777.00	487.00
9/08/2006	W	60294943	R	9/05/2006	4290.00	474.00
7/17/2006	W	60294943	R	7/03/2006	3816.00	389.00
5/15/2006	W	60294943	R	5/09/2006	3427.00	400.00
3/17/2006	W	60294943	R	3/10/2006	3027.00	378.00
2/10/2006	W	60294943	R	1/09/2006	2649.00	436.00
11/17/2005	W	60294943	R	11/02/2005	2213.00	420.00
9/15/2005	W	60294943	R	9/01/2005	1793.00	428.00
7/25/2005	W	60294943	R	7/07/2005	1365.00	505.00
5/17/2005	W	60294943	R	5/04/2005	860.00	446.00
3/16/2005	W	60294943	R	3/02/2005	414.00	288.00
1/19/2005	W	60294943	R	1/05/2005	126.00	115.00
1/19/2005	W	60294943	U	11/12/2004	99.00	
11/17/2004	W	60294943	U			88.00
9/17/2004	W	60294943	R	9/01/2004	11.00	11.00
7/15/2004	W	60294943	R	7/01/2004		

AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 411493-0 Wells Reit University Circle
Premises # 920030838 University Av, 2000
Meter # 1613660
Utility W

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
5/20/2009	W	1613660	R	5/14/2009	10399.00	187.00
3/16/2009	W	1613660	R	3/11/2009	10212.00	129.00
1/20/2009	W	1613660	R	1/16/2009	10083.00	139.00
11/14/2008	W	1613660	R	11/13/2008	9944.00	239.00
9/15/2008	W	1613660	R	9/11/2008	9705.00	304.00
7/15/2008	W	1613660	R	7/11/2008	9401.00	282.00
5/15/2008	W	1613660	R	5/09/2008	9119.00	191.00
3/17/2008	W	1613660	R	3/05/2008	8928.00	116.00
1/15/2008	W	1613660	R	1/14/2008	8812.00	201.00
11/26/2007	W	1613660	R	11/02/2007	8611.00	193.00
9/19/2007	W	1613660	R	9/17/2007	8418.00	323.00
7/13/2007	W	1613660	R	7/12/2007	8095.00	303.00
5/15/2007	W	1613660	R	5/01/2007	7792.00	170.00
3/15/2007	W	1613660	R	2/28/2007	7622.00	95.00
1/15/2007	W	1613660	R	1/15/2007	7527.00	155.00
11/13/2006	W	1613660	R	10/31/2006	7372.00	176.00
9/18/2006	W	1613660	R	9/14/2006	7196.00	359.00
7/17/2006	W	1613660	R	7/14/2006	6837.00	15.00

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AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 411488-0 Wells Reit University Circle
Premises # 920031665 University Av, 1950
Meter # 60294627
Utility W

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
5/20/2009	W	60294627	R	5/14/2009	19191.00	545.00
3/16/2009	W	60294627	R	3/13/2009	18646.00	155.00
1/20/2009	W	60294627	R	1/14/2009	18491.00	255.00
11/14/2008	W	60294627	R	11/14/2008	18236.00	910.00
9/15/2008	W	60294627	R	9/11/2008	17326.00	1177.00
7/15/2008	W	60294627	R	7/11/2008	16149.00	689.00
6/17/2008	W	60294627	R	6/17/2008		
5/15/2008	W	60294627	R	5/09/2008	1546.00	72.00
3/17/2008	W	60294627	R	3/05/2008	1474.00	35.00
1/15/2008	W	60294627	R	1/11/2008	1439.00	47.00
11/26/2007	W	60294627	R	11/07/2007	1392.00	63.00
9/19/2007	W	60294627	R	9/17/2007	1329.00	147.00
7/13/2007	W	60294627	R	7/12/2007	1182.00	113.00
5/15/2007	W	60294627	R	5/02/2007	1069.00	48.00
3/15/2007	W	60294627	R	2/28/2007	1021.00	14.00
1/15/2007	W	60294627	R	1/12/2007	1007.00	787.00
11/13/2006	W	60294627	R	10/31/2006	220.00	996.00
9/18/2006	W	60294627	R	9/14/2006	9224.00	1008.00
7/17/2006	W	60294627	R	7/14/2006	8216.00	19.00

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AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 411490-6 Wells Reit University Circle
Premises # 920030836 University Av, 1900
Meter # 1613170
Utility W

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
5/20/2009	W	1613170	R	5/14/2009	12070.00	352.00
3/16/2009	W	1613170	R	3/11/2009	11718.00	197.00
1/20/2009	W	1613170	R	1/15/2009	11521.00	218.00
11/14/2008	W	1613170	R	11/13/2008	11303.00	361.00
9/15/2008	W	1613170	R	9/11/2008	10942.00	427.00
7/15/2008	W	1613170	R	7/11/2008	10515.00	398.00
5/15/2008	W	1613170	R	5/09/2008	10117.00	316.00
3/17/2008	W	1613170	R	3/05/2008	9801.00	137.00
1/15/2008	W	1613170	R	1/14/2008	9664.00	214.00
11/26/2007	W	1613170	R	11/02/2007	9450.00	254.00
9/19/2007	W	1613170	R	9/14/2007	9196.00	450.00
7/13/2007	W	1613170	R	7/12/2007	8746.00	473.00
5/15/2007	W	1613170	R	4/30/2007	8273.00	312.00
3/15/2007	W	1613170	R	2/28/2007	7961.00	141.00
1/15/2007	W	1613170	R	1/15/2007	7820.00	243.00
11/13/2006	W	1613170	R	10/31/2006	7577.00	250.00
9/18/2006	W	1613170	R	9/14/2006	7327.00	463.00
7/17/2006	W	1613170	R	7/14/2006	6864.00	22.00

AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 411215-7 Bay Road Housing LP
Premises # 920029998 Bay Rd, 1730
Meter # 70155661
Utility W

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
4/16/2009	W	70155661	R	4/10/2009	5775.00	1085.00
2/17/2009	W	70155661	R	2/16/2009	4690.00	1380.00
12/15/2008	W	70155661	R	12/10/2008	3310.00	1050.00
10/17/2008	W	70155661	R	10/15/2008	2260.00	878.00
8/15/2008	W	70155661	R	8/12/2008	1382.00	1382.00
6/16/2008	W	70155661	R	6/13/2008	623.00	623.00
5/19/2008	W	70155661	R	5/19/2008		
4/21/2008	W	70155661	R	4/15/2008	33650.00	28150.00
2/15/2008	W	70155661	R	2/12/2008	5500.00	875.00
12/17/2007	W	70155661	R	12/14/2007	4625.00	954.00
10/15/2007	W	70155661	R	10/11/2007	3671.00	685.00
8/15/2007	W	70155661	R	8/07/2007	2986.00	535.00
6/15/2007	W	70155661	R	6/07/2007	2451.00	308.00
4/11/2007	W	70155661	R	4/05/2007	2143.00	532.00
2/09/2007	W	70155661	R	2/07/2007	1611.00	678.00
1/09/2007	W	70155661	R	11/29/2006	933.00	256.00
10/27/2006	W	70155661	R	10/27/2006		
10/27/2006	W	70155661	R	10/27/2006		
10/27/2006	W	70155661	R	10/27/2006		
10/27/2006	W	70155661	R	10/16/2006	677.00	677.00
8/11/2006	W	70155661	R	8/04/2006	27658.00	26205.00
6/16/2006	W	70155661	R	6/16/2006	1453.00	1105.00
4/17/2006	W	70155661	R	4/06/2006	348.00	348.00

5/22/2009 11:56 AM
ARCELC

9/9

AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 411491-4 Wells Reit University Circle
Premises # 920030837 University Av LS, 1900
Meter # 53147315
Utility W

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
5/20/2009	W	53147315	R	5/14/2009	26844.00	505.00
3/16/2009	W	53147315	R	3/11/2009	26339.00	163.00
1/20/2009	W	53147315	R	1/15/2009	26176.00	284.00
11/14/2008	W	53147315	R	11/13/2008	25892.00	842.00
9/15/2008	W	53147315	R	9/11/2008	25050.00	1092.00
7/15/2008	W	53147315	R	7/11/2008	23958.00	1257.00
5/15/2008	W	53147315	R	5/09/2008	22701.00	606.00
3/17/2008	W	53147315	R	3/05/2008	22095.00	271.00
1/15/2008	W	53147315	R	1/14/2008	21824.00	511.00
11/26/2007	W	53147315	R	11/02/2007	21313.00	410.00
9/19/2007	W	53147315	R	9/14/2007	20903.00	1081.00
7/13/2007	W	53147315	R	7/12/2007	19822.00	1074.00
5/15/2007	W	53147315	R	4/30/2007	18748.00	484.00
3/15/2007	W	53147315	R	2/28/2007	18264.00	205.00
1/15/2007	W	53147315	R	1/15/2007	18059.00	420.00
11/13/2006	W	53147315	R	10/31/2006	17639.00	706.00
9/18/2006	W	53147315	R	9/14/2006	16933.00	1068.00
7/17/2006	W	53147315	R	7/14/2006	15865.00	27.00

AMERICAN WATER SERVICES, INC - East Palo Alto

Usage Information Report

Account # 411230-6 Four Seasons Hotel
Premises # 920031799 University Av, 2050
Meter # 70146497
Utility W

Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
3/16/2009	W	70146497	R	3/16/2009	53409.00	1115.00
1/20/2009	W	70146497	R	1/06/2009	52294.00	5570.00
11/17/2008	W	70146497	R	11/10/2008	46724.00	4080.00
9/15/2008	W	70146497	R	9/08/2008	42644.00	3709.00
7/15/2008	W	70146497	R	7/09/2008	38935.00	3401.00
5/30/2008	W	70146497	R	5/15/2008	35534.00	3660.00
4/02/2008	W	70146497	R	3/17/2008	31874.00	3680.00
1/15/2008	W	70146497	R	1/11/2008	28194.00	2822.00
12/06/2007	W	70146497	R	11/19/2007		
11/26/2007	W	70146497	R	11/19/2007	26027.00	655.00
10/29/2007	W	70146497	R	10/29/2007		
10/15/2007	W	70146497	R	9/20/2007	25372.00	1046.00
7/13/2007	W	70146497	R	7/05/2007	24326.00	154.00
5/15/2007	W	70146497	R	5/08/2007	24172.00	2934.00
3/15/2007	W	70146497	R	3/13/2007	21238.00	2766.00
1/15/2007	W	70146497	R	1/09/2007	18472.00	2881.00
11/13/2006	W	70146497	R	11/07/2006	15591.00	2196.00
11/13/2006	W	70146497	U	9/06/2006	7136.00	
10/02/2006	W	70146497	U			2394.00
7/17/2006	W	70146497	R	7/10/2006	4742.00	1180.00
6/26/2006	W	70146497	R	6/26/2006		
5/15/2006	W	70146497	R	5/09/2006	5698.00	2394.00
5/15/2006	W	70146497	U	3/17/2006	13395.68	
5/03/2006	W	70146497	R	3/17/2006		
3/17/2006	W	70146497	U			91.68

AMERICAN WATER SERVICES, INC - East Palo Alto

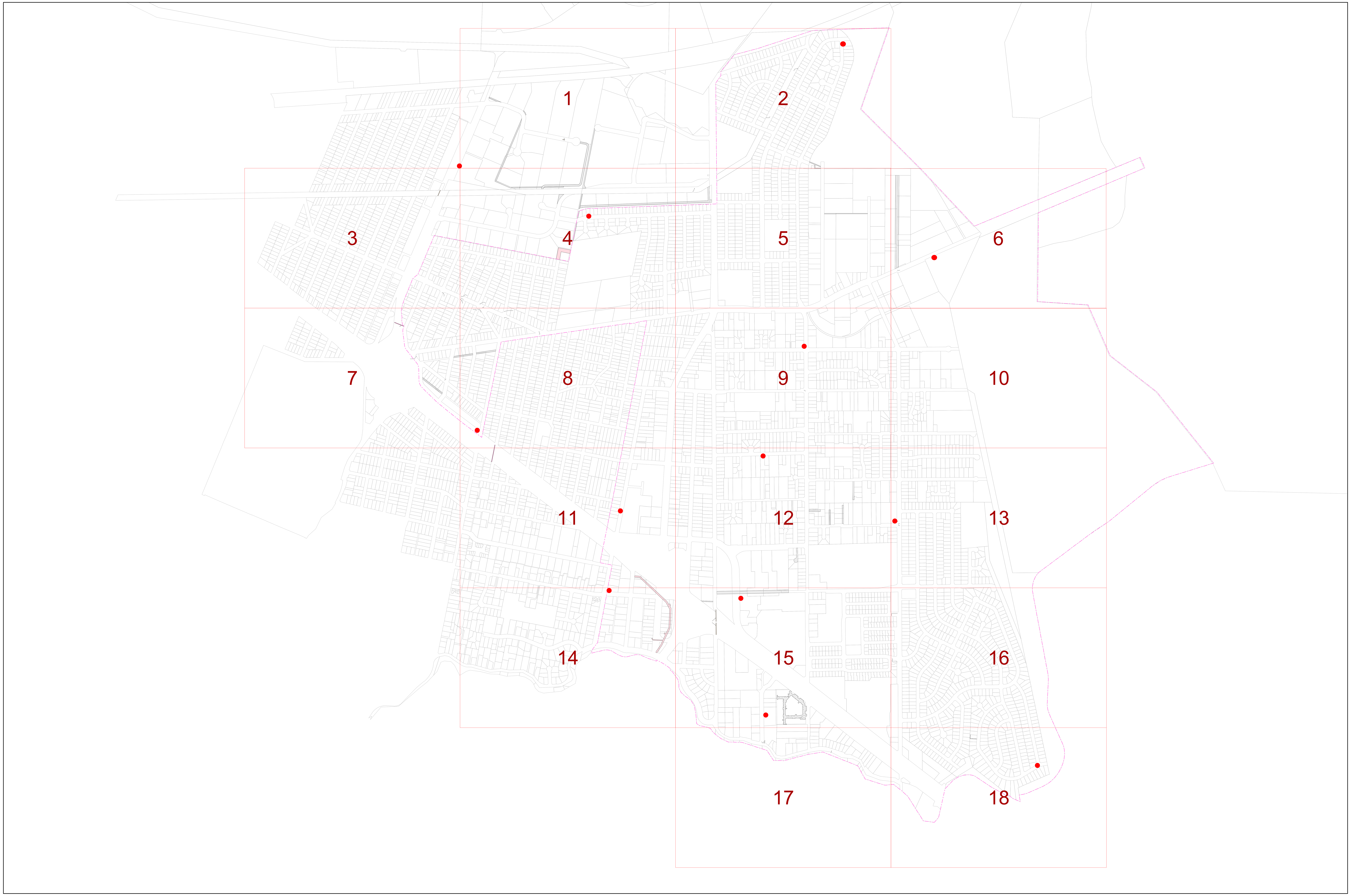
Usage Information Report

Account # 408572-6 Woodland Creek H.O.A.
Premises # 920028589 W Bayshore Rd LS, 1982
Meter # 54111499
Utility W

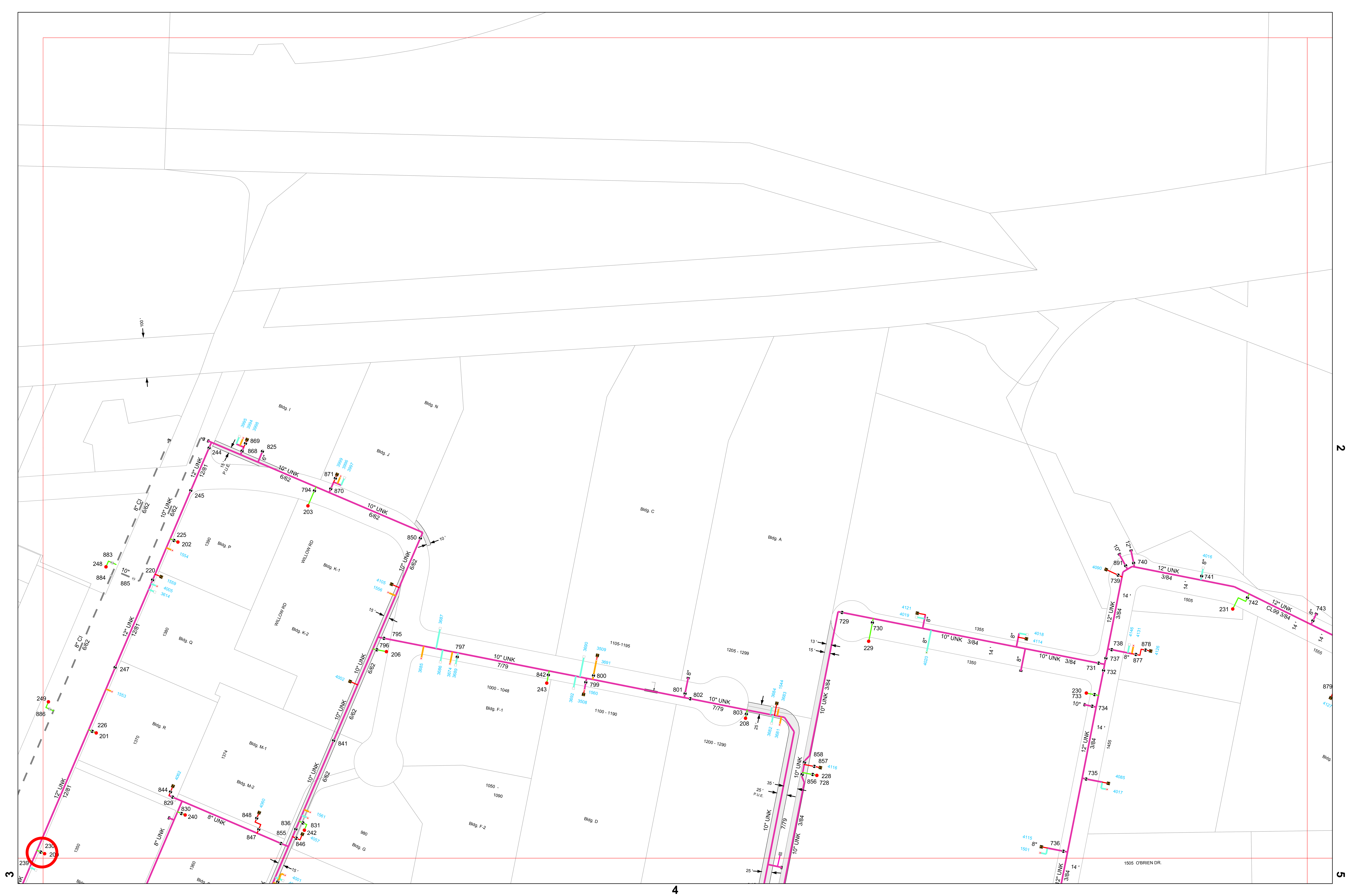
Bill Date	Utl	Meter #	U/R	Read Date	Reading	Usage
5/20/2009	W	54111499	R	5/13/2009	12824.00	76.00
3/16/2009	W	54111499	R	3/13/2009	12748.00	8.00
1/20/2009	W	54111499	R	1/06/2009	12740.00	12.00
11/14/2008	W	54111499	R	11/12/2008	12728.00	271.00
9/15/2008	W	54111499	R	9/10/2008	12457.00	444.00
7/15/2008	W	54111499	R	7/10/2008	12013.00	451.00
5/15/2008	W	54111499	R	5/09/2008	11562.00	411.00
3/17/2008	W	54111499	R	3/03/2008	11151.00	54.00
1/15/2008	W	54111499	R	1/11/2008	11097.00	177.00
11/26/2007	W	54111499	R	11/08/2007	10920.00	251.00
9/19/2007	W	54111499	R	9/14/2007	10669.00	402.00
7/13/2007	W	54111499	R	7/11/2007	10267.00	842.00
5/15/2007	W	54111499	R	5/03/2007	9425.00	232.00
3/15/2007	W	54111499	R	2/28/2007	9193.00	58.00
1/15/2007	W	54111499	R	1/15/2007	9135.00	194.00
11/13/2006	W	54111499	R	11/02/2006	8941.00	978.00
9/18/2006	W	54111499	R	9/18/2006	7963.00	71.00
7/17/2006	W	54111499	R	7/14/2006	7892.00	454.00
5/15/2006	W	54111499	R	5/05/2006	7438.00	113.00
3/17/2006	W	54111499	R	3/07/2006	7325.00	30.00
2/10/2006	W	54111499	R	2/08/2006	7295.00	182.00
11/17/2005	W	54111499	R	11/09/2005	7113.00	391.00
9/15/2005	W	54111499	R	9/09/2005	6722.00	391.00
7/25/2005	W	54111499	R	7/15/2005	6331.00	466.00
5/17/2005	W	54111499	R	5/09/2005	5865.00	170.00
3/16/2005	W	54111499	R	3/08/2005	5695.00	
1/19/2005	W	54111499	R	1/11/2005	5695.00	
11/17/2004	W	54111499	R	11/04/2004	5695.00	262.00
9/17/2004	W	54111499	R	9/13/2004	5433.00	714.00
7/15/2004	W	54111499	R	7/09/2004	4719.00	533.00
5/14/2004	W	54111499	R	5/10/2004	4186.00	459.00
3/16/2004	W	54111499	R	3/08/2004	3727.00	
1/15/2004	W	54111499	R	1/08/2004	3727.00	282.00
11/14/2003	W	54111499	R	11/10/2003	3445.00	509.00
9/18/2003	W	54111499	R	9/10/2003	2936.00	787.00
7/17/2003	W	54111499	R	7/09/2003	2149.00	554.00
5/19/2003	W	54111499	R	5/08/2003	1595.00	31.00
3/20/2003	W	54111499	R	3/06/2003	1564.00	29.00
1/21/2003	W	54111499	R	1/08/2003	1535.00	244.00
11/18/2002	W	54111499	R	11/06/2002	1291.00	308.00
9/16/2002	W	54111499	R	9/06/2002	983.00	323.00
7/18/2002	W	54111499	R	7/03/2002	660.00	286.00
5/16/2002	W	54111499	R	5/06/2002	374.00	176.00

Appendix 5:
Calibration

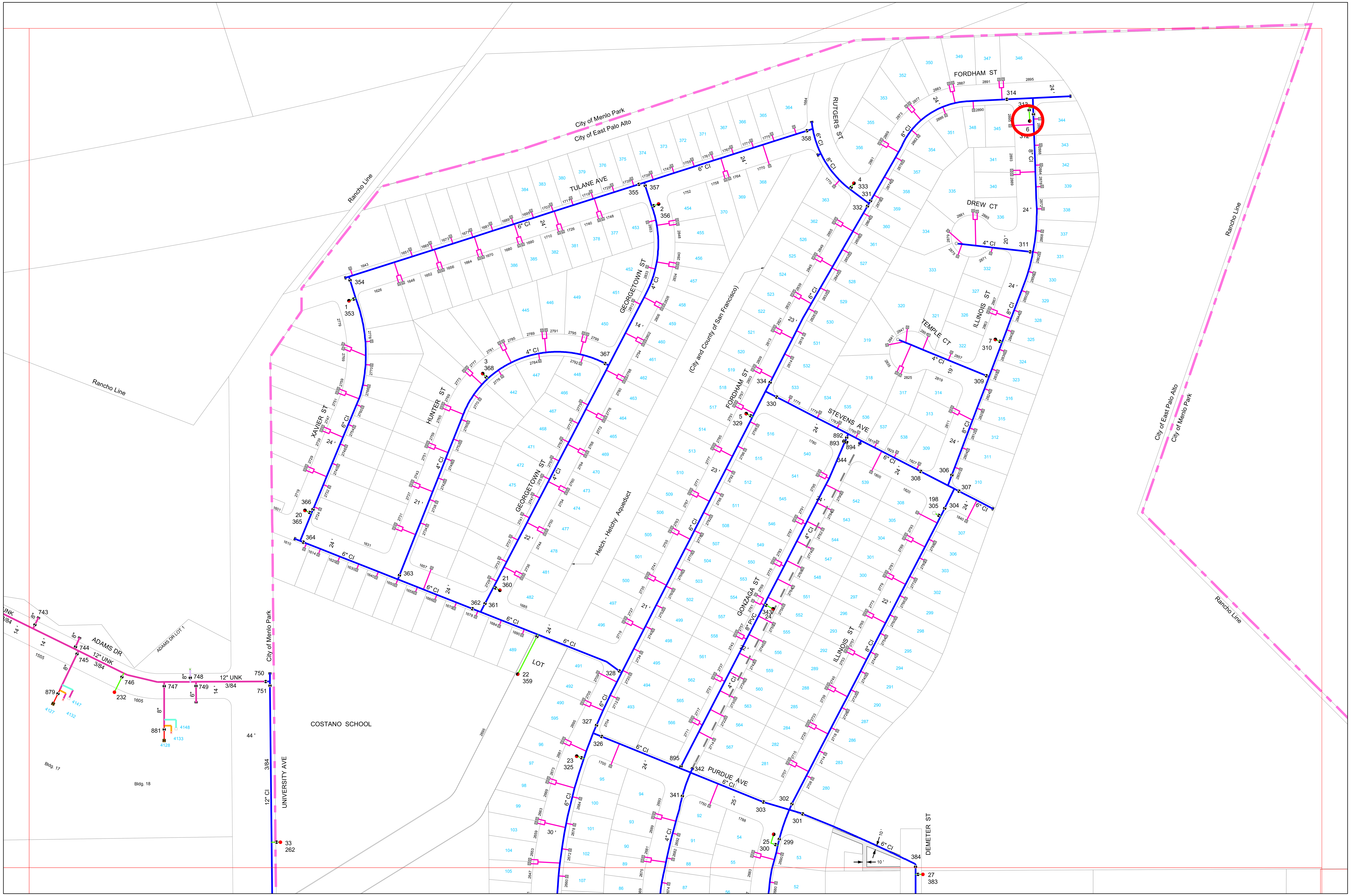
5.1:
Fire Hydrant Locations for Fire Flow Testing



Overview	Scale: 1" = 600' NOT FOR CONSTRUCTION	California-American Water Company	East Palo Alto Water System	Water Atlas Book	N	October 2008	Overview

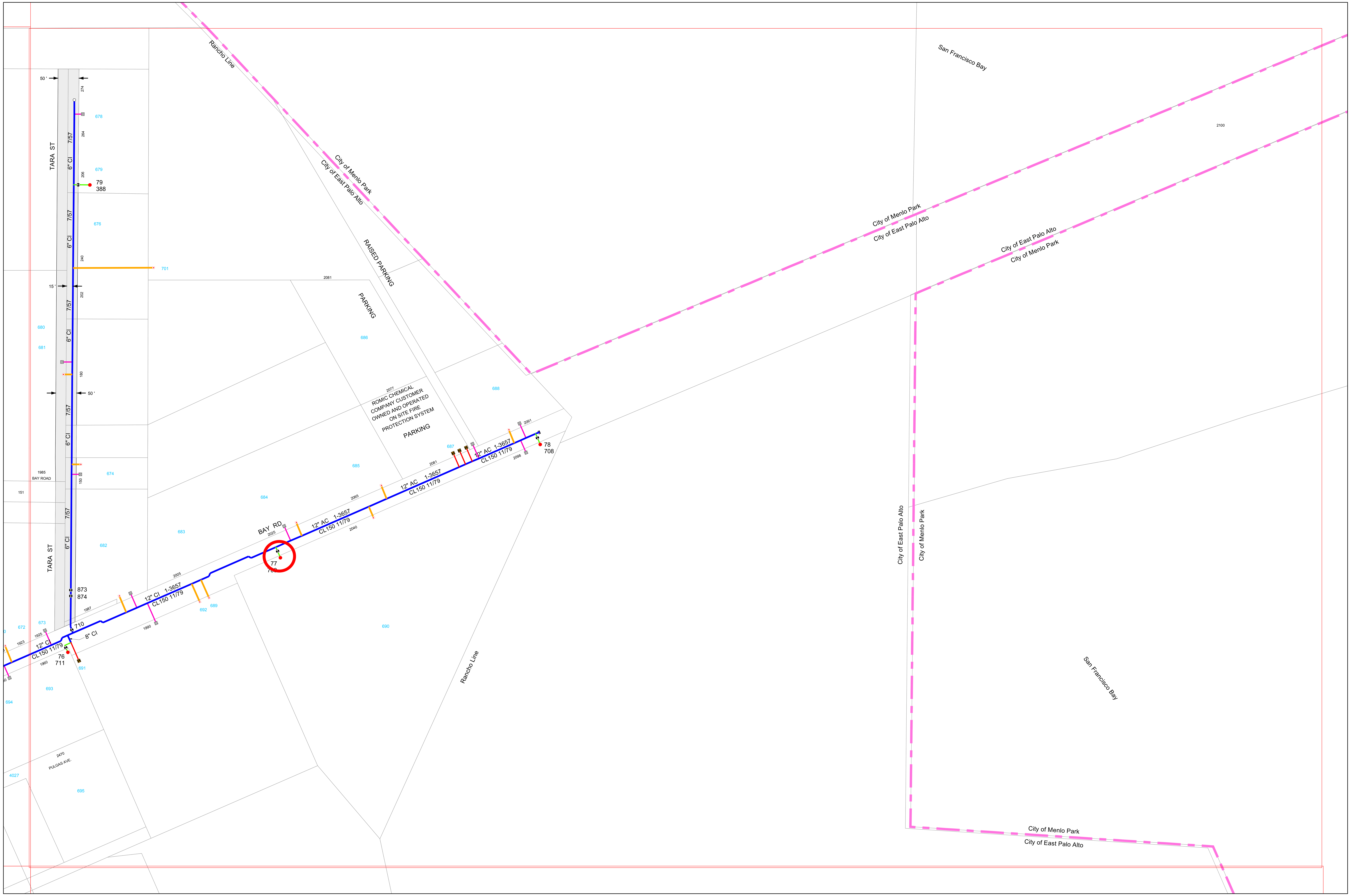


1	Scale: 1" = 100' NOT FOR CONSTRUCTION	California-American Water Company	East Palo Alto Water System	Water Atlas Book		October 2008	1



2	Scale: 1" = 100' NOT FOR CONSTRUCTION	California-American Water Company	East Palo Alto Water System	Water Atlas Book		October 2008	2

4	Scale: 1" = 100' NOT FOR CONSTRUCTION	California-American Water Company	East Palo Alto Water System	Water Atlas Book		October 2008	4



Rancho Line
San Francisco Bay
City of Menlo Park
City of East Palo Alto
RAISED PARKING
PARKING
ROMIC CHEMICAL COMPANY CUSTOMER OWNED AND OPERATED ON SITE FIRE PROTECTION SYSTEM
TARA ST
BAY RD
12" AC 1-3657
CL150 11/79
12" CI 1-3657
6" CI
7/57
8" CI
79
388
78
708
76
711
77
873
874
710

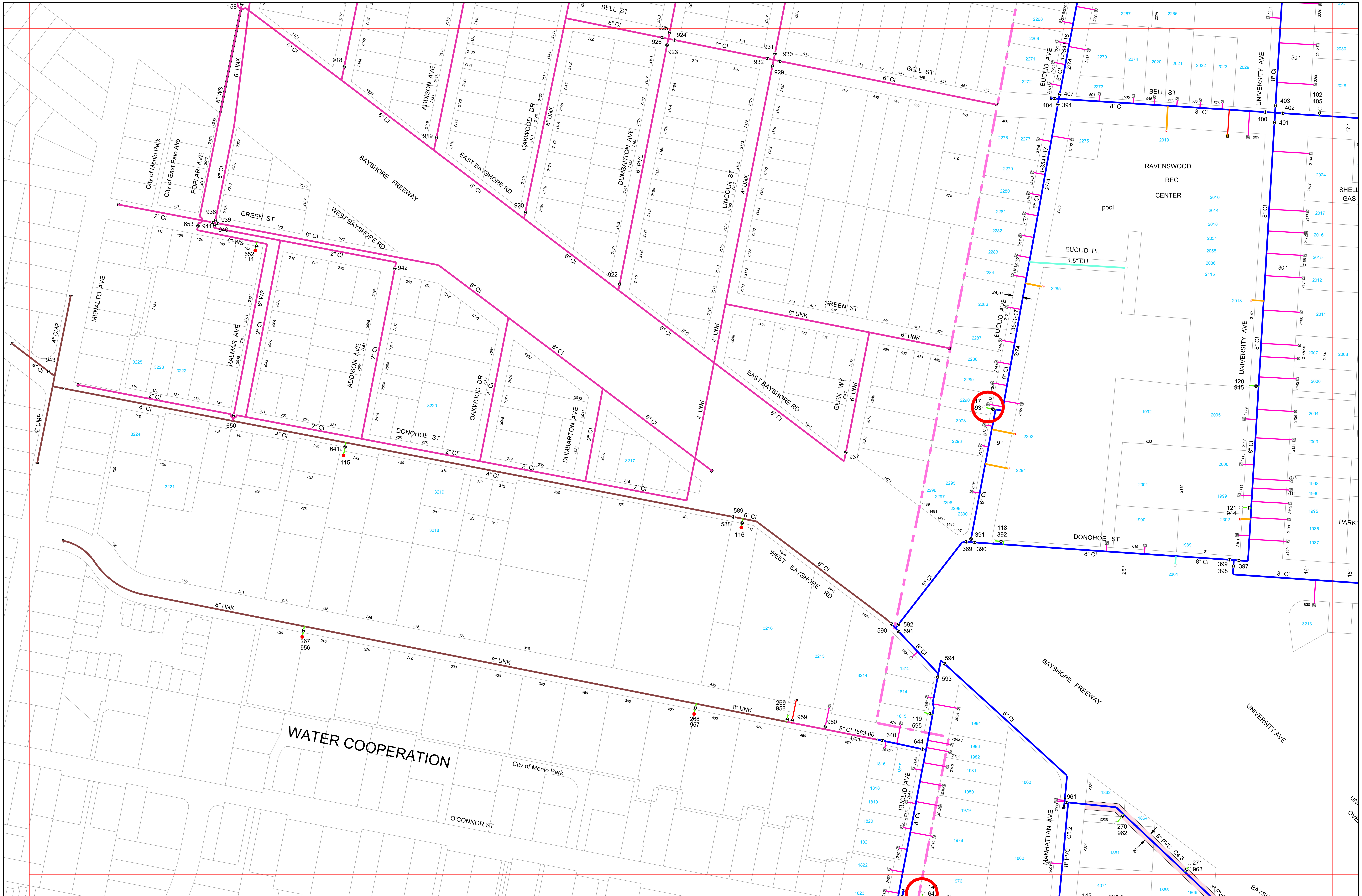

4
3
5
7
9
11
12
SCHOOL
COMMUNITY
LAW
OFFICES
STAINT
FRANCIS
OF
ASSISI
RECTORY
EPA
WATER
WELL
SCHOOL ACESS ROAD
BAY RD
NEWBRIDGE ST
DOUBLE OFFSET
POPLAR AVE
RALMAR AVE
MENALTO AVE
LAUREL AVE
MELLO ST
BRADLEY WY
HOLLAND ST
ADDISON AVE
OAKWOOD DR
DUMBARTON AVE
PALO VERDE AVE
WEEKS ST
LILAC LN
RUNNYMEDE ST
OAKDALE AVE
GARDEN ST
LINCOLN ST
GLEN WY
SACRAMENTO ST
EUCLID AVE
UNIVERSITY AVE
BELL ST
1050 BAY ROAD
E.P.A
COUNTY
WATERWORKS
DIST. OFFICE
City of East Palo Alto
City of Menlo Park
BAYSHORE FWY (U.S.-101)

9	Scale: 1" = 100' NOT FOR CONSTRUCTION	California-American Water Company	East Palo Alto Water System	Water Atlas Book		October 2008	9

8

7

9



12

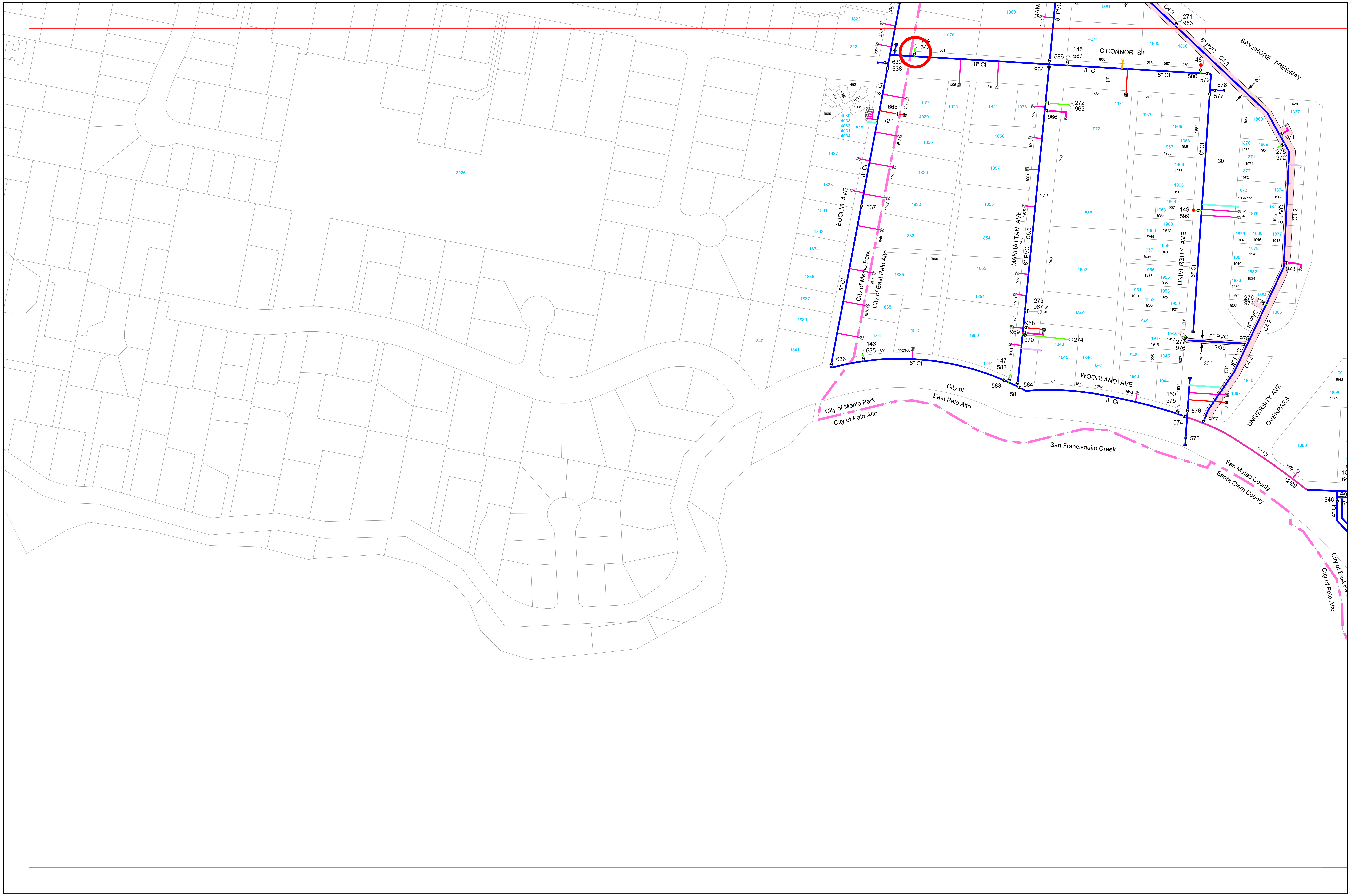
15

14

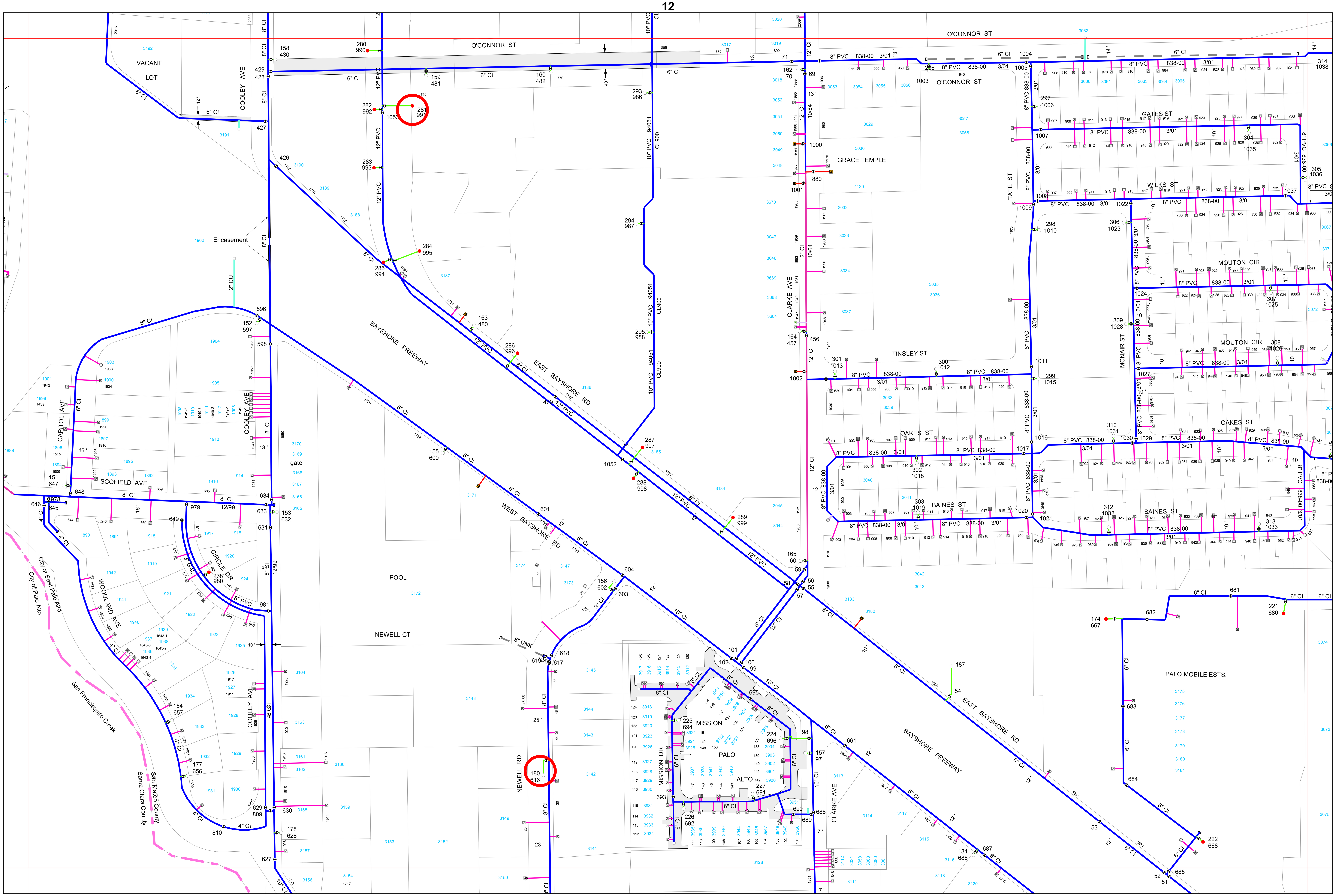
11	Scale: 1" = 100' NOT FOR CONSTRUCTION	California-American Water Company	East Palo Alto Water System	Water Atlas Book		October 2008	11


9
8
10
11
13
14
15
16
BELL ST
BELL CT
CAPITOL AVE
COOLEY AVE
HENRY CT
CLARKE AVE
TEA CT
BEECH ST
BRENTWOOD CT
TERRA VILLA AVE
SHELL
GAS
GREEN ST
CAMPHOR WY
DINES CT
LITA LN
ALMOND CT
MYRTLE ST
MYRTLE PL
MYRTLE CT
SPARROW CT
SALAS CT
DONOHOE ST
PARKING
UNIVERSITY AVE
OVERPASS
VACANT
O'CONNOR ST
BRENTWOOD
SCHOOL
RONALD MCNAIR
SCHOOL
OICW
CHILD
CENTER
PULGAS AVE

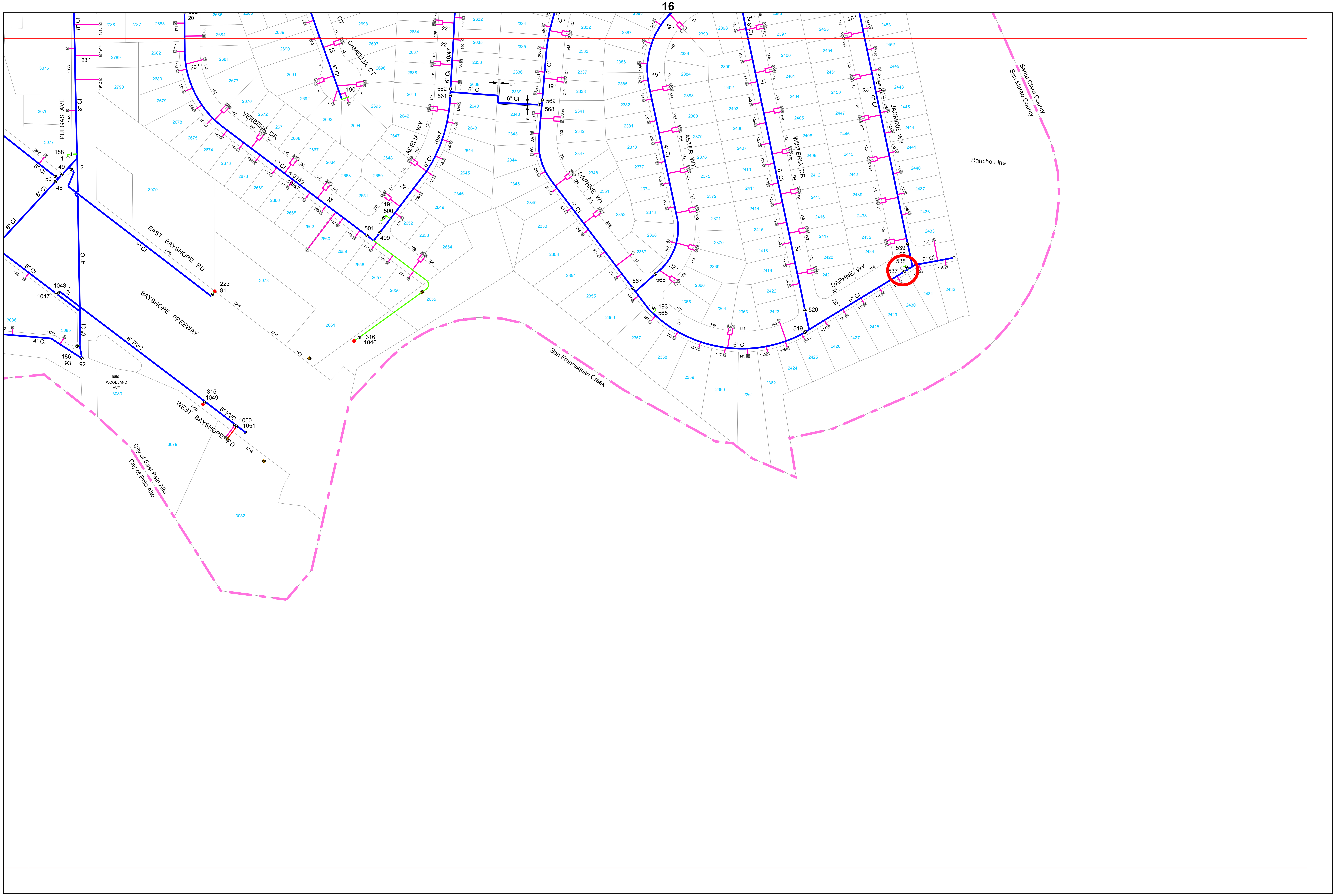
13	Scale: 1" = 100' NOT FOR CONSTRUCTION	California-American Water Company	East Palo Alto Water System	Water Atlas Book		October 2008	13



11
12
15
17
EUCLID AVE
MANHATTAN AVE
UNIVERSITY AVE
O'CONNOR ST
WOODLAND AVE
BAYSHORE FREEWAY
UNIVERSITY AVE OVERPASS
City of Menlo Park
City of East Palo Alto
City of Palo Alto
San Francisquito Creek
San Mateo County
Santa Clara County
8" CI
8" PVC
6" CI
6" PVC



Scale: 1" = 600'
NOT FOR CONSTRUCTION
California-American Water Company
East Palo Alto Water System
Water Atlas Book
October 2008


16
15
17
PULGAS AVE
EAST BAYSHORE RD
BAYSHORE FREEWAY
WEST BAYSHORE RD
VERBENA DR
CAMELLIA CT
ABELIA WY
DAPHNE WY
ASTER WY
WISTERIA DR
JASMINE WY
San Francisquito Creek
City of East Palo Alto
City of Palo Alto
Santa Clara County
San Mateo County
Rancho Line
1960 WOODLAND AVE.

5.2:
Fire Flow Testing Results

EAST PALO ALTO FIRE HYDRANT CALIBRATION
Date: 5/20-21/2009

Block Map Page	Location of Flow FH	Time of test	Location of Residual FH	Static (psi)	Residual (psi)	Flow (gpm)	Calculated Flow (gpm)	Notes
1	1350 Adams	10:10 PM	1370 Adams	75	71	1275	5250	J-731 (J-805)
2	2896 Illinios St	10:22 PM	2836 Illinois St	70	64	1060	3331	J-333 (J-302)
3	1201 Westminster (on Newbridge St)	11:00 PM	1207 Jervis Ave (on Newbridge St)	69	65	920	3559	J-227 (J-288)
4	1407 Kavanaugh Dr	10:36 PM	1451 Kavanaugh Dr	70	65	1190	4126	J-620 (J-196)
6	2025 Bay Rd	1:45 AM	1960 Bay Rd	75	66	1130	3003	J-708 (J-710)
8	999 Bayshore Rd (near Menalto X)	11:30 PM	999 Bayshore Rd	66	37	920	1180	Erratic Gauge J-156 (J-8)
9	891 Weeks St (on Clarke Ave)	1:35 AM	810 Weeks St	69	60	1160	2896	J-703 (J-453)
11	2137 Euclid Ave	11:47 PM	2160 Euclid Ave (at Donohoe X)	66	56	1030	2348	J-390 (J-398)
14	501 O'Connor St (on Euclid Ave)	11:52 PM	555 O'Connor St (on Manhattan)	65	55	970	2185	J-642 (J-592)
12	800 Bell St	1:22 AM	898 Bell St	71	60	1120	2564	J-446 (J-464)
13	2101 Pulgas St (at Myrtle Ave X)	1:09 AM	2033 Pulgas St	70	60	1090	2599	J-22 (J-12)
15	760 E Bayshore Rd (at McDonalds)	12:45 AM	E Bayshore Rd (across from McDonalds)	66	58	1160	2983	**** J-9 (J-10)
15	30 Newell Rd	12:28 AM	95 Newell Rd (across the street)	65	60	1040	3407	J-612 (J-100)
18	107 Daphne Way	12:58 AM	161 Daphne Way	73	55	1030	1845	J-519 (J-520)
1	~1300 Willow Rd.	9:45 PM		70		avg	2948	Willow Road Turnout, incoming pressure = 132 psi (avg day=134.6)
1	~1200 Obrien Dr.	9:57 PM		75				Kavanaugh Turnout, incoming pressure = 105 psi (avg day=134.8)
1	~1500 Obrien Dr.	9:59 PM		75				University Turnout, incoming pressure = 140 psi (avg day=134.2)

5.3:
Calibration Results, Revised C-Values

DB Table - 'Pipe Modeling'

	ID (Char)	LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
1	KAV_PRV_D	P-85 1.00	6.00	120.00
2	KAV_PRV_U	P-52 1.00	6.00	120.00
3	NEW_P1	300.00	16.00	130.00
4	NEW_P2	670.00	16.00	130.00
5	NEW_P3	1,560.00	16.00	130.00
6	NEW_P4	620.00	16.00	130.00
7	NEW_P5	610.00	16.00	130.00
8	NEW_P6	1,130.00	12.00	130.00
9	NEW_P7	670.00	12.00	130.00
10	NEW_P8	390.00	12.00	130.00
11	NEW_P9	300.00	12.00	130.00
12	P-1	450.00	12.00	50.00
13	P-10	930.00	8.00	120.00
14	P-100	4.00	6.00	106.00
15	P-101	240.00	6.00	106.00
16	P-102	480.00	6.00	120.00
17	P-103	1,700.00	6.00	106.00
18	P-104	1.00	6.00	106.00
19	P-105	1,910.00	8.00	50.00
20	P-106	270.00	8.00	50.00
21	P-107	1,670.00	6.00	120.00
22	P-108	240.00	12.00	85.00
23	P-109	930.00	10.00	57.00
24	P-11	555.00	8.00	120.00
25	P-110	670.00	10.00	57.00
26	P-111	980.00	8.00	57.00
27	P-112	770.00	10.00	57.00

DB Table - 'Pipe Modeling'

	ID (Char)	LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
28	P-113	900.00	8.00	57.00
29	P-114	1,620.00	8.00	120.00
30	P-115	1,890.00	10.00	120.00
31	P-116	690.00	8.00	120.00
32	P-117	245.00	8.00	50.00
33	P-118	620.00	8.00	50.00
34	P-119	840.00	8.00	50.00
35	P-12	450.00	8.00	120.00
36	P-121	1,270.00	8.00	106.00
37	P-122	290.00	8.00	50.00
38	P-123	660.00	12.00	120.00
39	P-124	380.00	8.00	50.00
40	P-125	660.00	8.00	50.00
41	P-126	580.00	8.00	50.00
42	P-127	1,290.00	8.00	50.00
43	P-128	530.00	8.00	50.00
44	P-129	130.00	8.00	50.00
45	P-13	275.00	6.00	85.00
46	P-130	1,290.00	8.00	50.00
47	P-131	910.00	8.00	50.00
48	P-132	1,130.00	8.00	50.00
49	P-133	1,040.00	8.00	50.00
50	P-134	310.00	8.00	50.00
51	P-135	1,070.00	8.00	50.00
52	P-136	1,080.00	6.00	50.00
53	P-137	1,020.00	6.00	50.00
54	P-138	470.00	8.00	50.00

DB Table - 'Pipe Modeling'

		ID (Char)	LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
55		P-139	1,620.00	6.00	50.00
56		P-14	1,290.00	6.00	85.00
57		P-140	1,550.00	6.00	85.00
58		P-141	980.00	6.00	57.00
59		P-142	2,675.00	6.00	57.00
60		P-143	1,280.00	6.00	57.00
61		P-144	2,300.00	8.00	120.00
62		P-145	50.00	12.00	120.00
63		P-146	200.00	12.00	120.00
64		P-147	500.00	12.00	120.00
65		P-149	5.00	8.00	120.00
66		P-15	1,210.00	4.00	71.00
67		P-150	770.00	8.00	120.00
68		P-16	555.00	12.00	50.00
69		P-160	858.00	6.00	71.00
70		P-161	686.00	10.00	50.00
71		P-162	514.00	10.00	50.00
72		P-169	350.00	4.00	71.00
73		P-170	1,210.00	12.00	120.00
74		P-171	362.00	8.00	120.00
75		P-172	575.00	6.00	85.00
76		P-173	1,035.00	6.00	71.00
77		P-174	1,644.00	12.00	50.00
78		P-175	5.00	12.00	50.00
79		P-176	838.00	12.00	50.00
80		P-18	800.00	8.00	120.00
81		P-180	1,320.00	8.00	50.00

DB Table - 'Pipe Modeling'

		ID (Char)	LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
82		P-19	620.00	6.00	85.00
83		P-190	275.00	6.00	120.00
84		P-2	980.00	12.00	50.00
85		P-20	650.00	8.00	50.00
86		P-200	1,320.00	6.00	120.00
87		P-21	1,250.00	10.00	50.00
88		P-210	275.00	6.00	120.00
89		P-22	400.00	8.00	50.00
90		P-220	275.00	6.00	120.00
91		P-23	1,350.00	8.00	50.00
92		P-230	1,045.00	6.00	120.00
93		P-24	620.00	8.00	50.00
94		P-240	1,045.00	6.00	120.00
95		P-25	650.00	8.00	50.00
96		P-250	440.00	6.00	106.00
97		P-26	600.00	8.00	50.00
98		P-260	770.00	6.00	106.00
99		P-27	740.00	8.00	50.00
100		P-270	880.00	6.00	120.00
101		P-28	380.00	8.00	50.00
102		P-280	1,155.00	6.00	120.00
103		P-29	1,500.00	8.00	50.00
104		P-290	330.00	6.00	106.00
105		P-3	1,500.00	12.00	113.00
106		P-30	890.00	10.00	57.00
107		P-300	330.00	6.00	106.00
108		P-31	1,220.00	10.00	57.00

DB Table - 'Pipe Modeling'

		ID (Char)	LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
109		P-310	1,100.00	6.00	106.00
110		P-32	75.00	12.00	64.00
111		P-320	750.00	6.00	106.00
112		P-33	1,750.00	8.00	50.00
113		P-330	275.00	6.00	106.00
114		P-34	2,030.00	8.00	50.00
115		P-340	1,280.00	6.00	106.00
116		P-350	220.00	6.00	106.00
117		P-36	100.00	10.00	50.00
118		P-360	1,650.00	6.00	106.00
119		P-37	1,150.00	10.00	120.00
120		P-370	1,100.00	6.00	106.00
121		P-38	900.00	8.00	120.00
122		P-380	990.00	6.00	106.00
123		P-390	770.00	6.00	106.00
124		P-4	1,440.00	8.00	85.00
125		P-40	242.00	12.00	57.00
126		P-400	1,155.00	12.00	64.00
127		P-41	980.00	8.00	57.00
128		P-410	1,485.00	6.00	120.00
129		P-42	222.00	8.00	57.00
130		P-420	880.00	8.00	71.00
131		P-43	620.00	10.00	57.00
132		P-430	1,210.00	4.00	64.00
133		P-44	610.00	10.00	57.00
134		P-440	1,320.00	4.00	71.00
135		P-45	1,550.00	12.00	57.00

DB Table - 'Pipe Modeling'

		ID (Char)	LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
136		P-450	682.00	12.00	57.00
137		P-46	520.00	12.00	50.00
138		P-460	990.00	10.00	57.00
139		P-47	666.00	12.00	50.00
140		P-470	330.00	6.00	64.00
141		P-48	1,900.00	10.00	57.00
142		P-480	880.00	6.00	64.00
143		P-49	220.00	8.00	50.00
144		P-5	532.80	8.00	50.00
145		P-50	200.00	10.00	57.00
146		P-51	220.00	10.00	57.00
147		P-53	5.00	10.00	57.00
148		P-54	333.00	10.00	57.00
149		P-55	100.00	10.00	57.00
150		P-56	290.00	12.00	50.00
151		P-57	1,980.00	10.00	120.00
152		P-58	555.00	10.00	120.00
153		P-59	580.00	10.00	120.00
154		P-6	290.00	8.00	50.00
155		P-60	1,220.00	10.00	120.00
156		P-61	1,200.00	10.00	120.00
157		P-62	730.00	12.00	50.00
158		P-63	800.00	12.00	50.00
159		P-64	1,780.00	12.00	50.00
160		P-65	330.00	12.00	50.00
161		P-66	820.00	12.00	50.00
162		P-67	5.00	12.00	50.00

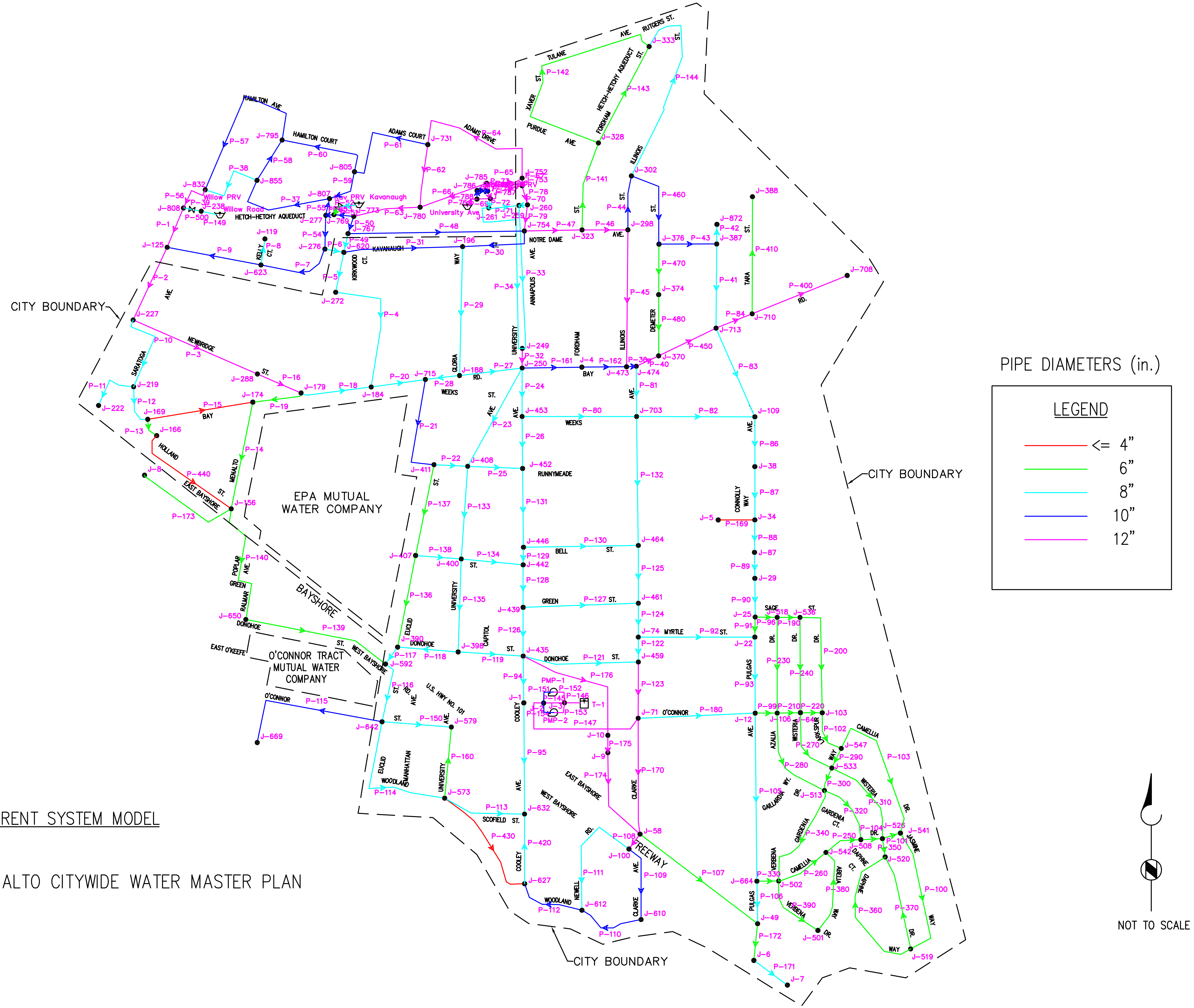
DB Table - 'Pipe Modeling'

		ID (Char)	LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
163		P-68	225.00	12.00	50.00
164		P-69	5.00	12.00	50.00
165		P-7	800.00	10.00	57.00
166		P-70	5.00	8.00	120.00
167		P-71	330.00	8.00	120.00
168		P-72	10.00	8.00	120.00
169		P-73	100.00	12.00	50.00
170		P-74	5.00	12.00	50.00
171		P-76	20.00	12.00	50.00
172		P-77	15.00	10.00	120.00
173		P-78	100.00	12.00	50.00
174		P-79	290.00	12.00	50.00
175		P-8	400.00	8.00	120.00
176		P-80	1,290.00	8.00	50.00
177		P-81	600.00	8.00	50.00
178		P-82	1,330.00	8.00	50.00
179		P-83	1,065.00	8.00	50.00
180		P-84	550.00	12.00	64.00
181		P-86	600.00	8.00	50.00
182		P-87	620.00	8.00	50.00
183		P-88	330.00	8.00	50.00
184		P-89	310.00	8.00	50.00
185		P-9	1,150.00	10.00	120.00
186		P-90	470.00	8.00	50.00
187		P-91	180.00	6.00	120.00
188		P-92	1,310.00	8.00	50.00
189		P-93	880.00	8.00	50.00

DB Table - 'Pipe Modeling'

		ID (Char)		LENGTH (Double)	DIAMETER (Double)	ROUGHNESS (Double)
190		P-94		512.00	8.00	57.00
191		P-95		1,218.00	8.00	57.00
192		P-96		1.00	6.00	120.00
193		P-99		1.00	6.00	120.00
194		PMP-1_D	P-151	1.00	99.00	130.00
195		PMP-1_U	P-152	1.00	99.00	130.00
196		PMP-2_D	P-154	1.00	99.00	130.00
197		PMP-2_U	P-153	1.00	99.00	130.00
198		UNIVERSITY_PRV_D	P-75	1.00	10.00	120.00
199		UNIVERSITY_PRV_U	P-490	1.00	10.00	120.00
200		WILLOW_PRV_D	P-39	1.00	6.00	120.00
201		WILLOW_PRV_U	P-500	1.00	6.00	120.00

Appendix 6:
Current System Model Pipe Diameters



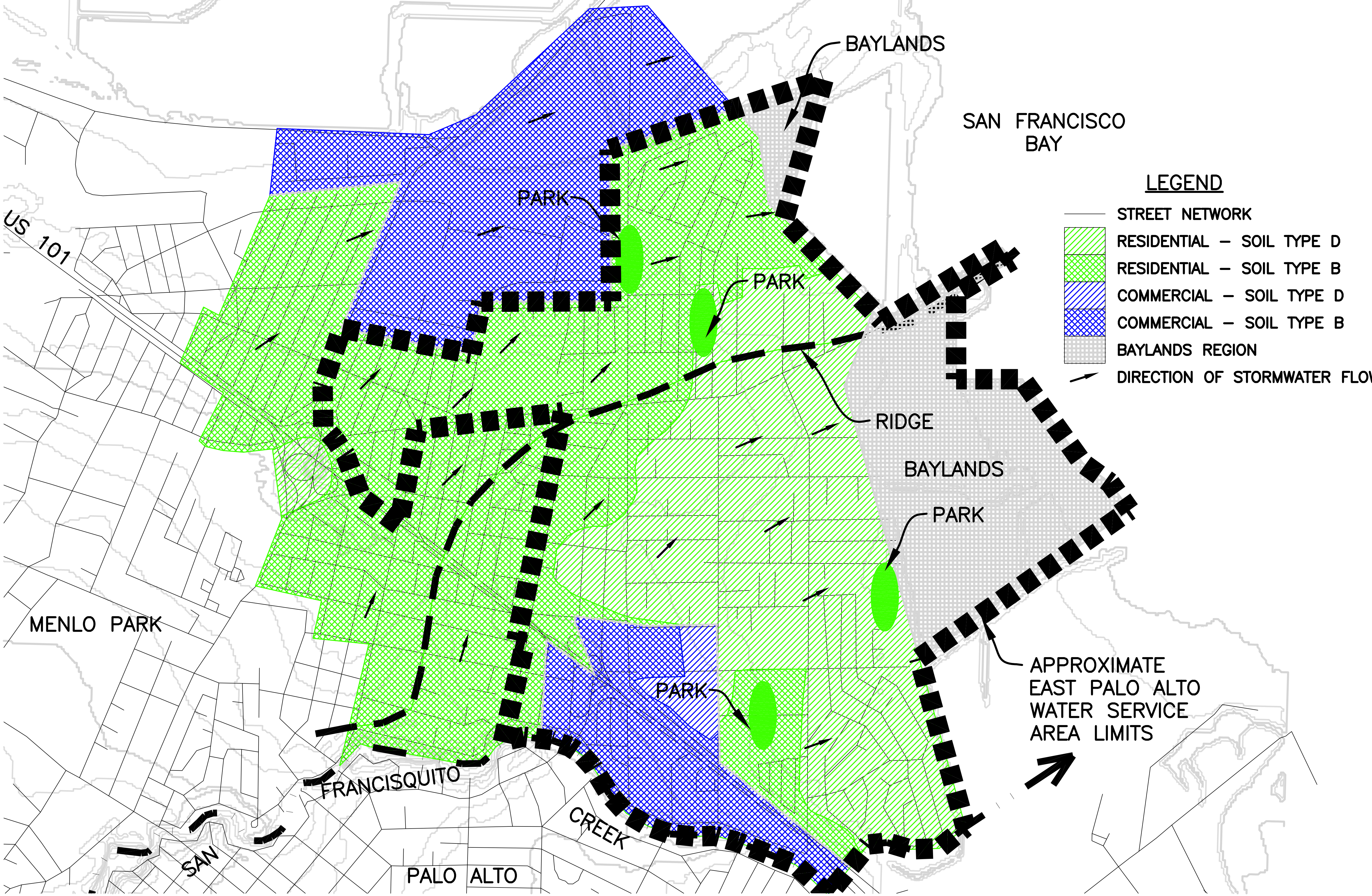
CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

Appendix 7:
Stormwater Capture Exhibit

STORMWATER CAPTURE EXHIBIT



Appendix 8:
WaterCAD Calculations for Current System

8.1.1:
ADD-Fire Flow Analysis Report

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	false	1,000	825	1,000	825	20.0	58.4	20.0	20.0	J-2	5.6	J-3
J-2	true	false	1,000	0	1,000	0	20.0	21.0	20.0	61.9	J-669	5.6	J-3
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	true	1,500	1,876	1,507	1,883	20.0	72.6	20.0	20.0	J-2	5.6	J-3
J-5	true	false	1,000	718	1,000	718	20.0	20.0	20.0	20.3	J-2	5.6	J-3
J-6	true	false	1,000	812	1,000	812	20.0	32.6	20.0	20.0	J-2	5.6	J-3
J-7	true	false	1,000	812	1,008	819	20.0	30.3	20.0	20.0	J-2	5.6	J-3
J-8	true	false	1,000	765	1,000	765	20.0	20.0	20.0	20.5	J-2	5.6	J-3
J-9	true	false	1,000	800	1,000	800	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-10	true	false	1,000	800	1,000	800	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-12	true	false	2,500	823	2,523	846	20.0	69.8	20.0	20.0	J-2	5.6	J-3
J-22	true	false	1,000	834	1,026	859	20.0	69.1	20.0	20.0	J-2	5.6	J-3
J-25	true	false	1,000	856	1,014	870	20.0	69.6	20.0	20.0	J-2	5.6	J-3
J-29	true	false	1,000	906	1,007	914	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-34	true	false	1,000	985	1,007	993	20.0	68.1	20.0	20.0	J-2	5.6	J-3
J-38	true	true	1,000	1,089	1,007	1,096	20.0	68.2	20.0	20.0	J-2	5.6	J-3
J-49	true	false	1,000	812	1,030	842	20.0	60.6	20.0	20.0	J-2	5.6	J-3
J-58	true	false	1,000	783	1,035	818	20.0	66.9	20.0	20.0	J-2	5.6	J-3
J-64	true	false	1,000	829	1,006	836	20.0	68.0	20.0	20.0	J-2	5.6	J-3
J-71	true	false	1,000	755	1,000	755	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-74	true	false	1,000	805	1,016	822	20.0	69.9	20.0	20.0	J-2	5.6	J-3
J-87	true	false	1,000	943	1,007	950	20.0	68.4	20.0	20.0	J-2	5.6	J-3
J-100	true	false	1,000	785	1,024	809	20.0	64.5	20.0	20.0	J-2	5.6	J-3
J-103	true	false	1,000	830	1,019	850	20.0	66.6	20.0	20.0	J-2	5.6	J-3
J-106	true	false	1,000	823	1,006	829	20.0	69.8	20.0	20.0	J-2	5.6	J-3
J-109	true	true	1,000	1,264	1,013	1,276	20.0	69.5	20.0	20.0	J-2	5.6	J-3
J-119	true	true	1,000	3,587	1,010	3,598	20.0	20.0	20.0	20.2	J-2	5.6	J-3
J-125	true	true	1,000	4,303	1,010	4,313	20.0	61.1	20.0	20.0	J-2	5.6	J-3
J-156	true	true	1,000	1,410	1,020	1,429	20.0	20.0	20.0	20.0	J-8	5.6	J-3
J-166	true	true	1,000	1,541	1,000	1,541	20.0	20.0	20.0	20.5	J-2	5.6	J-3
J-169	true	true	1,000	2,162	1,020	2,182	20.0	20.0	20.0	20.3	J-2	5.6	J-3
J-174	true	true	1,000	1,916	1,020	1,936	20.0	20.0	20.0	20.0	J-2	5.6	J-3
J-179	true	false	3,000	2,472	3,020	2,491	20.0	57.3	20.0	20.0	J-2	5.6	J-3
J-184	true	true	1,000	2,174	1,000	2,174	20.0	60.5	20.0	20.0	J-2	5.6	J-3
J-188	true	true	1,000	1,968	1,007	1,975	20.0	63.1	20.0	20.0	J-2	5.6	J-3
J-196	true	true	1,000	3,390	1,009	3,399	20.0	63.4	20.0	20.0	J-2	5.6	J-3
J-219	true	true	1,000	2,534	1,030	2,565	20.0	20.0	20.0	20.2	J-2	5.6	J-3
J-222	true	true	1,000	1,969	1,030	1,999	20.0	20.0	20.0	20.4	J-2	5.6	J-3
J-227	true	true	1,000	3,471	1,020	3,491	20.0	57.4	20.0	20.0	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	true	1,000	1,867	1,000	1,867	20.0	65.3	20.0	20.0	J-2	5.6	J-3
J-250	true	true	1,000	1,851	1,025	1,876	20.0	65.3	20.0	20.0	J-2	5.6	J-3
J-259	true	true	1,000	4,565	1,000	4,565	20.0	69.8	20.0	20.0	J-2	5.6	J-3
J-260	true	true	1,000	4,803	1,000	4,803	20.0	71.0	20.0	20.0	J-2	5.6	J-3
J-261	true	true	1,000	5,000	1,011	5,011	20.0	66.9	20.0	20.2	J-2	5.6	J-3
J-272	true	true	1,000	3,012	1,000	3,012	20.0	52.6	20.0	20.0	J-2	5.6	J-3
J-276	true	true	1,000	4,421	1,009	4,430	20.0	63.5	20.0	20.0	J-2	5.6	J-3
J-277	true	true	1,000	5,000	1,009	5,009	20.0	67.3	20.0	20.0	J-2	5.6	J-3
J-288	true	true	1,000	2,585	1,000	2,585	20.0	56.9	20.0	20.0	J-2	5.6	J-3
J-298	true	true	1,000	2,109	1,021	2,130	20.0	70.4	20.0	20.0	J-2	5.6	J-3
J-302	true	true	1,000	2,027	1,030	2,057	20.0	66.4	20.0	20.0	J-2	5.6	J-3
J-323	true	true	1,000	2,421	1,021	2,442	20.0	70.0	20.0	20.0	J-2	5.6	J-3

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-328	true	true	1,000	1,592	1,021	1,613	20.0	20.0	20.0	20.4	J-2	5.6	J-3
J-333	true	true	1,000	1,903	1,032	1,935	20.0	20.0	20.0	20.2	J-2	5.6	J-3
J-370	true	false	3,500	1,706	3,500	1,706	20.0	69.0	20.0	20.0	J-2	5.6	J-3
J-374	true	true	1,000	1,834	1,000	1,834	20.0	37.9	20.0	20.0	J-2	5.6	J-3
J-376	true	true	1,000	1,915	1,000	1,915	20.0	64.7	20.0	20.0	J-2	5.6	J-3
J-387	true	true	1,000	1,872	1,012	1,884	20.0	64.5	20.0	20.0	J-2	5.6	J-3
J-388	true	false	1,000	520	1,008	528	20.0	20.0	20.0	20.8	J-2	5.6	J-3
J-390	true	false	1,000	911	1,016	928	20.0	62.6	20.0	20.0	J-2	5.6	J-3
J-398	true	false	1,000	891	1,016	908	20.0	64.1	20.0	20.0	J-2	5.6	J-3
J-400	true	false	2,250	1,016	2,266	1,032	20.0	66.1	20.0	20.0	J-2	5.6	J-3
J-407	true	true	1,000	1,037	1,016	1,054	20.0	64.6	20.0	20.0	J-2	5.6	J-3
J-408	true	false	1,500	1,320	1,520	1,340	20.0	66.9	20.0	20.0	J-2	5.6	J-3
J-411	true	true	1,000	1,410	1,016	1,426	20.0	66.3	20.0	20.0	J-2	5.6	J-3
J-435	true	false	1,000	814	1,036	851	20.0	67.0	20.0	20.0	J-2	5.6	J-3
J-439	true	false	1,000	885	1,016	902	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-442	true	true	1,000	1,001	1,016	1,017	20.0	67.0	20.0	20.0	J-2	5.6	J-3
J-446	true	true	1,000	1,029	1,016	1,045	20.0	66.9	20.0	20.0	J-2	5.6	J-3
J-452	true	true	1,000	1,274	1,016	1,291	20.0	66.9	20.0	20.0	J-2	5.6	J-3
J-453	true	true	1,000	1,454	1,016	1,471	20.0	66.6	20.0	20.0	J-2	5.6	J-3
J-459	true	false	1,000	773	1,036	809	20.0	69.2	20.0	20.0	J-2	5.6	J-3
J-461	true	false	1,000	868	1,016	884	20.0	69.4	20.0	20.0	J-2	5.6	J-3
J-464	true	false	1,000	993	1,016	1,009	20.0	68.7	20.0	20.0	J-2	5.6	J-3
J-473	true	true	1,000	1,802	1,021	1,823	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-474	true	true	1,000	1,729	1,030	1,758	20.0	67.5	20.0	20.0	J-2	5.6	J-3
J-501	true	false	1,000	820	1,006	827	20.0	54.6	20.0	20.0	J-2	5.6	J-3
J-502	true	false	1,000	819	1,006	826	20.0	61.2	20.0	20.0	J-2	5.6	J-3
J-508	true	false	1,000	824	1,006	830	20.0	65.8	20.0	20.0	J-2	5.6	J-3
J-513	true	false	1,000	824	1,006	830	20.0	66.9	20.0	20.0	J-2	5.6	J-3
J-518	true	false	1,000	856	1,006	862	20.0	69.6	20.0	20.0	J-2	5.6	J-3
J-519	true	false	1,000	824	1,006	830	20.0	58.8	20.0	20.0	J-2	5.6	J-3
J-520	true	false	1,000	824	1,006	830	20.0	63.6	20.0	20.0	J-2	5.6	J-3
J-526	true	false	1,000	824	1,021	844	20.0	65.8	20.0	20.0	J-2	5.6	J-3
J-533	true	false	1,000	825	1,006	832	20.0	67.0	20.0	20.0	J-2	5.6	J-3
J-536	true	false	1,000	840	1,006	847	20.0	67.4	20.0	20.0	J-2	5.6	J-3
J-541	true	false	1,000	824	1,006	830	20.0	64.5	20.0	20.0	J-2	5.6	J-3
J-542	true	false	1,000	822	1,006	828	20.0	62.5	20.0	20.0	J-2	5.6	J-3
J-547	true	false	1,000	827	1,006	833	20.0	66.1	20.0	20.0	J-2	5.6	J-3
J-573	true	false	1,000	877	1,012	889	20.0	54.8	20.0	20.0	J-2	5.6	J-3
J-579	true	false	2,500	886	2,539	926	20.0	52.9	20.0	20.0	J-2	5.6	J-3
J-592	true	false	3,500	914	3,518	931	20.0	61.9	20.0	20.0	J-2	5.6	J-3
J-610	true	false	1,000	803	1,018	821	20.0	59.1	20.0	20.0	J-2	5.6	J-3
J-612	true	false	1,000	814	1,019	833	20.0	58.1	20.0	20.0	J-2	5.6	J-3
J-620	true	true	1,000	3,677	1,006	3,683	20.0	66.8	20.0	20.0	J-2	5.6	J-3
J-623	true	true	1,000	4,447	1,010	4,457	20.0	52.0	20.0	20.0	J-2	5.6	J-3
J-627	true	false	1,000	835	1,000	835	20.0	57.3	20.0	20.0	J-2	5.6	J-3
J-632	true	false	1,000	842	1,041	882	20.0	56.8	20.0	20.0	J-2	5.6	J-3
J-642	true	false	1,000	889	1,015	905	20.0	57.0	20.0	20.0	J-2	5.6	J-3
J-650	true	false	1,500	1,174	1,500	1,174	20.0	29.9	20.0	20.0	J-2	5.6	J-3
J-664	true	false	1,000	814	1,026	841	20.0	61.7	20.0	20.0	J-2	5.6	J-3
J-669	true	false	1,000	889	1,022	912	20.0	48.2	20.0	20.0	J-2	5.6	J-3
J-703	true	true	1,000	1,346	1,016	1,362	20.0	70.2	20.0	20.0	J-2	5.6	J-3
J-708	true	true	1,000	1,667	1,006	1,673	20.0	65.1	20.0	20.0	J-2	5.6	J-3

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-710	true	true	1,000	1,667	1,009	1,676	20.0	67.8	20.0	20.0	J-2	5.6	J-3
J-713	true	true	1,000	1,667	1,008	1,674	20.0	69.6	20.0	20.0	J-2	5.6	J-3
J-715	true	true	1,000	1,765	1,003	1,768	20.0	64.4	20.0	20.0	J-2	5.6	J-3
J-731	true	true	1,000	5,000	1,004	5,004	20.0	65.3	20.0	20.2	J-2	5.6	J-3
J-752	true	true	1,000	5,000	1,004	5,004	20.0	72.6	20.0	20.2	J-2	5.6	J-3
J-753	true	true	1,000	5,000	1,004	5,004	20.0	71.8	20.0	20.2	J-2	5.6	J-3
J-754	true	true	1,000	3,661	1,032	3,694	20.0	69.8	20.0	20.0	J-2	5.6	J-3
J-767	true	true	1,000	4,436	1,006	4,442	20.0	65.6	20.0	20.0	J-2	5.6	J-3
J-769	true	true	1,000	5,000	1,000	5,000	20.0	67.8	20.0	20.0	J-2	5.6	J-3
J-773	true	true	1,000	4,909	1,008	4,917	20.0	67.4	20.0	20.0	J-2	5.6	J-3
J-780	true	true	1,000	5,000	1,013	5,013	20.0	67.9	20.0	20.1	J-2	5.6	J-3
J-785	true	true	1,000	5,000	1,004	5,004	20.0	73.6	20.0	20.4	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	true	1,000	5,000	1,000	5,000	20.0	72.9	20.0	20.5	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	true	1,000	5,000	1,000	5,000	20.0	73.0	20.0	20.5	J-2	5.6	J-3
J-795	true	true	1,000	4,979	1,006	4,985	20.0	50.3	20.0	20.0	J-2	5.6	J-3
J-805	true	true	1,000	5,000	1,011	5,011	20.0	31.2	20.0	20.1	J-2	5.6	J-3
J-807	true	true	1,000	5,000	1,006	5,006	20.0	64.4	20.0	20.0	J-2	5.6	J-3
J-808	true	true	1,000	4,759	1,000	4,759	20.0	60.2	20.0	20.0	J-2	5.6	J-3
J-832	true	true	1,000	4,809	1,006	4,815	20.0	58.7	20.0	20.0	J-2	5.6	J-3
J-855	true	true	1,000	5,000	1,006	5,006	20.0	53.5	20.0	20.0	J-2	5.6	J-3
J-872	true	true	1,000	1,872	1,003	1,876	20.0	58.0	20.0	20.0	J-2	5.6	J-3

8.1.2:
ADD-Junction Report

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	66.3	21.0
J-669	36.00	Zone-1	Demand	22	Pattern - 1	22	178.8	61.9
J-579	30.00	Zone-1	Demand	39	Pattern - 1	39	178.7	64.5
J-573	30.00	Zone-1	Demand	12	Pattern - 1	12	178.7	64.5
J-612	28.00	Zone-1	Demand	19	Pattern - 1	19	178.7	65.3
J-632	27.00	Zone-1	Demand	41	Pattern - 1	41	178.7	65.8
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	178.7	65.8
J-642	27.00	Zone-1	Demand	15	Pattern - 1	15	178.8	65.8
J-610	25.00	Zone-1	Demand	18	Pattern - 1	18	178.7	66.6
J-650	25.00	Zone-1	Demand	0	Pattern - 1	0	179.5	67.0
J-592	21.00	Zone-1	Demand	18	Pattern - 1	18	179.0	68.5
J-390	21.00	Zone-1	Demand	16	Pattern - 1	16	179.0	68.5
J-100	20.00	Zone-1	Demand	24	Pattern - 1	24	178.8	68.8
J-398	20.00	Zone-1	Demand	16	Pattern - 1	16	179.0	68.9
J-7	19.00	Zone-1	Demand	8	Fixed	8	178.5	69.2
J-6	19.00	Zone-1	Demand	0	Fixed	0	178.5	69.2
J-49	19.00	Zone-1	Demand	30	Pattern - 1	30	178.6	69.2
J-519	18.00	Zone-1	Demand	6	Pattern - 1	6	178.5	69.6
J-501	18.00	Zone-1	Demand	6	Pattern - 1	6	178.5	69.6
J-664	18.00	Zone-1	Demand	26	Pattern - 1	26	178.6	69.6
J-1	18.00	Zone-1	Demand	0	Fixed	0	178.8	69.7
J-250	20.00	Zone-1	Demand	25	Pattern - 1	25	180.9	69.8
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	180.9	69.8
J-188	20.00	Zone-1	Demand	7	Pattern - 1	7	181.0	69.8
J-184	20.00	Zone-1	Demand	0	Pattern - 1	0	181.2	69.9
J-502	17.00	Zone-1	Demand	6	Pattern - 1	6	178.6	70.0
J-715	19.00	Zone-1	Demand	3	Pattern - 1	3	180.9	70.2
J-400	17.00	Zone-1	Demand	16	Pattern - 1	16	179.5	70.4
J-407	17.00	Zone-1	Demand	16	Pattern - 1	16	179.5	70.4
J-156	17.00	Zone-1	Demand	20	Pattern - 1	20	180.1	70.7
J-8	17.00	Zone-1	Demand	0	Fixed	0	180.1	70.7
J-219	18.00	Zone-1	Demand	30	Pattern - 1	30	181.1	70.7
J-58	15.00	Zone-1	Demand	35	Pattern - 1	35	178.8	71.0
J-435	15.00	Zone-1	Demand	36	Pattern - 1	36	178.9	71.0
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	181.1	71.1
J-169	17.00	Zone-1	Demand	20	Pattern - 1	20	181.1	71.2
J-442	15.00	Zone-1	Demand	16	Pattern - 1	16	179.5	71.3
J-446	15.00	Zone-1	Demand	16	Pattern - 1	16	179.5	71.3
J-9	14.00	Zone-1	Demand	0	Fixed	0	178.9	71.5
J-10	14.00	Zone-1	Demand	0	Fixed	0	178.9	71.5
J-439	14.00	Zone-1	Demand	16	Pattern - 1	16	179.1	71.6
J-222	16.00	Zone-1	Demand	30	Pattern - 1	30	181.1	71.6
J-179	16.00	Zone-1	Demand	20	Pattern - 1	20	181.2	71.6
J-408	15.00	Zone-1	Demand	20	Pattern - 1	20	180.2	71.6
J-411	15.00	Zone-1	Demand	16	Pattern - 1	16	180.4	71.7
J-174	15.00	Zone-1	Demand	20	Pattern - 1	20	180.7	71.9
J-473	15.00	Zone-1	Demand	21	Pattern - 1	21	180.9	71.9
J-452	14.00	Zone-1	Demand	16	Pattern - 1	16	180.2	72.0
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	181.2	72.1
J-453	14.00	Zone-1	Demand	16	Pattern - 1	16	180.4	72.1
J-474	14.00	Zone-1	Demand	30	Pattern - 1	30	180.8	72.3
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	178.8	72.7
J-227	13.00	Zone-1	Demand	20	Pattern - 1	20	181.4	73.0

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-542	10.00	Zone-1	Demand	6	Pattern - 1	6	178.5	73.1
J-459	10.00	Zone-1	Demand	36	Pattern - 1	36	178.8	73.2
J-464	10.00	Zone-1	Demand	16	Pattern - 1	16	179.5	73.5
J-623	12.00	Zone-1	Demand	10	Pattern - 1	10	181.7	73.6
J-196	12.00	Zone-1	Demand	9	Pattern - 1	9	181.8	73.6
J-276	12.00	Zone-1	Demand	9	Pattern - 1	9	181.9	73.6
J-461	9.00	Zone-1	Demand	16	Pattern - 1	16	179.1	73.7
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	181.7	74.0
J-370	10.00	Zone-1	Demand	0	Pattern - 1	0	180.8	74.0
J-74	8.00	Zone-1	Demand	16	Pattern - 1	16	178.9	74.1
J-767	11.00	Zone-1	Demand	6	Pattern - 1	6	182.0	74.1
J-125	10.00	Zone-1	Demand	10	Pattern - 1	10	181.6	74.4
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	181.6	74.4
J-119	10.00	Zone-1	Demand	10	Pattern - 1	10	181.7	74.4
J-620	10.00	Zone-1	Demand	6	Pattern - 1	6	181.9	74.5
J-277	10.00	Zone-1	Demand	9	Pattern - 1	9	181.9	74.5
J-754	10.00	Zone-1	Demand	32	Pattern - 1	32	182.0	74.5
J-773	10.00	Zone-1	Demand	8	Pattern - 1	8	182.0	74.6
J-22	6.50	Zone-1	Demand	26	Pattern - 1	26	178.8	74.7
J-780	10.00	Zone-1	Demand	13	Pattern - 1	13	182.3	74.7
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	180.9	74.7
J-261	10.00	Zone-1	Demand	11	Pattern - 1	11	182.6	74.8
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	182.7	74.9
J-832	9.00	Zone-1	Demand	6	Pattern - 1	6	181.7	74.9
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	182.7	74.9
J-807	9.00	Zone-1	Demand	6	Pattern - 1	6	181.9	75.0
J-805	9.00	Zone-1	Demand	11	Pattern - 1	11	181.9	75.0
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	181.9	75.0
J-328	8.00	Zone-1	Demand	21	Pattern - 1	21	181.1	75.0
J-103	5.50	Zone-1	Demand	19	Pattern - 1	19	178.6	75.1
J-64	5.50	Zone-1	Demand	6	Pattern - 1	6	178.7	75.1
J-703	7.00	Zone-1	Demand	16	Pattern - 1	16	180.3	75.1
J-753	9.00	Zone-1	Demand	4	Pattern - 1	4	182.4	75.2
J-323	8.00	Zone-1	Demand	21	Pattern - 1	21	181.5	75.2
J-520	5.00	Zone-1	Demand	6	Pattern - 1	6	178.5	75.2
J-541	5.00	Zone-1	Demand	6	Pattern - 1	6	178.5	75.2
J-526	5.00	Zone-1	Demand	21	Pattern - 1	21	178.5	75.2
J-508	5.00	Zone-1	Demand	6	Pattern - 1	6	178.5	75.2
J-513	5.00	Zone-1	Demand	6	Pattern - 1	6	178.6	75.3
J-533	5.00	Zone-1	Demand	6	Pattern - 1	6	178.6	75.3
J-547	5.00	Zone-1	Demand	6	Pattern - 1	6	178.6	75.3
J-106	5.00	Zone-1	Demand	6	Pattern - 1	6	178.7	75.3
J-12	5.00	Zone-1	Demand	23	Pattern - 1	23	178.7	75.3
J-536	5.00	Zone-1	Demand	6	Pattern - 1	6	178.7	75.3
J-710	7.00	Zone-1	Demand	9	Pattern - 1	9	180.7	75.3
J-713	7.00	Zone-1	Demand	8	Pattern - 1	8	180.7	75.3
J-855	8.00	Zone-1	Demand	6	Pattern - 1	6	181.8	75.3
J-518	5.00	Zone-1	Demand	6	Pattern - 1	6	178.8	75.3
J-25	5.00	Zone-1	Demand	14	Pattern - 1	14	178.8	75.3
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	180.9	75.4
J-302	7.00	Zone-1	Demand	30	Pattern - 1	30	181.0	75.4
J-29	5.00	Zone-1	Demand	7	Pattern - 1	7	179.0	75.4
J-298	7.00	Zone-1	Demand	21	Pattern - 1	21	181.2	75.5
J-87	5.00	Zone-1	Demand	7	Pattern - 1	7	179.2	75.5

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	182.3	75.6
J-731	8.00	Zone-1	Demand	4	Pattern - 1	4	182.3	75.6
J-34	5.00	Zone-1	Demand	7	Pattern - 1	7	179.4	75.6
J-5	5.00	Zone-1	Demand	0	Fixed	0	179.4	75.6
J-388	6.00	Zone-1	Demand	8	Pattern - 1	8	180.7	75.7
J-38	5.00	Zone-1	Demand	7	Pattern - 1	7	179.8	75.8
J-872	6.00	Zone-1	Demand	3	Pattern - 1	3	180.9	75.8
J-387	6.00	Zone-1	Demand	12	Pattern - 1	12	180.9	75.8
J-109	5.00	Zone-1	Demand	13	Pattern - 1	13	180.2	76.0
J-795	6.50	Zone-1	Demand	6	Pattern - 1	6	181.8	76.0
J-752	7.00	Zone-1	Demand	4	Pattern - 1	4	182.5	76.1
J-333	5.50	Zone-1	Demand	32	Pattern - 1	32	181.0	76.1
J-708	4.50	Zone-1	Demand	6	Pattern - 1	6	180.7	76.4
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	182.3	76.4
J-785	6.00	Zone-1	Demand	4	Pattern - 1	4	182.6	76.5
J-4	0.00	Zone-1	Demand	7	Fixed	7	180.9	78.4
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	318.4	133.7
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	319.4	134.1
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

8.1.3:
ADD-Pipe Report

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-138	181.6	181.6	0.0	0.1
P-2	980	12	Ductile Iro	120	false	0.00	Open	230	181.6	181.4	0.2	0.2
P-3	1,500	12	Cast iron	78	false	0.00	Open	113	181.4	181.2	0.2	0.1
P-4	1,440	8	Cast iron	120	false	0.00	Open	-106	181.2	181.7	0.5	0.3
P-5	533	8	Ductile Iro	120	false	0.00	Open	-106	181.7	181.9	0.2	0.3
P-6	290	8	Ductile Iro	120	false	0.00	Open	-18	181.9	181.9	0.0	0.0
P-7	800	10	Ductile Iro	113	false	0.00	Open	-123	181.7	181.9	0.1	0.2
P-8	400	8	Ductile Iro	120	false	0.00	Open	10	181.7	181.7	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	102	181.7	181.6	0.1	0.1
P-10	930	8	Ductile Iro	120	false	0.00	Open	98	181.4	181.1	0.3	0.3
P-11	555	8	Ductile Iro	120	false	0.00	Open	30	181.1	181.1	0.0	0.0
P-12	450	8	Ductile Iro	120	false	0.00	Open	38	181.1	181.1	0.0	0.0
P-13	275	6	Ductile Iro	106	false	0.00	Open	11	181.1	181.1	0.0	0.0
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-56	180.1	180.7	0.7	0.5
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	-7	180.7	181.1	0.4	0.3
P-16	555	12	Ductile Iro	120	false	0.00	Open	113	181.2	181.2	0.0	0.1
P-18	800	8	Ductile Iro	120	false	0.00	Open	-24	181.2	181.2	0.0	0.0
P-19	620	6	Ductile Iro	106	false	0.00	Open	-69	180.7	181.2	0.5	0.8
P-20	650	8	Ductile Iro	120	false	0.00	Open	130	181.2	180.9	0.3	0.5
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	212	180.9	180.4	0.5	0.4
P-22	400	8	Ductile Iro	120	false	0.00	Open	111	180.4	180.2	0.1	0.4
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	-131	180.2	180.9	0.7	0.5
P-24	620	8	Ductile Iro	120	false	0.00	Open	174	180.9	180.4	0.5	0.8
P-25	650	8	Ductile Iro	120	false	0.00	Open	-60	180.2	180.2	0.1	0.1
P-26	600	8	Ductile Iro	120	false	0.00	Open	-114	180.2	180.4	0.2	0.4
P-27	740	8	Ductile Iro	120	false	0.00	Open	-53	180.9	181.0	0.1	0.1
P-28	380	8	Ductile Iro	120	false	0.00	Open	-84	180.9	181.0	0.1	0.2
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-143	181.0	181.8	0.9	0.6
P-30	890	10	Ductile Iro	113	false	0.00	Open	-115	181.8	182.0	0.1	0.1
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-38	181.8	181.9	0.0	0.0
P-32	75	12	Ductile Iro	120	false	0.00	Open	-340	180.9	180.9	0.0	0.4
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-168	180.9	182.3	1.4	0.8
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-172	180.9	182.6	1.6	0.8
P-36	100	10	Ductile Iro	120	false	0.00	Open	-282	180.8	180.9	0.1	0.7
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	109	181.9	181.8	0.1	0.1
P-38	900	8	Ductile Iro	120	false	0.00	Open	68	181.8	181.7	0.1	0.1
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	181.6	181.6	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	81	180.8	180.8	0.0	0.0
P-41	980	8	Ductile Iro	120	false	0.00	Open	-61	180.7	180.9	0.1	0.1
P-42	222	8	Ductile Iro	120	false	0.00	Open	3	180.9	180.9	0.0	0.0
P-43	620	10	Ductile Iro	120	false	0.00	Open	-76	180.9	180.9	0.0	0.1
P-44	610	10	Ductile Iro	99	false	0.00	Open	-140	181.0	181.2	0.2	0.3
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	247	181.2	180.9	0.3	0.2
P-46	520	12	Ductile Iro	120	false	0.00	Open	-408	181.2	181.5	0.3	0.6
P-47	666	12	Ductile Iro	120	false	0.00	Open	-467	181.5	182.0	0.5	0.7
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-10	182.0	182.0	0.0	0.0
P-49	220	8	Ductile Iro	120	false	0.00	Open	-132	181.9	182.0	0.1	0.5
P-50	200	10	Ductile Iro	113	false	0.00	Open	-147	182.0	182.0	0.0	0.2
P-51	220	10	Ductile Iro	113	false	0.00	Open	175	182.0	181.9	0.1	0.3
P-52	20	8	Ductile Iro	50	false	0.00	Open	80	320.0	320.0	0.0	1.0
P-53	5	10	Ductile Iro	113	false	0.00	Open	255	181.9	181.9	0.0	0.6
P-54	333	10	Ductile Iro	113	false	0.00	Open	150	181.9	181.9	0.1	0.2
P-55	100	10	Ductile Iro	113	false	0.00	Open	96	181.9	181.9	0.0	0.1

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	138	181.7	181.6	0.0	0.1
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-77	181.7	181.8	0.1	0.1
P-58	555	10	Ductile Iro	120	false	0.00	Open	-35	181.8	181.8	0.0	0.0
P-59	580	10	Ductile Iro	50	false	0.00	Open	-19	181.9	181.9	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-48	181.8	181.9	0.2	0.1
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-78	181.9	182.3	0.4	0.3
P-62	730	12	Ductile Iro	120	false	0.00	Open	53	182.3	182.3	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	330	182.3	182.0	0.3	0.4
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-135	182.3	182.5	0.1	0.1
P-65	330	12	Ductile Iro	120	false	0.00	Open	303	182.6	182.5	0.1	0.3
P-66	820	12	Ductile Iro	120	false	0.00	Open	290	182.6	182.3	0.2	0.3
P-67	5	12	Ductile Iro	120	false	0.00	Open	164	182.5	182.4	0.0	0.1
P-68	225	12	Ductile Iro	120	false	0.00	Open	-538	182.4	182.7	0.2	0.9
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	182.7	319.4	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	94	182.3	182.3	0.0	1.4
P-71	330	8	Ductile Iro	50	false	0.00	Open	-74	182.3	182.6	0.3	0.9
P-72	10	8	Ductile Iro	50	false	0.00	Open	256	182.7	182.6	0.1	8.6
P-73	100	12	Ductile Iro	120	false	0.00	Open	596	182.7	182.6	0.1	1.1
P-74	5	12	Ductile Iro	120	false	0.00	Open	794	182.7	182.7	0.0	1.9
P-75	5	10	Ductile Iro	50	false	0.00	Open	1,391	183.0	182.7	0.3	66.6
P-76	20	12	Ductile Iro	120	false	0.00	Open	1,391	319.5	319.4	0.1	5.4
P-77	15	10	Ductile Iro	50	false	0.00	Open	-1,391	318.4	319.4	1.0	66.6
P-78	100	12	Ductile Iro	120	false	0.00	Open	699	182.4	182.3	0.2	1.5
P-79	290	12	Ductile Iro	120	false	0.00	Open	605	182.3	182.0	0.3	1.2
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	44	180.4	180.3	0.1	0.1
P-81	600	8	Ductile Iro	120	false	0.00	Open	-171	180.3	180.8	0.5	0.8
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	41	180.3	180.2	0.1	0.1
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	-131	180.2	180.7	0.5	0.5
P-84	550	12	Ductile Iro	120	false	0.00	Open	23	180.7	180.7	0.0	0.0
P-85	15	6	Ductile Iro	50	false	0.00	Open	80	182.0	181.9	0.1	4.0
P-86	600	8	Ductile Iro	120	false	0.00	Open	160	180.2	179.8	0.4	0.7
P-87	620	8	Ductile Iro	120	false	0.00	Open	152	179.8	179.4	0.4	0.6
P-88	330	8	Ductile Iro	120	false	0.00	Open	145	179.4	179.2	0.2	0.6
P-89	310	8	Ductile Iro	120	false	0.00	Open	137	179.2	179.0	0.2	0.5
P-90	470	8	Ductile Iro	120	false	0.00	Open	130	179.0	178.8	0.2	0.5
P-91	180	6	Ductile Iro	120	false	0.00	Open	34	178.8	178.8	0.0	0.2
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	48	178.9	178.8	0.1	0.1
P-93	880	8	Ductile Iro	120	false	0.00	Open	56	178.8	178.7	0.1	0.1
P-94	512	8	Ductile Iro	50	false	0.00	Open	22	178.9	178.8	0.0	0.1
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	22	178.8	178.7	0.1	0.1
P-96	1	6	Ductile Iro	120	false	0.00	Open	83	178.8	178.8	0.0	0.9
P-99	1	6	Ductile Iro	120	false	0.00	Open	36	178.7	178.7	0.0	0.2
P-100	4	6	Ductile Iro	120	false	0.00	Open	9	178.5	178.5	0.0	0.0
P-101	240	6	Ductile Iro	120	false	0.00	Open	3	178.5	178.5	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	25	178.6	178.6	0.0	0.1
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	12	178.6	178.5	0.0	0.0
P-104	1	6	Ductile Iro	120	false	0.00	Open	-13	178.5	178.5	0.0	0.0
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-45	178.6	178.7	0.1	0.1
P-106	270	8	Ductile Iro	120	false	0.00	Open	7	178.6	178.6	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-31	178.6	178.8	0.2	0.1
P-108	240	12	Ductile Iro	120	false	0.00	Open	69	178.8	178.8	0.0	0.0
P-109	930	10	Ductile Iro	50	false	0.00	Open	29	178.8	178.7	0.0	0.1
P-110	670	10	Ductile Iro	50	false	0.00	Open	11	178.7	178.7	0.0	0.0

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	-16	178.7	178.8	0.1	0.1
P-112	770	10	Ductile Iro	50	false	0.00	Open	8	178.7	178.7	0.0	0.0
P-113	900	8	Ductile Iro	50	false	0.00	Open	-8	178.7	178.7	0.0	0.0
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-25	178.7	178.8	0.0	0.0
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	22	178.8	178.8	0.0	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-100	178.8	179.0	0.2	0.3
P-117	245	8	Ductile Iro	120	false	0.00	Open	-70	179.0	179.0	0.0	0.2
P-118	620	8	Ductile Iro	120	false	0.00	Open	-29	179.0	179.0	0.0	0.0
P-119	840	8	Ductile Iro	120	false	0.00	Open	75	179.0	178.9	0.1	0.2
P-121	1,270	8	PVC	120	false	0.00	Open	39	178.9	178.8	0.1	0.1
P-122	290	8	Ductile Iro	120	false	0.00	Open	84	178.9	178.8	0.1	0.2
P-123	660	12	Ductile Iro	120	false	0.00	Open	87	178.8	178.8	0.0	0.0
P-124	380	8	Ductile Iro	120	false	0.00	Open	-148	178.9	179.1	0.2	0.6
P-125	660	8	Ductile Iro	120	false	0.00	Open	-149	179.1	179.5	0.4	0.6
P-126	580	8	Ductile Iro	120	false	0.00	Open	-120	178.9	179.1	0.2	0.4
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	15	179.1	179.1	0.0	0.0
P-128	530	8	Ductile Iro	120	false	0.00	Open	-151	179.1	179.5	0.3	0.6
P-129	130	8	Ductile Iro	120	false	0.00	Open	-132	179.5	179.5	0.1	0.5
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	9	179.5	179.5	0.0	0.0
P-131	910	8	Ductile Iro	120	false	0.00	Open	-157	179.5	180.2	0.6	0.7
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	157	180.3	179.5	0.8	0.7
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	162	180.2	179.5	0.8	0.7
P-134	310	8	Ductile Iro	120	false	0.00	Open	36	179.5	179.5	0.0	0.0
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	120	179.5	179.0	0.4	0.4
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-57	179.0	179.5	0.5	0.4
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	-84	179.5	180.4	0.9	0.9
P-138	470	8	Ductile Iro	120	false	0.00	Open	10	179.5	179.5	0.0	0.0
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	-48	179.0	179.5	0.5	0.3
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	-48	179.5	180.1	0.6	0.4
P-141	980	6	Ductile Iro	78	false	0.00	Open	38	181.5	181.1	0.4	0.4
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	7	181.1	181.0	0.0	0.0
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-10	181.0	181.1	0.0	0.0
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	-15	181.0	181.0	0.0	0.0
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	66.3	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	66.3	178.8	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	37	178.8	178.7	0.0	0.0
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	66.3	66.3	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	66.3	66.3	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	2	178.7	178.7	0.0	0.0
P-161	686	10	Ductile Iro	120	false	0.00	Open	63	180.9	180.9	0.0	0.0
P-162	514	10	Ductile Iro	120	false	0.00	Open	55	180.9	180.9	0.0	0.0
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	179.4	179.4	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	-38	178.8	178.8	0.0	0.0
P-171	362	8	PVC	120	false	0.00	Open	-8	178.5	178.5	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-8	178.5	178.6	0.0	0.0
P-173	1,035	6	PVC	99	false	0.00	Open	0	180.1	180.1	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-97	178.8	178.9	0.1	0.0
P-175	5	12	PVC	120	false	0.00	Open	-97	178.9	178.9	0.0	0.0
P-176	838	12	PVC	120	false	0.00	Open	-97	178.9	178.9	0.0	0.0

Scenario: Ave Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	49	178.8	178.7	0.1	0.1
P-190	275	6	Ductile Iro	120	false	0.00	Open	49	178.8	178.7	0.1	0.3
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-21	178.6	178.7	0.1	0.1
P-210	275	6	Ductile Iro	120	false	0.00	Open	32	178.7	178.7	0.0	0.1
P-220	275	6	Ductile Iro	120	false	0.00	Open	-23	178.6	178.7	0.0	0.1
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	28	178.8	178.7	0.1	0.1
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	21	178.7	178.7	0.1	0.1
P-250	440	6	Ductile Iro	120	false	0.00	Open	-3	178.5	178.5	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-8	178.5	178.6	0.0	0.0
P-270	880	6	Ductile Iro	120	false	0.00	Open	23	178.7	178.6	0.1	0.1
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	26	178.7	178.6	0.1	0.1
P-290	330	6	Ductile Iro	120	false	0.00	Open	7	178.6	178.6	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	8	178.6	178.6	0.0	0.0
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	15	178.6	178.5	0.0	0.0
P-320	750	6	Ductile Iro	120	false	0.00	Open	17	178.6	178.5	0.0	0.0
P-330	275	6	Ductile Iro	120	false	0.00	Open	11	178.6	178.6	0.0	0.0
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	11	178.6	178.6	0.0	0.0
P-350	220	6	Ductile Iro	120	false	0.00	Open	4	178.5	178.5	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-1	178.5	178.5	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-1	178.5	178.5	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-1	178.5	178.5	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	8	178.6	178.5	0.0	0.0
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-6	180.7	180.7	0.0	0.0
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-8	180.7	180.7	0.0	0.0
P-420	880	8	Cast iron	120	false	0.00	Open	-10	178.7	178.7	0.0	0.0
P-430	1,210	4	Cast iron	120	false	0.00	Open	2	178.7	178.7	0.0	0.0
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	-11	180.1	181.1	1.0	0.8
P-450	682	12	Ductile Iro	120	false	0.00	Open	-100	180.7	180.8	0.0	0.0
P-460	990	10	Ductile Iro	99	false	0.00	Open	95	181.0	180.9	0.1	0.1
P-470	330	6	Ductile Iro	85	false	0.00	Open	19	180.9	180.9	0.0	0.1
P-480	880	6	Ductile Iro	85	false	0.00	Open	-19	180.8	180.9	0.1	0.1
P-490	1	10	Ductile Iro	50	false	0.00	Open	1,391	318.4	318.4	0.1	66.6
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

8.2.1:
PDD-Fire Flow Analysis Report

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	false	1,000	372	1,000	372	20.0	64.0	20.0	20.0	J-2	5.6	J-3
J-2	true	false	1,000	0	1,000	0	20.0	20.5	20.0	60.0	J-669	5.6	J-3
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	false	1,500	942	1,511	953	20.0	74.8	20.0	20.0	J-2	5.6	J-3
J-5	true	false	1,000	437	1,000	437	20.0	50.6	20.0	20.0	J-2	5.6	J-3
J-6	true	false	1,000	366	1,000	366	20.0	57.0	20.0	20.0	J-2	5.6	J-3
J-7	true	false	1,000	367	1,012	378	20.0	56.4	20.0	20.0	J-2	5.6	J-3
J-8	true	false	1,000	619	1,000	619	20.0	34.1	20.0	20.0	J-2	5.6	J-3
J-9	true	false	1,000	361	1,000	361	20.0	67.5	20.0	20.0	J-2	5.6	J-3
J-10	true	false	1,000	361	1,000	361	20.0	67.5	20.0	20.0	J-2	5.6	J-3
J-12	true	false	2,500	371	2,535	406	20.0	70.8	20.0	20.0	J-2	5.6	J-3
J-22	true	false	1,000	376	1,038	415	20.0	70.2	20.0	20.0	J-2	5.6	J-3
J-25	true	false	1,000	383	1,021	404	20.0	70.8	20.0	20.0	J-2	5.6	J-3
J-29	true	false	1,000	401	1,011	412	20.0	70.8	20.0	20.0	J-2	5.6	J-3
J-34	true	false	1,000	437	1,011	448	20.0	70.9	20.0	20.0	J-2	5.6	J-3
J-38	true	false	1,000	498	1,011	509	20.0	71.0	20.0	20.0	J-2	5.6	J-3
J-49	true	false	1,000	366	1,046	412	20.0	63.7	20.0	20.0	J-2	5.6	J-3
J-58	true	false	1,000	353	1,053	405	20.0	67.0	20.0	20.0	J-2	5.6	J-3
J-64	true	false	1,000	373	1,010	383	20.0	70.1	20.0	20.0	J-2	5.6	J-3
J-71	true	false	1,000	345	1,000	345	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-74	true	false	1,000	364	1,025	388	20.0	70.1	20.0	20.0	J-2	5.6	J-3
J-87	true	false	1,000	416	1,011	427	20.0	70.9	20.0	20.0	J-2	5.6	J-3
J-100	true	false	1,000	354	1,036	389	20.0	64.8	20.0	20.0	J-2	5.6	J-3
J-103	true	false	1,000	373	1,029	402	20.0	69.7	20.0	20.0	J-2	5.6	J-3
J-106	true	false	1,000	371	1,010	381	20.0	70.8	20.0	20.0	J-2	5.6	J-3
J-109	true	false	1,000	625	1,019	644	20.0	71.5	20.0	20.0	J-2	5.6	J-3
J-119	true	true	1,000	1,839	1,015	1,854	20.0	56.5	20.0	20.0	J-2	5.6	J-3
J-125	true	true	1,000	1,752	1,015	1,767	20.0	69.3	20.0	20.0	J-2	5.6	J-3
J-156	true	false	1,000	619	1,029	649	20.0	56.7	20.0	20.0	J-2	5.6	J-3
J-166	true	true	1,000	1,219	1,000	1,219	20.0	35.6	20.0	20.0	J-2	5.6	J-3
J-169	true	true	1,000	1,253	1,029	1,283	20.0	49.5	20.0	20.0	J-2	5.6	J-3
J-174	true	false	1,000	802	1,029	832	20.0	58.8	20.0	20.0	J-2	5.6	J-3
J-179	true	false	3,000	1,123	3,029	1,152	20.0	66.3	20.0	20.0	J-2	5.6	J-3
J-184	true	true	1,000	1,092	1,000	1,092	20.0	65.4	20.0	20.0	J-2	5.6	J-3
J-188	true	false	1,000	979	1,010	989	20.0	66.1	20.0	20.0	J-2	5.6	J-3
J-196	true	true	1,000	1,712	1,014	1,726	20.0	69.4	20.0	20.0	J-2	5.6	J-3
J-219	true	true	1,000	1,275	1,045	1,321	20.0	53.2	20.0	20.0	J-2	5.6	J-3
J-222	true	true	1,000	1,276	1,045	1,322	20.0	45.5	20.0	20.0	J-2	5.6	J-3
J-227	true	true	1,000	1,386	1,029	1,415	20.0	67.6	20.0	20.0	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	false	1,000	950	1,000	950	20.0	66.5	20.0	20.0	J-2	5.6	J-3
J-250	true	false	1,000	943	1,038	980	20.0	66.5	20.0	20.0	J-2	5.6	J-3
J-259	true	true	1,000	2,617	1,000	2,617	20.0	72.9	20.0	20.0	J-2	5.6	J-3
J-260	true	true	1,000	2,803	1,000	2,803	20.0	72.8	20.0	20.0	J-2	5.6	J-3
J-261	true	true	1,000	3,216	1,016	3,232	20.0	70.6	20.0	20.0	J-2	5.6	J-3
J-272	true	true	1,000	1,485	1,000	1,485	20.0	66.8	20.0	20.0	J-2	5.6	J-3
J-276	true	true	1,000	2,161	1,013	2,175	20.0	69.4	20.0	20.0	J-2	5.6	J-3
J-277	true	true	1,000	2,500	1,013	2,513	20.0	71.0	20.0	20.0	J-2	5.6	J-3
J-288	true	true	1,000	1,150	1,000	1,150	20.0	66.7	20.0	20.0	J-2	5.6	J-3
J-298	true	true	1,000	1,112	1,031	1,143	20.0	72.0	20.0	20.0	J-2	5.6	J-3
J-302	true	true	1,000	1,041	1,045	1,086	20.0	70.7	20.0	20.0	J-2	5.6	J-3
J-323	true	true	1,000	1,325	1,031	1,357	20.0	71.7	20.0	20.0	J-2	5.6	J-3

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-328	true	true	1,000	1,175	1,031	1,207	20.0	40.9	20.0	20.0	J-2	5.6	J-3
J-333	true	true	1,000	1,124	1,047	1,171	20.0	51.9	20.0	20.0	J-2	5.6	J-3
J-370	true	false	3,500	888	3,500	888	20.0	70.4	20.0	20.0	J-2	5.6	J-3
J-374	true	false	1,000	935	1,000	935	20.0	62.1	20.0	20.0	J-2	5.6	J-3
J-376	true	false	1,000	969	1,000	969	20.0	70.3	20.0	20.0	J-2	5.6	J-3
J-387	true	false	1,000	947	1,018	964	20.0	70.5	20.0	20.0	J-2	5.6	J-3
J-388	true	false	1,000	510	1,011	521	20.0	20.0	20.0	20.2	J-2	5.6	J-3
J-390	true	false	1,000	406	1,025	430	20.0	64.1	20.0	20.0	J-2	5.6	J-3
J-398	true	false	1,000	396	1,025	421	20.0	64.9	20.0	20.0	J-2	5.6	J-3
J-400	true	false	2,250	477	2,275	501	20.0	66.6	20.0	20.0	J-2	5.6	J-3
J-407	true	false	1,000	474	1,025	499	20.0	66.3	20.0	20.0	J-2	5.6	J-3
J-408	true	false	1,500	648	1,530	678	20.0	68.0	20.0	20.0	J-2	5.6	J-3
J-411	true	false	1,000	683	1,025	707	20.0	68.0	20.0	20.0	J-2	5.6	J-3
J-435	true	false	1,000	368	1,054	422	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-439	true	false	1,000	406	1,025	430	20.0	67.6	20.0	20.0	J-2	5.6	J-3
J-442	true	false	1,000	472	1,025	496	20.0	67.5	20.0	20.0	J-2	5.6	J-3
J-446	true	false	1,000	482	1,025	507	20.0	67.5	20.0	20.0	J-2	5.6	J-3
J-452	true	false	1,000	617	1,025	642	20.0	68.2	20.0	20.0	J-2	5.6	J-3
J-453	true	false	1,000	696	1,025	721	20.0	68.5	20.0	20.0	J-2	5.6	J-3
J-459	true	false	1,000	350	1,054	405	20.0	69.3	20.0	20.0	J-2	5.6	J-3
J-461	true	false	1,000	399	1,025	424	20.0	69.8	20.0	20.0	J-2	5.6	J-3
J-464	true	false	1,000	471	1,025	496	20.0	69.5	20.0	20.0	J-2	5.6	J-3
J-473	true	false	1,000	930	1,031	962	20.0	68.4	20.0	20.0	J-2	5.6	J-3
J-474	true	false	1,000	892	1,045	937	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-501	true	false	1,000	369	1,010	379	20.0	62.6	20.0	20.0	J-2	5.6	J-3
J-502	true	false	1,000	369	1,010	378	20.0	64.5	20.0	20.0	J-2	5.6	J-3
J-508	true	false	1,000	371	1,010	380	20.0	69.5	20.0	20.0	J-2	5.6	J-3
J-513	true	false	1,000	371	1,010	380	20.0	69.9	20.0	20.0	J-2	5.6	J-3
J-518	true	false	1,000	383	1,010	393	20.0	70.8	20.0	20.0	J-2	5.6	J-3
J-519	true	false	1,000	371	1,010	380	20.0	63.5	20.0	20.0	J-2	5.6	J-3
J-520	true	false	1,000	371	1,010	380	20.0	69.0	20.0	20.0	J-2	5.6	J-3
J-526	true	false	1,000	371	1,031	402	20.0	69.5	20.0	20.0	J-2	5.6	J-3
J-533	true	false	1,000	371	1,010	381	20.0	69.9	20.0	20.0	J-2	5.6	J-3
J-536	true	false	1,000	377	1,010	387	20.0	70.2	20.0	20.0	J-2	5.6	J-3
J-541	true	false	1,000	371	1,010	380	20.0	69.2	20.0	20.0	J-2	5.6	J-3
J-542	true	false	1,000	370	1,010	380	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-547	true	false	1,000	372	1,010	381	20.0	69.7	20.0	20.0	J-2	5.6	J-3
J-573	true	false	1,000	392	1,018	410	20.0	58.9	20.0	20.0	J-2	5.6	J-3
J-579	true	false	2,500	396	2,559	455	20.0	58.4	20.0	20.0	J-2	5.6	J-3
J-592	true	false	3,500	407	3,527	433	20.0	63.8	20.0	20.0	J-2	5.6	J-3
J-610	true	false	1,000	362	1,027	389	20.0	61.7	20.0	20.0	J-2	5.6	J-3
J-612	true	false	1,000	366	1,028	394	20.0	60.5	20.0	20.0	J-2	5.6	J-3
J-620	true	true	1,000	1,978	1,009	1,987	20.0	70.8	20.0	20.0	J-2	5.6	J-3
J-623	true	true	1,000	1,839	1,015	1,854	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-627	true	false	1,000	373	1,000	373	20.0	60.6	20.0	20.0	J-2	5.6	J-3
J-632	true	false	1,000	376	1,061	437	20.0	60.4	20.0	20.0	J-2	5.6	J-3
J-642	true	false	1,000	397	1,023	420	20.0	60.4	20.0	20.0	J-2	5.6	J-3
J-650	true	false	1,500	490	1,500	490	20.0	56.8	20.0	20.0	J-2	5.6	J-3
J-664	true	false	1,000	367	1,040	407	20.0	64.3	20.0	20.0	J-2	5.6	J-3
J-669	true	false	1,000	397	1,034	430	20.0	55.3	20.0	20.0	J-2	5.6	J-3
J-703	true	false	1,000	670	1,025	695	20.0	71.4	20.0	20.0	J-2	5.6	J-3
J-708	true	false	1,000	863	1,009	872	20.0	70.8	20.0	20.0	J-2	5.6	J-3

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-710	true	false	1,000	863	1,013	876	20.0	70.8	20.0	20.0	J-2	5.6	J-3
J-713	true	false	1,000	863	1,011	874	20.0	71.4	20.0	20.0	J-2	5.6	J-3
J-715	true	false	1,000	884	1,004	888	20.0	66.5	20.0	20.0	J-2	5.6	J-3
J-731	true	true	1,000	3,137	1,006	3,143	20.0	70.4	20.0	20.0	J-2	5.6	J-3
J-752	true	true	1,000	3,530	1,006	3,536	20.0	73.5	20.0	20.0	J-2	5.6	J-3
J-753	true	true	1,000	3,521	1,005	3,526	20.0	72.6	20.0	20.0	J-2	5.6	J-3
J-754	true	true	1,000	2,090	1,049	2,138	20.0	71.6	20.0	20.0	J-2	5.6	J-3
J-767	true	true	1,000	2,368	1,009	2,377	20.0	70.2	20.0	20.0	J-2	5.6	J-3
J-769	true	true	1,000	2,515	1,000	2,515	20.0	71.4	20.0	20.0	J-2	5.6	J-3
J-773	true	true	1,000	2,578	1,011	2,590	20.0	71.1	20.0	20.0	J-2	5.6	J-3
J-780	true	true	1,000	3,082	1,019	3,101	20.0	71.0	20.0	20.0	J-2	5.6	J-3
J-785	true	true	1,000	4,040	1,005	4,046	20.0	73.9	20.0	20.0	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	true	1,000	4,938	1,000	4,938	20.0	72.5	20.0	20.0	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	true	1,000	5,000	1,000	5,000	20.0	72.6	20.0	20.0	J-2	5.6	J-3
J-795	true	true	1,000	2,164	1,009	2,173	20.0	68.4	20.0	20.0	J-2	5.6	J-3
J-805	true	true	1,000	2,414	1,016	2,431	20.0	62.0	20.0	20.0	J-2	5.6	J-3
J-807	true	true	1,000	2,352	1,009	2,361	20.0	70.7	20.0	20.0	J-2	5.6	J-3
J-808	true	true	1,000	2,038	1,000	2,038	20.0	69.0	20.0	20.0	J-2	5.6	J-3
J-832	true	true	1,000	2,065	1,009	2,074	20.0	69.1	20.0	20.0	J-2	5.6	J-3
J-855	true	true	1,000	2,162	1,009	2,172	20.0	68.7	20.0	20.0	J-2	5.6	J-3
J-872	true	false	1,000	947	1,005	952	20.0	68.6	20.0	20.0	J-2	5.6	J-3

8.2.2:
PDD-Junction Report

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	65.3	20.5
J-669	36.00	Zone-1	Demand	34	Pattern - 1	34	174.4	60.0
J-579	30.00	Zone-1	Demand	59	Pattern - 1	59	174.3	62.6
J-573	30.00	Zone-1	Demand	18	Pattern - 1	18	174.3	62.6
J-612	28.00	Zone-1	Demand	28	Pattern - 1	28	174.3	63.4
J-632	27.00	Zone-1	Demand	61	Pattern - 1	61	174.3	63.8
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	174.3	63.8
J-642	27.00	Zone-1	Demand	23	Pattern - 1	23	174.4	63.9
J-610	25.00	Zone-1	Demand	27	Pattern - 1	27	174.3	64.7
J-650	25.00	Zone-1	Demand	0	Pattern - 1	0	175.9	65.4
J-592	21.00	Zone-1	Demand	27	Pattern - 1	27	174.8	66.7
J-390	21.00	Zone-1	Demand	25	Pattern - 1	25	174.9	66.7
J-100	20.00	Zone-1	Demand	36	Pattern - 1	36	174.4	66.9
J-7	19.00	Zone-1	Demand	12	Fixed	12	173.9	67.2
J-6	19.00	Zone-1	Demand	0	Fixed	0	173.9	67.2
J-49	19.00	Zone-1	Demand	46	Pattern - 1	46	173.9	67.2
J-398	20.00	Zone-1	Demand	25	Pattern - 1	25	174.9	67.2
J-519	18.00	Zone-1	Demand	10	Pattern - 1	10	173.9	67.6
J-501	18.00	Zone-1	Demand	10	Pattern - 1	10	173.9	67.6
J-664	18.00	Zone-1	Demand	40	Pattern - 1	40	173.9	67.6
J-1	18.00	Zone-1	Demand	0	Fixed	0	174.5	67.9
J-502	17.00	Zone-1	Demand	10	Pattern - 1	10	173.9	68.0
J-250	20.00	Zone-1	Demand	38	Pattern - 1	38	178.9	68.9
J-400	17.00	Zone-1	Demand	25	Pattern - 1	25	175.9	68.9
J-407	17.00	Zone-1	Demand	25	Pattern - 1	25	175.9	68.9
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	178.9	68.9
J-188	20.00	Zone-1	Demand	10	Pattern - 1	10	179.0	68.9
J-58	15.00	Zone-1	Demand	53	Pattern - 1	53	174.4	69.1
J-184	20.00	Zone-1	Demand	0	Pattern - 1	0	179.6	69.2
J-435	15.00	Zone-1	Demand	54	Pattern - 1	54	174.6	69.2
J-715	19.00	Zone-1	Demand	4	Pattern - 1	4	178.9	69.3
J-8	17.00	Zone-1	Demand	0	Fixed	0	177.2	69.4
J-156	17.00	Zone-1	Demand	29	Pattern - 1	29	177.2	69.4
J-9	14.00	Zone-1	Demand	0	Fixed	0	174.5	69.6
J-10	14.00	Zone-1	Demand	0	Fixed	0	174.5	69.6
J-442	15.00	Zone-1	Demand	25	Pattern - 1	25	175.8	69.7
J-446	15.00	Zone-1	Demand	25	Pattern - 1	25	176.0	69.8
J-439	14.00	Zone-1	Demand	25	Pattern - 1	25	175.1	69.8
J-219	18.00	Zone-1	Demand	45	Pattern - 1	45	179.5	70.0
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	179.5	70.4
J-408	15.00	Zone-1	Demand	30	Pattern - 1	30	177.5	70.4
J-169	17.00	Zone-1	Demand	29	Pattern - 1	29	179.5	70.4
J-411	15.00	Zone-1	Demand	25	Pattern - 1	25	177.8	70.6
J-452	14.00	Zone-1	Demand	25	Pattern - 1	25	177.3	70.8
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	174.4	70.8
J-222	16.00	Zone-1	Demand	45	Pattern - 1	45	179.5	70.9
J-174	15.00	Zone-1	Demand	29	Pattern - 1	29	178.6	70.9
J-179	16.00	Zone-1	Demand	29	Pattern - 1	29	179.6	70.9
J-473	15.00	Zone-1	Demand	31	Pattern - 1	31	178.8	71.0
J-453	14.00	Zone-1	Demand	25	Pattern - 1	25	177.8	71.0
J-542	10.00	Zone-1	Demand	10	Pattern - 1	10	173.9	71.1
J-459	10.00	Zone-1	Demand	54	Pattern - 1	54	174.5	71.3
J-474	14.00	Zone-1	Demand	45	Pattern - 1	45	178.6	71.4

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	179.7	71.4
J-464	10.00	Zone-1	Demand	25	Pattern - 1	25	176.0	72.0
J-461	9.00	Zone-1	Demand	25	Pattern - 1	25	175.1	72.0
J-74	8.00	Zone-1	Demand	25	Pattern - 1	25	174.6	72.2
J-227	13.00	Zone-1	Demand	29	Pattern - 1	29	180.1	72.4
J-22	6.50	Zone-1	Demand	38	Pattern - 1	38	174.4	72.8
J-103	5.50	Zone-1	Demand	29	Pattern - 1	29	174.1	73.1
J-370	10.00	Zone-1	Demand	0	Pattern - 1	0	178.6	73.1
J-64	5.50	Zone-1	Demand	10	Pattern - 1	10	174.1	73.1
J-623	12.00	Zone-1	Demand	15	Pattern - 1	15	180.8	73.2
J-520	5.00	Zone-1	Demand	10	Pattern - 1	10	173.9	73.2
J-541	5.00	Zone-1	Demand	10	Pattern - 1	10	173.9	73.2
J-526	5.00	Zone-1	Demand	31	Pattern - 1	31	173.9	73.2
J-508	5.00	Zone-1	Demand	10	Pattern - 1	10	173.9	73.2
J-196	12.00	Zone-1	Demand	14	Pattern - 1	14	180.9	73.2
J-513	5.00	Zone-1	Demand	10	Pattern - 1	10	174.0	73.2
J-533	5.00	Zone-1	Demand	10	Pattern - 1	10	174.0	73.3
J-547	5.00	Zone-1	Demand	10	Pattern - 1	10	174.0	73.3
J-276	12.00	Zone-1	Demand	13	Pattern - 1	13	181.1	73.3
J-106	5.00	Zone-1	Demand	10	Pattern - 1	10	174.2	73.4
J-12	5.00	Zone-1	Demand	35	Pattern - 1	35	174.2	73.4
J-536	5.00	Zone-1	Demand	10	Pattern - 1	10	174.3	73.4
J-518	5.00	Zone-1	Demand	10	Pattern - 1	10	174.5	73.5
J-25	5.00	Zone-1	Demand	21	Pattern - 1	21	174.5	73.5
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	180.6	73.5
J-29	5.00	Zone-1	Demand	11	Pattern - 1	11	174.9	73.7
J-767	11.00	Zone-1	Demand	9	Pattern - 1	9	181.2	73.8
J-87	5.00	Zone-1	Demand	11	Pattern - 1	11	175.3	73.8
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	178.8	73.8
J-125	10.00	Zone-1	Demand	15	Pattern - 1	15	180.5	73.9
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	180.6	74.0
J-703	7.00	Zone-1	Demand	25	Pattern - 1	25	177.6	74.0
J-34	5.00	Zone-1	Demand	11	Pattern - 1	11	175.7	74.0
J-5	5.00	Zone-1	Demand	0	Fixed	0	175.7	74.0
J-119	10.00	Zone-1	Demand	15	Pattern - 1	15	180.8	74.0
J-620	10.00	Zone-1	Demand	9	Pattern - 1	9	181.0	74.1
J-754	10.00	Zone-1	Demand	49	Pattern - 1	49	181.1	74.2
J-328	8.00	Zone-1	Demand	31	Pattern - 1	31	179.2	74.2
J-277	10.00	Zone-1	Demand	13	Pattern - 1	13	181.3	74.3
J-773	10.00	Zone-1	Demand	11	Pattern - 1	11	181.3	74.3
J-710	7.00	Zone-1	Demand	13	Pattern - 1	13	178.5	74.4
J-38	5.00	Zone-1	Demand	11	Pattern - 1	11	176.5	74.4
J-713	7.00	Zone-1	Demand	11	Pattern - 1	11	178.5	74.4
J-832	9.00	Zone-1	Demand	9	Pattern - 1	9	180.6	74.4
J-780	10.00	Zone-1	Demand	19	Pattern - 1	19	181.8	74.5
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	178.9	74.5
J-323	8.00	Zone-1	Demand	31	Pattern - 1	31	180.1	74.6
J-302	7.00	Zone-1	Demand	45	Pattern - 1	45	179.1	74.6
J-261	10.00	Zone-1	Demand	16	Pattern - 1	16	182.2	74.7
J-807	9.00	Zone-1	Demand	9	Pattern - 1	9	181.3	74.7
J-805	9.00	Zone-1	Demand	16	Pattern - 1	16	181.3	74.7
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	181.3	74.7
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	182.4	74.7
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	182.4	74.7

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-109	5.00	Zone-1	Demand	19	Pattern - 1	19	177.4	74.8
J-388	6.00	Zone-1	Demand	11	Pattern - 1	11	178.4	74.8
J-298	7.00	Zone-1	Demand	31	Pattern - 1	31	179.5	74.8
J-872	6.00	Zone-1	Demand	5	Pattern - 1	5	178.8	74.9
J-387	6.00	Zone-1	Demand	18	Pattern - 1	18	178.8	74.9
J-855	8.00	Zone-1	Demand	9	Pattern - 1	9	180.9	75.0
J-753	9.00	Zone-1	Demand	5	Pattern - 1	5	182.0	75.0
J-333	5.50	Zone-1	Demand	47	Pattern - 1	47	179.1	75.3
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	181.7	75.3
J-731	8.00	Zone-1	Demand	6	Pattern - 1	6	181.8	75.4
J-708	4.50	Zone-1	Demand	9	Pattern - 1	9	178.5	75.5
J-795	6.50	Zone-1	Demand	9	Pattern - 1	9	180.9	75.6
J-752	7.00	Zone-1	Demand	6	Pattern - 1	6	182.0	75.9
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	181.7	76.2
J-785	6.00	Zone-1	Demand	5	Pattern - 1	5	182.2	76.4
J-4	0.00	Zone-1	Demand	11	Fixed	11	178.8	77.5
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	317.6	133.3
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	319.3	134.1
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

8.2.3:
PDD-Pipe Report

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-215	180.5	180.6	0.1	0.2
P-2	980	12	Ductile Iro	120	false	0.00	Open	353	180.5	180.1	0.4	0.4
P-3	1,500	12	Cast iron	78	false	0.00	Open	176	180.1	179.7	0.4	0.3
P-4	1,440	8	Cast iron	120	false	0.00	Open	-161	179.6	180.6	1.0	0.7
P-5	533	8	Ductile Iro	120	false	0.00	Open	-161	180.6	181.0	0.4	0.7
P-6	290	8	Ductile Iro	120	false	0.00	Open	-68	181.0	181.1	0.0	0.1
P-7	800	10	Ductile Iro	113	false	0.00	Open	-184	180.8	181.1	0.3	0.3
P-8	400	8	Ductile Iro	120	false	0.00	Open	15	180.8	180.8	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	154	180.8	180.5	0.3	0.2
P-10	930	8	Ductile Iro	120	false	0.00	Open	148	180.1	179.5	0.6	0.6
P-11	555	8	Ductile Iro	120	false	0.00	Open	45	179.5	179.5	0.0	0.1
P-12	450	8	Ductile Iro	120	false	0.00	Open	57	179.5	179.5	0.0	0.1
P-13	275	6	Ductile Iro	106	false	0.00	Open	17	179.5	179.5	0.0	0.1
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-85	177.2	178.6	1.4	1.1
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	-11	178.6	179.5	0.8	0.7
P-16	555	12	Ductile Iro	120	false	0.00	Open	176	179.7	179.6	0.1	0.1
P-18	800	8	Ductile Iro	120	false	0.00	Open	-43	179.6	179.6	0.0	0.1
P-19	620	6	Ductile Iro	106	false	0.00	Open	-103	178.6	179.6	1.0	1.6
P-20	650	8	Ductile Iro	120	false	0.00	Open	204	179.6	178.9	0.7	1.1
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	320	178.9	177.8	1.1	0.9
P-22	400	8	Ductile Iro	120	false	0.00	Open	169	177.8	177.5	0.3	0.8
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	-195	177.5	178.9	1.4	1.0
P-24	620	8	Ductile Iro	120	false	0.00	Open	259	178.9	177.8	1.1	1.7
P-25	650	8	Ductile Iro	120	false	0.00	Open	-92	177.3	177.5	0.2	0.3
P-26	600	8	Ductile Iro	120	false	0.00	Open	-169	177.3	177.8	0.5	0.8
P-27	740	8	Ductile Iro	120	false	0.00	Open	-87	178.9	179.0	0.2	0.2
P-28	380	8	Ductile Iro	120	false	0.00	Open	-120	178.9	179.0	0.2	0.4
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-218	179.0	180.9	1.9	1.3
P-30	890	10	Ductile Iro	113	false	0.00	Open	-148	180.9	181.1	0.2	0.2
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-83	180.9	181.0	0.1	0.1
P-32	75	12	Ductile Iro	120	false	0.00	Open	-498	178.9	178.9	0.1	0.8
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-248	178.9	181.7	2.8	1.6
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-250	178.9	182.2	3.3	1.6
P-36	100	10	Ductile Iro	120	false	0.00	Open	-422	178.6	178.8	0.1	1.4
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	171	181.3	180.9	0.3	0.3
P-38	900	8	Ductile Iro	120	false	0.00	Open	105	180.9	180.6	0.3	0.3
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	180.6	180.6	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	121	178.6	178.6	0.0	0.1
P-41	980	8	Ductile Iro	120	false	0.00	Open	-92	178.5	178.8	0.2	0.3
P-42	222	8	Ductile Iro	120	false	0.00	Open	5	178.8	178.8	0.0	0.0
P-43	620	10	Ductile Iro	120	false	0.00	Open	-114	178.8	178.9	0.1	0.1
P-44	610	10	Ductile Iro	99	false	0.00	Open	-210	179.1	179.5	0.3	0.6
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	371	179.5	178.8	0.7	0.5
P-46	520	12	Ductile Iro	120	false	0.00	Open	-613	179.5	180.1	0.6	1.2
P-47	666	12	Ductile Iro	120	false	0.00	Open	-701	180.1	181.1	1.0	1.5
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-64	181.1	181.2	0.1	0.0
P-49	220	8	Ductile Iro	120	false	0.00	Open	-185	181.0	181.2	0.2	0.9
P-50	200	10	Ductile Iro	113	false	0.00	Open	-258	181.2	181.3	0.1	0.6
P-51	220	10	Ductile Iro	113	false	0.00	Open	150	181.3	181.3	0.1	0.2
P-52	20	8	Ductile Iro	50	false	0.00	Open	301	320.0	319.8	0.2	11.6
P-53	5	10	Ductile Iro	113	false	0.00	Open	451	181.3	181.3	0.0	1.8
P-54	333	10	Ductile Iro	113	false	0.00	Open	266	181.3	181.1	0.2	0.7
P-55	100	10	Ductile Iro	113	false	0.00	Open	172	181.3	181.3	0.0	0.3

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	215	180.6	180.6	0.0	0.2
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-119	180.6	180.9	0.3	0.1
P-58	555	10	Ductile Iro	120	false	0.00	Open	-57	180.9	180.9	0.0	0.0
P-59	580	10	Ductile Iro	50	false	0.00	Open	-8	181.3	181.3	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-72	180.9	181.3	0.3	0.3
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-97	181.3	181.8	0.6	0.5
P-62	730	12	Ductile Iro	120	false	0.00	Open	62	181.8	181.8	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	419	181.8	181.3	0.5	0.6
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-165	181.8	182.0	0.2	0.1
P-65	330	12	Ductile Iro	120	false	0.00	Open	421	182.2	182.0	0.2	0.6
P-66	820	12	Ductile Iro	120	false	0.00	Open	376	182.2	181.8	0.4	0.5
P-67	5	12	Ductile Iro	120	false	0.00	Open	250	182.0	182.0	0.0	0.2
P-68	225	12	Ductile Iro	120	false	0.00	Open	-735	182.0	182.4	0.4	1.7
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	182.4	319.3	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	147	181.7	181.7	0.0	3.1
P-71	330	8	Ductile Iro	50	false	0.00	Open	-101	181.7	182.2	0.5	1.5
P-72	10	8	Ductile Iro	50	false	0.00	Open	367	182.4	182.2	0.2	16.7
P-73	100	12	Ductile Iro	120	false	0.00	Open	802	182.4	182.2	0.2	2.0
P-74	5	12	Ductile Iro	120	false	0.00	Open	1,102	182.4	182.4	0.0	3.5
P-75	5	10	Ductile Iro	50	false	0.00	Open	1,905	183.0	182.4	0.6	119.2
P-76	20	12	Ductile Iro	120	false	0.00	Open	1,905	319.5	319.3	0.2	9.7
P-77	15	10	Ductile Iro	50	false	0.00	Open	-1,905	317.6	319.3	1.8	119.2
P-78	100	12	Ductile Iro	120	false	0.00	Open	980	182.0	181.7	0.3	2.8
P-79	290	12	Ductile Iro	120	false	0.00	Open	833	181.7	181.1	0.6	2.1
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	66	177.8	177.6	0.2	0.1
P-81	600	8	Ductile Iro	120	false	0.00	Open	-256	177.6	178.6	1.0	1.7
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	62	177.6	177.4	0.2	0.1
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	-196	177.4	178.5	1.1	1.0
P-84	550	12	Ductile Iro	120	false	0.00	Open	34	178.5	178.5	0.0	0.0
P-85	15	6	Ductile Iro	50	false	0.00	Open	301	182.0	181.3	0.7	47.2
P-86	600	8	Ductile Iro	120	false	0.00	Open	239	177.4	176.5	0.9	1.5
P-87	620	8	Ductile Iro	120	false	0.00	Open	228	176.5	175.7	0.8	1.4
P-88	330	8	Ductile Iro	120	false	0.00	Open	217	175.7	175.3	0.4	1.2
P-89	310	8	Ductile Iro	120	false	0.00	Open	206	175.3	174.9	0.4	1.1
P-90	470	8	Ductile Iro	120	false	0.00	Open	195	174.9	174.5	0.5	1.0
P-91	180	6	Ductile Iro	120	false	0.00	Open	50	174.5	174.4	0.1	0.3
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	72	174.6	174.4	0.2	0.2
P-93	880	8	Ductile Iro	120	false	0.00	Open	83	174.4	174.2	0.2	0.2
P-94	512	8	Ductile Iro	50	false	0.00	Open	33	174.6	174.5	0.1	0.2
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	33	174.5	174.3	0.2	0.2
P-96	1	6	Ductile Iro	120	false	0.00	Open	124	174.5	174.5	0.0	1.8
P-99	1	6	Ductile Iro	120	false	0.00	Open	54	174.2	174.2	0.0	0.4
P-100	4	6	Ductile Iro	120	false	0.00	Open	13	173.9	173.9	0.0	0.0
P-101	240	6	Ductile Iro	120	false	0.00	Open	4	173.9	173.9	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	37	174.1	174.0	0.1	0.2
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	18	174.0	173.9	0.1	0.1
P-104	1	6	Ductile Iro	120	false	0.00	Open	-20	173.9	173.9	0.0	0.1
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-68	173.9	174.2	0.3	0.1
P-106	270	8	Ductile Iro	120	false	0.00	Open	11	173.9	173.9	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-46	173.9	174.4	0.5	0.3
P-108	240	12	Ductile Iro	120	false	0.00	Open	103	174.4	174.4	0.0	0.0
P-109	930	10	Ductile Iro	50	false	0.00	Open	43	174.4	174.3	0.1	0.1
P-110	670	10	Ductile Iro	50	false	0.00	Open	16	174.3	174.3	0.0	0.0

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	-25	174.3	174.4	0.1	0.1
P-112	770	10	Ductile Iro	50	false	0.00	Open	12	174.3	174.3	0.0	0.0
P-113	900	8	Ductile Iro	50	false	0.00	Open	-12	174.3	174.3	0.0	0.0
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-37	174.3	174.4	0.1	0.0
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	34	174.4	174.4	0.0	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-150	174.4	174.8	0.4	0.6
P-117	245	8	Ductile Iro	120	false	0.00	Open	-104	174.8	174.9	0.1	0.3
P-118	620	8	Ductile Iro	120	false	0.00	Open	-42	174.9	174.9	0.0	0.1
P-119	840	8	Ductile Iro	120	false	0.00	Open	113	174.9	174.6	0.3	0.4
P-121	1,270	8	PVC	120	false	0.00	Open	59	174.6	174.5	0.1	0.1
P-122	290	8	Ductile Iro	120	false	0.00	Open	126	174.6	174.5	0.1	0.5
P-123	660	12	Ductile Iro	120	false	0.00	Open	130	174.5	174.4	0.0	0.1
P-124	380	8	Ductile Iro	120	false	0.00	Open	-222	174.6	175.1	0.5	1.3
P-125	660	8	Ductile Iro	120	false	0.00	Open	-224	175.1	176.0	0.9	1.3
P-126	580	8	Ductile Iro	120	false	0.00	Open	-179	174.6	175.1	0.5	0.9
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	23	175.1	175.1	0.0	0.0
P-128	530	8	Ductile Iro	120	false	0.00	Open	-227	175.1	175.8	0.7	1.4
P-129	130	8	Ductile Iro	120	false	0.00	Open	-198	175.8	176.0	0.1	1.1
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	14	176.0	176.0	0.0	0.0
P-131	910	8	Ductile Iro	120	false	0.00	Open	-236	176.0	177.3	1.3	1.5
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	235	177.6	176.0	1.6	1.4
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	243	177.5	175.9	1.6	1.5
P-134	310	8	Ductile Iro	120	false	0.00	Open	54	175.9	175.8	0.0	0.1
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	180	175.9	174.9	0.9	0.9
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-86	174.9	175.9	1.0	0.9
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	-127	175.9	177.8	1.9	1.9
P-138	470	8	Ductile Iro	120	false	0.00	Open	16	175.9	175.9	0.0	0.0
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	-73	174.8	175.9	1.1	0.7
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	-73	175.9	177.2	1.3	0.8
P-141	980	6	Ductile Iro	78	false	0.00	Open	57	180.1	179.2	0.9	0.9
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	10	179.2	179.1	0.1	0.0
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-15	179.1	179.2	0.1	0.1
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	-22	179.1	179.1	0.1	0.0
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	65.3	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	65.3	174.4	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	56	174.4	174.3	0.1	0.1
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	65.3	65.3	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	65.3	65.3	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	3	174.3	174.3	0.0	0.0
P-161	686	10	Ductile Iro	120	false	0.00	Open	92	178.9	178.8	0.1	0.1
P-162	514	10	Ductile Iro	120	false	0.00	Open	82	178.8	178.8	0.0	0.1
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	175.7	175.7	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	-57	174.4	174.4	0.0	0.0
P-171	362	8	PVC	120	false	0.00	Open	-12	173.9	173.9	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-12	173.9	173.9	0.0	0.0
P-173	1,035	6	PVC	99	false	0.00	Open	0	177.2	177.2	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-145	174.4	174.5	0.1	0.1
P-175	5	12	PVC	120	false	0.00	Open	-145	174.5	174.5	0.0	0.1
P-176	838	12	PVC	120	false	0.00	Open	-145	174.5	174.6	0.1	0.1

Scenario: Peak Day-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	73	174.4	174.2	0.2	0.2
P-190	275	6	Ductile Iro	120	false	0.00	Open	73	174.5	174.3	0.2	0.7
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-32	174.1	174.3	0.2	0.1
P-210	275	6	Ductile Iro	120	false	0.00	Open	47	174.2	174.1	0.1	0.3
P-220	275	6	Ductile Iro	120	false	0.00	Open	-35	174.1	174.1	0.0	0.2
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	41	174.5	174.2	0.2	0.2
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	31	174.3	174.1	0.1	0.1
P-250	440	6	Ductile Iro	120	false	0.00	Open	-4	173.9	173.9	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-12	173.9	173.9	0.0	0.0
P-270	880	6	Ductile Iro	120	false	0.00	Open	34	174.1	174.0	0.1	0.2
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	38	174.2	174.0	0.2	0.2
P-290	330	6	Ductile Iro	120	false	0.00	Open	10	174.0	174.0	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	13	174.0	174.0	0.0	0.0
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	22	174.0	173.9	0.1	0.1
P-320	750	6	Ductile Iro	120	false	0.00	Open	25	174.0	173.9	0.1	0.1
P-330	275	6	Ductile Iro	120	false	0.00	Open	17	173.9	173.9	0.0	0.0
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	16	174.0	173.9	0.1	0.0
P-350	220	6	Ductile Iro	120	false	0.00	Open	7	173.9	173.9	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-1	173.9	173.9	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-2	173.9	173.9	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-2	173.9	173.9	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	12	173.9	173.9	0.0	0.0
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-9	178.5	178.5	0.0	0.0
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-11	178.4	178.5	0.1	0.1
P-420	880	8	Cast iron	120	false	0.00	Open	-15	174.3	174.3	0.0	0.0
P-430	1,210	4	Cast iron	120	false	0.00	Open	3	174.3	174.3	0.0	0.0
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	-17	177.2	179.5	2.3	1.7
P-450	682	12	Ductile Iro	120	false	0.00	Open	-150	178.5	178.6	0.1	0.1
P-460	990	10	Ductile Iro	99	false	0.00	Open	142	179.1	178.9	0.3	0.3
P-470	330	6	Ductile Iro	85	false	0.00	Open	28	178.9	178.8	0.1	0.2
P-480	880	6	Ductile Iro	85	false	0.00	Open	-28	178.6	178.8	0.2	0.2
P-490	1	10	Ductile Iro	50	false	0.00	Open	1,905	317.6	317.4	0.1	119.2
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

8.3.1:
PHD-Fire Flow Analysis Report

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	false	1,000	0	1,000	0	20.0	58.5	20.0	18.2	J-2	5.6	J-3
J-2	true	false	1,000	0	1,000	0	20.0	18.2	20.0	50.4	J-669	5.6	J-3
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	false	1,500	0	1,522	22	20.0	73.0	20.0	18.2	J-2	5.6	J-3
J-5	true	false	1,000	0	1,000	0	20.0	66.0	20.0	18.2	J-2	5.6	J-3
J-6	true	false	1,000	0	1,000	0	20.0	57.1	20.0	18.2	J-2	5.6	J-3
J-7	true	false	1,000	0	1,023	23	20.0	57.1	20.0	18.2	J-2	5.6	J-3
J-8	true	false	1,000	0	1,000	0	20.0	63.2	20.0	18.2	J-2	5.6	J-3
J-9	true	false	1,000	0	1,000	0	20.0	60.3	20.0	18.2	J-2	5.6	J-3
J-10	true	false	1,000	0	1,000	0	20.0	60.3	20.0	18.2	J-2	5.6	J-3
J-12	true	false	2,500	0	2,570	70	20.0	63.6	20.0	18.2	J-2	5.6	J-3
J-22	true	false	1,000	0	1,077	77	20.0	63.3	20.0	18.2	J-2	5.6	J-3
J-25	true	false	1,000	0	1,041	41	20.0	64.0	20.0	18.2	J-2	5.6	J-3
J-29	true	false	1,000	0	1,022	22	20.0	64.8	20.0	18.2	J-2	5.6	J-3
J-34	true	false	1,000	0	1,022	22	20.0	66.0	20.0	18.2	J-2	5.6	J-3
J-38	true	false	1,000	0	1,022	22	20.0	67.3	20.0	18.2	J-2	5.6	J-3
J-49	true	false	1,000	0	1,091	91	20.0	57.1	20.0	18.2	J-2	5.6	J-3
J-58	true	false	1,000	0	1,106	106	20.0	59.6	20.0	18.2	J-2	5.6	J-3
J-64	true	false	1,000	0	1,019	19	20.0	63.3	20.0	18.2	J-2	5.6	J-3
J-71	true	false	1,000	0	1,000	0	20.0	61.4	20.0	18.2	J-2	5.6	J-3
J-74	true	false	1,000	0	1,049	49	20.0	63.0	20.0	18.2	J-2	5.6	J-3
J-87	true	false	1,000	0	1,022	22	20.0	65.3	20.0	18.2	J-2	5.6	J-3
J-100	true	false	1,000	0	1,071	71	20.0	57.4	20.0	18.2	J-2	5.6	J-3
J-103	true	false	1,000	0	1,058	58	20.0	63.2	20.0	18.2	J-2	5.6	J-3
J-106	true	false	1,000	0	1,019	19	20.0	63.6	20.0	18.2	J-2	5.6	J-3
J-109	true	false	1,000	0	1,038	38	20.0	68.7	20.0	18.2	J-2	5.6	J-3
J-119	true	false	1,000	0	1,031	31	20.0	71.9	20.0	18.2	J-2	5.6	J-3
J-125	true	false	1,000	0	1,031	31	20.0	71.5	20.0	18.2	J-2	5.6	J-3
J-156	true	false	1,000	0	1,059	59	20.0	63.2	20.0	18.2	J-2	5.6	J-3
J-166	true	false	1,000	0	1,000	0	20.0	66.8	20.0	18.2	J-2	5.6	J-3
J-169	true	false	1,000	0	1,059	59	20.0	66.8	20.0	18.2	J-2	5.6	J-3
J-174	true	false	1,000	0	1,059	59	20.0	66.3	20.0	18.2	J-2	5.6	J-3
J-179	true	false	3,000	0	3,059	59	20.0	67.5	20.0	18.2	J-2	5.6	J-3
J-184	true	false	1,000	0	1,000	0	20.0	65.6	20.0	18.2	J-2	5.6	J-3
J-188	true	false	1,000	0	1,020	20	20.0	64.7	20.0	18.2	J-2	5.6	J-3
J-196	true	false	1,000	0	1,028	28	20.0	71.1	20.0	18.2	J-2	5.6	J-3
J-219	true	false	1,000	0	1,091	91	20.0	66.4	20.0	18.2	J-2	5.6	J-3
J-222	true	false	1,000	0	1,091	91	20.0	67.2	20.0	18.2	J-2	5.6	J-3
J-227	true	false	1,000	0	1,059	59	20.0	69.5	20.0	18.2	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	false	1,000	0	1,000	0	20.0	64.5	20.0	18.2	J-2	5.6	J-3
J-250	true	false	1,000	0	1,075	75	20.0	64.4	20.0	18.2	J-2	5.6	J-3
J-259	true	false	1,000	0	1,000	0	20.0	74.9	20.0	18.2	J-2	5.6	J-3
J-260	true	false	1,000	0	1,000	0	20.0	74.0	20.0	18.2	J-2	5.6	J-3
J-261	true	false	1,000	0	1,032	32	20.0	73.9	20.0	18.2	J-2	5.6	J-3
J-272	true	false	1,000	0	1,000	0	20.0	71.2	20.0	18.2	J-2	5.6	J-3
J-276	true	false	1,000	0	1,027	27	20.0	71.4	20.0	18.2	J-2	5.6	J-3
J-277	true	false	1,000	0	1,027	27	20.0	72.7	20.0	18.2	J-2	5.6	J-3
J-288	true	false	1,000	0	1,000	0	20.0	68.0	20.0	18.2	J-2	5.6	J-3
J-298	true	false	1,000	0	1,063	63	20.0	71.0	20.0	18.2	J-2	5.6	J-3
J-302	true	false	1,000	0	1,090	90	20.0	70.5	20.0	18.2	J-2	5.6	J-3
J-323	true	false	1,000	0	1,063	63	20.0	71.6	20.0	18.2	J-2	5.6	J-3

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-328	true	false	1,000	0	1,063	63	20.0	70.1	20.0	18.2	J-2	5.6	J-3
J-333	true	false	1,000	0	1,095	95	20.0	71.1	20.0	18.2	J-2	5.6	J-3
J-370	true	false	3,500	0	3,500	0	20.0	68.4	20.0	18.2	J-2	5.6	J-3
J-374	true	false	1,000	0	1,000	0	20.0	69.3	20.0	18.2	J-2	5.6	J-3
J-376	true	false	1,000	0	1,000	0	20.0	70.1	20.0	18.2	J-2	5.6	J-3
J-387	true	false	1,000	0	1,035	35	20.0	70.4	20.0	18.2	J-2	5.6	J-3
J-388	true	false	1,000	0	1,023	23	20.0	69.8	20.0	18.2	J-2	5.6	J-3
J-390	true	false	1,000	0	1,049	49	20.0	57.8	20.0	18.2	J-2	5.6	J-3
J-398	true	false	1,000	0	1,049	49	20.0	58.3	20.0	18.2	J-2	5.6	J-3
J-400	true	false	2,250	0	2,299	49	20.0	61.1	20.0	18.2	J-2	5.6	J-3
J-407	true	false	1,000	0	1,049	49	20.0	61.1	20.0	18.2	J-2	5.6	J-3
J-408	true	false	1,500	0	1,560	60	20.0	64.4	20.0	18.2	J-2	5.6	J-3
J-411	true	false	1,000	0	1,049	49	20.0	64.9	20.0	18.2	J-2	5.6	J-3
J-435	true	false	1,000	0	1,109	109	20.0	59.9	20.0	18.2	J-2	5.6	J-3
J-439	true	false	1,000	0	1,049	49	20.0	61.2	20.0	18.2	J-2	5.6	J-3
J-442	true	false	1,000	0	1,049	49	20.0	61.9	20.0	18.2	J-2	5.6	J-3
J-446	true	false	1,000	0	1,049	49	20.0	62.1	20.0	18.2	J-2	5.6	J-3
J-452	true	false	1,000	0	1,049	49	20.0	64.6	20.0	18.2	J-2	5.6	J-3
J-453	true	false	1,000	0	1,049	49	20.0	65.3	20.0	18.2	J-2	5.6	J-3
J-459	true	false	1,000	0	1,109	109	20.0	61.9	20.0	18.2	J-2	5.6	J-3
J-461	true	false	1,000	0	1,049	49	20.0	63.3	20.0	18.2	J-2	5.6	J-3
J-464	true	false	1,000	0	1,049	49	20.0	64.2	20.0	18.2	J-2	5.6	J-3
J-473	true	false	1,000	0	1,063	63	20.0	66.4	20.0	18.2	J-2	5.6	J-3
J-474	true	false	1,000	0	1,089	89	20.0	66.6	20.0	18.2	J-2	5.6	J-3
J-501	true	false	1,000	0	1,019	19	20.0	57.5	20.0	18.2	J-2	5.6	J-3
J-502	true	false	1,000	0	1,019	19	20.0	58.0	20.0	18.2	J-2	5.6	J-3
J-508	true	false	1,000	0	1,019	19	20.0	63.2	20.0	18.2	J-2	5.6	J-3
J-513	true	false	1,000	0	1,019	19	20.0	63.3	20.0	18.2	J-2	5.6	J-3
J-518	true	false	1,000	0	1,019	19	20.0	64.0	20.0	18.2	J-2	5.6	J-3
J-519	true	false	1,000	0	1,019	19	20.0	57.5	20.0	18.2	J-2	5.6	J-3
J-520	true	false	1,000	0	1,019	19	20.0	63.2	20.0	18.2	J-2	5.6	J-3
J-526	true	false	1,000	0	1,062	62	20.0	63.2	20.0	18.2	J-2	5.6	J-3
J-533	true	false	1,000	0	1,019	19	20.0	63.3	20.0	18.2	J-2	5.6	J-3
J-536	true	false	1,000	0	1,019	19	20.0	63.7	20.0	18.2	J-2	5.6	J-3
J-541	true	false	1,000	0	1,019	19	20.0	63.2	20.0	18.2	J-2	5.6	J-3
J-542	true	false	1,000	0	1,019	19	20.0	61.0	20.0	18.2	J-2	5.6	J-3
J-547	true	false	1,000	0	1,019	19	20.0	63.3	20.0	18.2	J-2	5.6	J-3
J-573	true	false	1,000	0	1,037	37	20.0	53.0	20.0	18.2	J-2	5.6	J-3
J-579	true	false	2,500	0	2,618	118	20.0	53.0	20.0	18.2	J-2	5.6	J-3
J-592	true	false	3,500	0	3,553	53	20.0	57.7	20.0	18.2	J-2	5.6	J-3
J-610	true	false	1,000	0	1,054	54	20.0	55.1	20.0	18.2	J-2	5.6	J-3
J-612	true	false	1,000	0	1,057	57	20.0	53.8	20.0	18.2	J-2	5.6	J-3
J-620	true	false	1,000	0	1,018	18	20.0	72.2	20.0	18.2	J-2	5.6	J-3
J-623	true	false	1,000	0	1,031	31	20.0	71.0	20.0	18.2	J-2	5.6	J-3
J-627	true	false	1,000	0	1,000	0	20.0	54.2	20.0	18.2	J-2	5.6	J-3
J-632	true	false	1,000	0	1,122	122	20.0	54.2	20.0	18.2	J-2	5.6	J-3
J-642	true	false	1,000	0	1,046	46	20.0	54.4	20.0	18.2	J-2	5.6	J-3
J-650	true	false	1,500	0	1,500	0	20.0	57.6	20.0	18.2	J-2	5.6	J-3
J-664	true	false	1,000	0	1,079	79	20.0	57.6	20.0	18.2	J-2	5.6	J-3
J-669	true	false	1,000	0	1,067	67	20.0	50.4	20.0	18.2	J-2	5.6	J-3
J-703	true	false	1,000	0	1,049	49	20.0	68.1	20.0	18.2	J-2	5.6	J-3
J-708	true	false	1,000	0	1,018	18	20.0	70.6	20.0	18.2	J-2	5.6	J-3

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-710	true	false	1,000	0	1,027	27	20.0	69.6	20.0	18.2	J-2	5.6	J-3
J-713	true	false	1,000	0	1,023	23	20.0	69.6	20.0	18.2	J-2	5.6	J-3
J-715	true	false	1,000	0	1,008	8	20.0	64.9	20.0	18.2	J-2	5.6	J-3
J-731	true	false	1,000	0	1,012	12	20.0	74.2	20.0	18.2	J-2	5.6	J-3
J-752	true	false	1,000	0	1,012	12	20.0	74.9	20.0	18.2	J-2	5.6	J-3
J-753	true	false	1,000	0	1,011	11	20.0	74.0	20.0	18.2	J-2	5.6	J-3
J-754	true	false	1,000	0	1,097	97	20.0	72.3	20.0	18.2	J-2	5.6	J-3
J-767	true	false	1,000	0	1,018	18	20.0	72.1	20.0	18.2	J-2	5.6	J-3
J-769	true	false	1,000	0	1,000	0	20.0	73.2	20.0	18.2	J-2	5.6	J-3
J-773	true	false	1,000	0	1,023	23	20.0	72.8	20.0	18.2	J-2	5.6	J-3
J-780	true	false	1,000	0	1,039	39	20.0	73.4	20.0	18.2	J-2	5.6	J-3
J-785	true	false	1,000	0	1,011	11	20.0	75.6	20.0	18.2	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	false	1,000	0	1,000	0	20.0	74.1	20.0	18.2	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	false	1,000	0	1,000	0	20.0	74.2	20.0	18.2	J-2	5.6	J-3
J-795	true	false	1,000	0	1,018	18	20.0	73.6	20.0	18.2	J-2	5.6	J-3
J-805	true	false	1,000	0	1,033	33	20.0	73.1	20.0	18.2	J-2	5.6	J-3
J-807	true	false	1,000	0	1,018	18	20.0	73.1	20.0	18.2	J-2	5.6	J-3
J-808	true	false	1,000	0	1,000	0	20.0	71.6	20.0	18.2	J-2	5.6	J-3
J-832	true	false	1,000	0	1,018	18	20.0	72.1	20.0	18.2	J-2	5.6	J-3
J-855	true	false	1,000	0	1,018	18	20.0	73.0	20.0	18.2	J-2	5.6	J-3
J-872	true	false	1,000	0	1,010	10	20.0	70.4	20.0	18.2	J-2	5.6	J-3

8.3.2:
PHD-Junction Report

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	59.9	18.2
J-669	36.00	Zone-1	Demand	67	Pattern - 1	67	152.3	50.4
J-579	30.00	Zone-1	Demand	118	Pattern - 1	118	152.1	53.0
J-573	30.00	Zone-1	Demand	37	Pattern - 1	37	152.2	53.0
J-612	28.00	Zone-1	Demand	57	Pattern - 1	57	152.1	53.8
J-632	27.00	Zone-1	Demand	122	Pattern - 1	122	152.1	54.2
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	152.1	54.2
J-642	27.00	Zone-1	Demand	46	Pattern - 1	46	152.4	54.4
J-610	25.00	Zone-1	Demand	54	Pattern - 1	54	152.2	55.1
J-7	19.00	Zone-1	Demand	23	Fixed	23	150.7	57.1
J-6	19.00	Zone-1	Demand	0	Fixed	0	150.7	57.1
J-49	19.00	Zone-1	Demand	91	Pattern - 1	91	150.8	57.1
J-100	20.00	Zone-1	Demand	71	Pattern - 1	71	152.5	57.4
J-519	18.00	Zone-1	Demand	19	Pattern - 1	19	150.7	57.5
J-501	18.00	Zone-1	Demand	19	Pattern - 1	19	150.7	57.5
J-664	18.00	Zone-1	Demand	79	Pattern - 1	79	150.8	57.6
J-650	25.00	Zone-1	Demand	0	Pattern - 1	0	158.0	57.6
J-592	21.00	Zone-1	Demand	53	Pattern - 1	53	154.0	57.7
J-390	21.00	Zone-1	Demand	49	Pattern - 1	49	154.3	57.8
J-502	17.00	Zone-1	Demand	19	Pattern - 1	19	150.8	58.0
J-398	20.00	Zone-1	Demand	49	Pattern - 1	49	154.4	58.3
J-1	18.00	Zone-1	Demand	0	Fixed	0	152.9	58.5
J-58	15.00	Zone-1	Demand	106	Pattern - 1	106	152.5	59.6
J-435	15.00	Zone-1	Demand	109	Pattern - 1	109	153.3	59.9
J-9	14.00	Zone-1	Demand	0	Fixed	0	153.0	60.3
J-10	14.00	Zone-1	Demand	0	Fixed	0	153.0	60.3
J-542	10.00	Zone-1	Demand	19	Pattern - 1	19	150.7	61.0
J-400	17.00	Zone-1	Demand	49	Pattern - 1	49	157.8	61.1
J-407	17.00	Zone-1	Demand	49	Pattern - 1	49	157.8	61.1
J-439	14.00	Zone-1	Demand	49	Pattern - 1	49	155.1	61.2
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	152.6	61.4
J-442	15.00	Zone-1	Demand	49	Pattern - 1	49	157.7	61.9
J-459	10.00	Zone-1	Demand	109	Pattern - 1	109	152.8	61.9
J-446	15.00	Zone-1	Demand	49	Pattern - 1	49	158.2	62.1
J-74	8.00	Zone-1	Demand	49	Pattern - 1	49	153.2	63.0
J-520	5.00	Zone-1	Demand	19	Pattern - 1	19	150.7	63.2
J-541	5.00	Zone-1	Demand	19	Pattern - 1	19	150.7	63.2
J-526	5.00	Zone-1	Demand	62	Pattern - 1	62	150.7	63.2
J-508	5.00	Zone-1	Demand	19	Pattern - 1	19	150.7	63.2
J-156	17.00	Zone-1	Demand	59	Pattern - 1	59	162.7	63.2
J-8	17.00	Zone-1	Demand	0	Fixed	0	162.7	63.2
J-103	5.50	Zone-1	Demand	58	Pattern - 1	58	151.3	63.2
J-513	5.00	Zone-1	Demand	19	Pattern - 1	19	150.9	63.3
J-533	5.00	Zone-1	Demand	19	Pattern - 1	19	151.0	63.3
J-22	6.50	Zone-1	Demand	77	Pattern - 1	77	152.5	63.3
J-547	5.00	Zone-1	Demand	19	Pattern - 1	19	151.0	63.3
J-64	5.50	Zone-1	Demand	19	Pattern - 1	19	151.5	63.3
J-461	9.00	Zone-1	Demand	49	Pattern - 1	49	155.0	63.3
J-106	5.00	Zone-1	Demand	19	Pattern - 1	19	151.8	63.6
J-12	5.00	Zone-1	Demand	70	Pattern - 1	70	151.8	63.6
J-536	5.00	Zone-1	Demand	19	Pattern - 1	19	152.0	63.7
J-518	5.00	Zone-1	Demand	19	Pattern - 1	19	152.7	64.0
J-25	5.00	Zone-1	Demand	41	Pattern - 1	41	152.7	64.0

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-464	10.00	Zone-1	Demand	49	Pattern - 1	49	158.2	64.2
J-250	20.00	Zone-1	Demand	75	Pattern - 1	75	168.6	64.4
J-408	15.00	Zone-1	Demand	60	Pattern - 1	60	163.6	64.4
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	168.8	64.5
J-452	14.00	Zone-1	Demand	49	Pattern - 1	49	163.0	64.6
J-188	20.00	Zone-1	Demand	20	Pattern - 1	20	169.3	64.7
J-29	5.00	Zone-1	Demand	22	Pattern - 1	22	154.4	64.8
J-715	19.00	Zone-1	Demand	8	Pattern - 1	8	168.7	64.9
J-411	15.00	Zone-1	Demand	49	Pattern - 1	49	164.8	64.9
J-87	5.00	Zone-1	Demand	22	Pattern - 1	22	155.7	65.3
J-453	14.00	Zone-1	Demand	49	Pattern - 1	49	164.7	65.3
J-184	20.00	Zone-1	Demand	0	Pattern - 1	0	171.4	65.6
J-5	5.00	Zone-1	Demand	0	Fixed	0	157.2	66.0
J-34	5.00	Zone-1	Demand	22	Pattern - 1	22	157.2	66.0
J-174	15.00	Zone-1	Demand	59	Pattern - 1	59	168.0	66.3
J-473	15.00	Zone-1	Demand	63	Pattern - 1	63	168.2	66.4
J-219	18.00	Zone-1	Demand	91	Pattern - 1	91	171.3	66.4
J-474	14.00	Zone-1	Demand	89	Pattern - 1	89	167.7	66.6
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	171.0	66.8
J-169	17.00	Zone-1	Demand	59	Pattern - 1	59	171.1	66.8
J-222	16.00	Zone-1	Demand	91	Pattern - 1	91	171.1	67.2
J-38	5.00	Zone-1	Demand	22	Pattern - 1	22	160.2	67.3
J-179	16.00	Zone-1	Demand	59	Pattern - 1	59	171.6	67.5
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	171.9	68.0
J-703	7.00	Zone-1	Demand	49	Pattern - 1	49	164.1	68.1
J-370	10.00	Zone-1	Demand	0	Pattern - 1	0	167.7	68.4
J-109	5.00	Zone-1	Demand	38	Pattern - 1	38	163.5	68.7
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	168.4	69.3
J-227	13.00	Zone-1	Demand	59	Pattern - 1	59	173.3	69.5
J-710	7.00	Zone-1	Demand	27	Pattern - 1	27	167.5	69.6
J-713	7.00	Zone-1	Demand	23	Pattern - 1	23	167.5	69.6
J-388	6.00	Zone-1	Demand	23	Pattern - 1	23	167.1	69.8
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	168.6	70.1
J-328	8.00	Zone-1	Demand	63	Pattern - 1	63	169.8	70.1
J-872	6.00	Zone-1	Demand	10	Pattern - 1	10	168.4	70.4
J-387	6.00	Zone-1	Demand	35	Pattern - 1	35	168.4	70.4
J-302	7.00	Zone-1	Demand	90	Pattern - 1	90	169.6	70.5
J-708	4.50	Zone-1	Demand	18	Pattern - 1	18	167.4	70.6
J-623	12.00	Zone-1	Demand	31	Pattern - 1	31	175.8	71.0
J-298	7.00	Zone-1	Demand	63	Pattern - 1	63	170.9	71.0
J-333	5.50	Zone-1	Demand	95	Pattern - 1	95	169.4	71.1
J-196	12.00	Zone-1	Demand	28	Pattern - 1	28	176.1	71.1
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	175.2	71.2
J-276	12.00	Zone-1	Demand	27	Pattern - 1	27	176.8	71.4
J-125	10.00	Zone-1	Demand	31	Pattern - 1	31	174.9	71.5
J-323	8.00	Zone-1	Demand	63	Pattern - 1	63	173.1	71.6
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	175.2	71.6
J-119	10.00	Zone-1	Demand	31	Pattern - 1	31	175.8	71.9
J-767	11.00	Zone-1	Demand	18	Pattern - 1	18	177.3	72.1
J-832	9.00	Zone-1	Demand	18	Pattern - 1	18	175.3	72.1
J-620	10.00	Zone-1	Demand	18	Pattern - 1	18	176.6	72.2
J-754	10.00	Zone-1	Demand	97	Pattern - 1	97	176.8	72.3
J-277	10.00	Zone-1	Demand	27	Pattern - 1	27	177.7	72.7
J-773	10.00	Zone-1	Demand	23	Pattern - 1	23	177.8	72.8

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-4	0.00	Zone-1	Demand	22	Fixed	22	168.4	73.0
J-855	8.00	Zone-1	Demand	18	Pattern - 1	18	176.4	73.0
J-805	9.00	Zone-1	Demand	33	Pattern - 1	33	177.6	73.1
J-807	9.00	Zone-1	Demand	18	Pattern - 1	18	177.6	73.1
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	177.8	73.2
J-780	10.00	Zone-1	Demand	39	Pattern - 1	39	179.2	73.4
J-795	6.50	Zone-1	Demand	18	Pattern - 1	18	176.4	73.6
J-261	10.00	Zone-1	Demand	32	Pattern - 1	32	180.4	73.9
J-753	9.00	Zone-1	Demand	11	Pattern - 1	11	179.8	74.0
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	178.8	74.0
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	181.0	74.1
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	181.0	74.2
J-731	8.00	Zone-1	Demand	12	Pattern - 1	12	179.2	74.2
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	178.7	74.9
J-752	7.00	Zone-1	Demand	12	Pattern - 1	12	179.8	74.9
J-785	6.00	Zone-1	Demand	11	Pattern - 1	11	180.4	75.6
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	313.0	131.4
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	318.9	133.9
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

8.3.3:
PHD-Pipe Report

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-437	174.9	175.2	0.3	0.6
P-2	980	12	Ductile Iro	120	false	0.00	Open	714	174.9	173.3	1.5	1.6
P-3	1,500	12	Cast iron	78	false	0.00	Open	359	173.3	171.9	1.5	1.0
P-4	1,440	8	Cast iron	120	false	0.00	Open	-323	171.4	175.2	3.8	2.6
P-5	533	8	Ductile Iro	120	false	0.00	Open	-323	175.2	176.6	1.4	2.6
P-6	290	8	Ductile Iro	120	false	0.00	Open	-169	176.6	176.8	0.2	0.8
P-7	800	10	Ductile Iro	113	false	0.00	Open	-369	175.8	176.8	1.0	1.3
P-8	400	8	Ductile Iro	120	false	0.00	Open	31	175.8	175.8	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	308	175.8	174.9	0.9	0.8
P-10	930	8	Ductile Iro	120	false	0.00	Open	296	173.3	171.3	2.1	2.2
P-11	555	8	Ductile Iro	120	false	0.00	Open	91	171.3	171.1	0.1	0.2
P-12	450	8	Ductile Iro	120	false	0.00	Open	115	171.3	171.1	0.2	0.4
P-13	275	6	Ductile Iro	106	false	0.00	Open	35	171.1	171.0	0.1	0.2
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-170	162.7	168.0	5.3	4.1
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	-22	168.0	171.1	3.1	2.6
P-16	555	12	Ductile Iro	120	false	0.00	Open	359	171.9	171.6	0.2	0.4
P-18	800	8	Ductile Iro	120	false	0.00	Open	-92	171.4	171.6	0.2	0.3
P-19	620	6	Ductile Iro	106	false	0.00	Open	-207	168.0	171.6	3.6	5.9
P-20	650	8	Ductile Iro	120	false	0.00	Open	416	171.4	168.7	2.7	4.2
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	643	168.7	164.8	3.9	3.2
P-22	400	8	Ductile Iro	120	false	0.00	Open	340	164.8	163.6	1.2	2.9
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	-389	163.6	168.6	5.0	3.7
P-24	620	8	Ductile Iro	120	false	0.00	Open	518	168.6	164.7	3.9	6.3
P-25	650	8	Ductile Iro	120	false	0.00	Open	-184	163.0	163.6	0.6	0.9
P-26	600	8	Ductile Iro	120	false	0.00	Open	-337	163.0	164.7	1.7	2.8
P-27	740	8	Ductile Iro	120	false	0.00	Open	-182	168.6	169.3	0.7	0.9
P-28	380	8	Ductile Iro	120	false	0.00	Open	-235	168.7	169.3	0.6	1.4
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-437	169.3	176.1	6.9	4.6
P-30	890	10	Ductile Iro	113	false	0.00	Open	-271	176.1	176.8	0.6	0.7
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-194	176.1	176.6	0.5	0.4
P-32	75	12	Ductile Iro	120	false	0.00	Open	-984	168.6	168.8	0.2	2.9
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-491	168.8	178.7	9.9	5.7
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-493	168.8	180.4	11.6	5.7
P-36	100	10	Ductile Iro	120	false	0.00	Open	-842	167.7	168.2	0.5	5.2
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	348	177.6	176.4	1.2	1.0
P-38	900	8	Ductile Iro	120	false	0.00	Open	214	176.4	175.3	1.1	1.2
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	175.2	175.2	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	242	167.7	167.7	0.1	0.2
P-41	980	8	Ductile Iro	120	false	0.00	Open	-183	167.5	168.4	0.9	0.9
P-42	222	8	Ductile Iro	120	false	0.00	Open	10	168.4	168.4	0.0	0.0
P-43	620	10	Ductile Iro	120	false	0.00	Open	-228	168.4	168.6	0.3	0.5
P-44	610	10	Ductile Iro	99	false	0.00	Open	-419	169.6	170.9	1.2	2.0
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	743	170.9	168.2	2.6	1.7
P-46	520	12	Ductile Iro	120	false	0.00	Open	-1,225	170.9	173.1	2.2	4.3
P-47	666	12	Ductile Iro	120	false	0.00	Open	-1,401	173.1	176.8	3.7	5.5
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-168	176.8	177.3	0.6	0.3
P-49	220	8	Ductile Iro	120	false	0.00	Open	-366	176.6	177.3	0.7	3.3
P-50	200	10	Ductile Iro	113	false	0.00	Open	-552	177.3	177.8	0.5	2.7
P-51	220	10	Ductile Iro	113	false	0.00	Open	174	177.8	177.8	0.1	0.3
P-52	20	8	Ductile Iro	50	false	0.00	Open	791	320.0	318.6	1.4	69.4
P-53	5	10	Ductile Iro	113	false	0.00	Open	965	177.8	177.7	0.0	7.5
P-54	333	10	Ductile Iro	113	false	0.00	Open	565	177.7	176.8	0.9	2.8
P-55	100	10	Ductile Iro	113	false	0.00	Open	373	177.7	177.6	0.1	1.3

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	437	175.3	175.2	0.2	0.6
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-242	175.3	176.4	1.0	0.5
P-58	555	10	Ductile Iro	120	false	0.00	Open	-116	176.4	176.4	0.1	0.1
P-59	580	10	Ductile Iro	50	false	0.00	Open	7	177.6	177.6	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-145	176.4	177.6	1.2	1.0
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-171	177.6	179.2	1.6	1.4
P-62	730	12	Ductile Iro	120	false	0.00	Open	102	179.2	179.2	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	749	179.2	177.8	1.4	1.7
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-285	179.2	179.8	0.5	0.3
P-65	330	12	Ductile Iro	120	false	0.00	Open	810	180.4	179.8	0.7	2.0
P-66	820	12	Ductile Iro	120	false	0.00	Open	686	180.4	179.2	1.2	1.5
P-67	5	12	Ductile Iro	120	false	0.00	Open	513	179.8	179.8	0.0	0.9
P-68	225	12	Ductile Iro	120	false	0.00	Open	-1,398	179.8	181.0	1.2	5.5
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	181.0	318.9	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	299	178.8	178.7	0.1	11.4
P-71	330	8	Ductile Iro	50	false	0.00	Open	-192	178.7	180.4	1.7	5.1
P-72	10	8	Ductile Iro	50	false	0.00	Open	717	181.0	180.4	0.6	57.9
P-73	100	12	Ductile Iro	120	false	0.00	Open	1,506	181.0	180.4	0.6	6.3
P-74	5	12	Ductile Iro	120	false	0.00	Open	2,115	181.0	181.0	0.1	11.8
P-75	5	10	Ductile Iro	50	false	0.00	Open	3,621	183.0	181.0	2.0	391.8
P-76	20	12	Ductile Iro	120	false	0.00	Open	3,621	319.5	318.9	0.6	31.9
P-77	15	10	Ductile Iro	50	false	0.00	Open	-3,621	313.0	318.9	5.9	391.8
P-78	100	12	Ductile Iro	120	false	0.00	Open	1,900	179.8	178.8	1.0	9.6
P-79	290	12	Ductile Iro	120	false	0.00	Open	1,601	178.8	176.8	2.0	7.0
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	131	164.7	164.1	0.6	0.5
P-81	600	8	Ductile Iro	120	false	0.00	Open	-511	164.1	167.7	3.7	6.1
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	124	164.1	163.5	0.6	0.4
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	-392	163.5	167.5	4.0	3.7
P-84	550	12	Ductile Iro	120	false	0.00	Open	68	167.5	167.5	0.0	0.0
P-85	15	6	Ductile Iro	50	false	0.00	Open	791	182.0	177.8	4.2	282.0
P-86	600	8	Ductile Iro	120	false	0.00	Open	478	163.5	160.2	3.2	5.4
P-87	620	8	Ductile Iro	120	false	0.00	Open	455	160.2	157.2	3.1	4.9
P-88	330	8	Ductile Iro	120	false	0.00	Open	433	157.2	155.7	1.5	4.5
P-89	310	8	Ductile Iro	120	false	0.00	Open	411	155.7	154.4	1.3	4.1
P-90	470	8	Ductile Iro	120	false	0.00	Open	389	154.4	152.7	1.7	3.7
P-91	180	6	Ductile Iro	120	false	0.00	Open	100	152.7	152.5	0.2	1.2
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	143	153.2	152.5	0.8	0.6
P-93	880	8	Ductile Iro	120	false	0.00	Open	167	152.5	151.8	0.7	0.8
P-94	512	8	Ductile Iro	50	false	0.00	Open	67	153.3	152.9	0.4	0.7
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	67	152.9	152.1	0.9	0.7
P-96	1	6	Ductile Iro	120	false	0.00	Open	247	152.7	152.7	0.0	6.5
P-99	1	6	Ductile Iro	120	false	0.00	Open	108	151.8	151.8	0.0	1.4
P-100	4	6	Ductile Iro	120	false	0.00	Open	26	150.7	150.7	0.0	0.1
P-101	240	6	Ductile Iro	120	false	0.00	Open	9	150.7	150.7	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	75	151.3	151.0	0.3	0.7
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	36	151.0	150.7	0.3	0.2
P-104	1	6	Ductile Iro	120	false	0.00	Open	-40	150.7	150.7	0.0	0.2
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-136	150.8	151.8	1.0	0.5
P-106	270	8	Ductile Iro	120	false	0.00	Open	22	150.8	150.8	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-92	150.8	152.5	1.7	1.0
P-108	240	12	Ductile Iro	120	false	0.00	Open	206	152.5	152.5	0.0	0.2
P-109	930	10	Ductile Iro	50	false	0.00	Open	86	152.5	152.2	0.4	0.4
P-110	670	10	Ductile Iro	50	false	0.00	Open	32	152.2	152.1	0.0	0.1

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

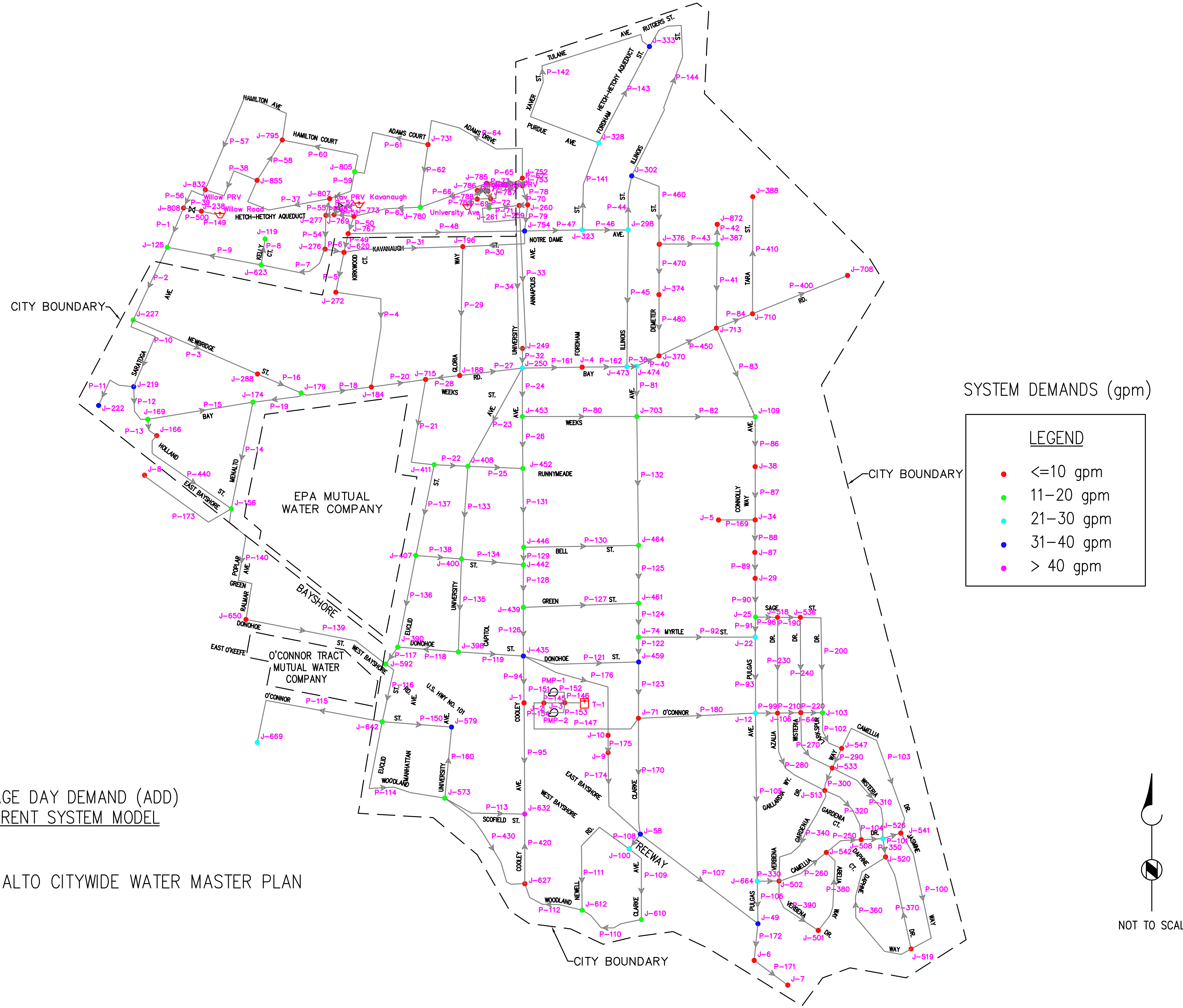
Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	-49	152.1	152.5	0.4	0.4
P-112	770	10	Ductile Iro	50	false	0.00	Open	24	152.1	152.1	0.0	0.0
P-113	900	8	Ductile Iro	50	false	0.00	Open	-25	152.1	152.2	0.1	0.1
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-74	152.2	152.4	0.3	0.2
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	67	152.4	152.3	0.1	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-300	152.4	154.0	1.6	2.3
P-117	245	8	Ductile Iro	120	false	0.00	Open	-207	154.0	154.3	0.3	1.1
P-118	620	8	Ductile Iro	120	false	0.00	Open	-84	154.3	154.4	0.1	0.2
P-119	840	8	Ductile Iro	120	false	0.00	Open	226	154.4	153.3	1.1	1.3
P-121	1,270	8	PVC	120	false	0.00	Open	118	153.3	152.8	0.5	0.4
P-122	290	8	Ductile Iro	120	false	0.00	Open	251	153.2	152.8	0.5	1.6
P-123	660	12	Ductile Iro	120	false	0.00	Open	260	152.8	152.6	0.2	0.2
P-124	380	8	Ductile Iro	120	false	0.00	Open	-444	153.2	155.0	1.8	4.7
P-125	660	8	Ductile Iro	120	false	0.00	Open	-447	155.0	158.2	3.1	4.8
P-126	580	8	Ductile Iro	120	false	0.00	Open	-359	153.3	155.1	1.8	3.2
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	46	155.1	155.0	0.1	0.1
P-128	530	8	Ductile Iro	120	false	0.00	Open	-454	155.1	157.7	2.6	4.9
P-129	130	8	Ductile Iro	120	false	0.00	Open	-395	157.7	158.2	0.5	3.8
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	28	158.2	158.2	0.0	0.0
P-131	910	8	Ductile Iro	120	false	0.00	Open	-472	158.2	163.0	4.8	5.3
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	469	164.1	158.2	5.9	5.2
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	485	163.6	157.8	5.8	5.6
P-134	310	8	Ductile Iro	120	false	0.00	Open	109	157.8	157.7	0.1	0.3
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	360	157.8	154.4	3.4	3.2
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-172	154.3	157.8	3.6	3.3
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	-254	157.8	164.8	6.9	6.8
P-138	470	8	Ductile Iro	120	false	0.00	Open	32	157.8	157.8	0.0	0.0
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	-146	154.0	158.0	4.0	2.4
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	-146	158.0	162.7	4.8	3.1
P-141	980	6	Ductile Iro	78	false	0.00	Open	113	173.1	169.8	3.3	3.4
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	20	169.8	169.4	0.4	0.1
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-30	169.4	169.8	0.4	0.3
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	-44	169.4	169.6	0.2	0.1
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	59.9	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	59.9	152.6	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	112	152.4	152.1	0.3	0.4
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	59.9	59.9	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	59.9	59.9	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	6	152.2	152.1	0.0	0.0
P-161	686	10	Ductile Iro	120	false	0.00	Open	184	168.6	168.4	0.2	0.3
P-162	514	10	Ductile Iro	120	false	0.00	Open	162	168.4	168.2	0.1	0.2
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	157.2	157.2	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	-114	152.5	152.6	0.1	0.1
P-171	362	8	PVC	120	false	0.00	Open	-23	150.7	150.7	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-23	150.7	150.8	0.1	0.2
P-173	1,035	6	PVC	99	false	0.00	Open	0	162.7	162.7	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-291	152.5	153.0	0.5	0.3
P-175	5	12	PVC	120	false	0.00	Open	-291	153.0	153.0	0.0	0.3
P-176	838	12	PVC	120	false	0.00	Open	-291	153.0	153.3	0.2	0.3

Scenario: Peak Hour-Calibrated-Calculated FF
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	147	152.6	151.8	0.8	0.6
P-190	275	6	Ductile Iro	120	false	0.00	Open	145	152.7	152.0	0.7	2.4
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-64	151.3	152.0	0.7	0.5
P-210	275	6	Ductile Iro	120	false	0.00	Open	95	151.8	151.5	0.3	1.1
P-220	275	6	Ductile Iro	120	false	0.00	Open	-69	151.3	151.5	0.2	0.6
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	83	152.7	151.8	0.9	0.9
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	62	152.0	151.5	0.5	0.5
P-250	440	6	Ductile Iro	120	false	0.00	Open	-9	150.7	150.7	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-24	150.7	150.8	0.1	0.1
P-270	880	6	Ductile Iro	120	false	0.00	Open	69	151.5	151.0	0.5	0.6
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	77	151.8	150.9	0.9	0.7
P-290	330	6	Ductile Iro	120	false	0.00	Open	20	151.0	151.0	0.0	0.1
P-300	330	6	Ductile Iro	120	false	0.00	Open	25	151.0	150.9	0.0	0.1
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	44	151.0	150.7	0.3	0.3
P-320	750	6	Ductile Iro	120	false	0.00	Open	51	150.9	150.7	0.3	0.3
P-330	275	6	Ductile Iro	120	false	0.00	Open	34	150.8	150.8	0.0	0.2
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	32	150.9	150.8	0.2	0.1
P-350	220	6	Ductile Iro	120	false	0.00	Open	13	150.7	150.7	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-3	150.7	150.7	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-3	150.7	150.7	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-4	150.7	150.7	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	23	150.8	150.7	0.1	0.1
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-18	167.4	167.5	0.0	0.0
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-23	167.1	167.5	0.4	0.2
P-420	880	8	Cast iron	120	false	0.00	Open	-31	152.1	152.1	0.0	0.0
P-430	1,210	4	Cast iron	120	false	0.00	Open	7	152.2	152.1	0.1	0.1
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	-35	162.7	171.0	8.3	6.3
P-450	682	12	Ductile Iro	120	false	0.00	Open	-299	167.5	167.7	0.2	0.3
P-460	990	10	Ductile Iro	99	false	0.00	Open	285	169.6	168.6	1.0	1.0
P-470	330	6	Ductile Iro	85	false	0.00	Open	57	168.6	168.4	0.3	0.8
P-480	880	6	Ductile Iro	85	false	0.00	Open	-57	167.7	168.4	0.7	0.8
P-490	1	10	Ductile Iro	50	false	0.00	Open	3,621	313.0	312.6	0.4	391.8
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

Appendix 9:
WaterCAD Exhibits for Current System

9.1.1:
ADD-System Demands



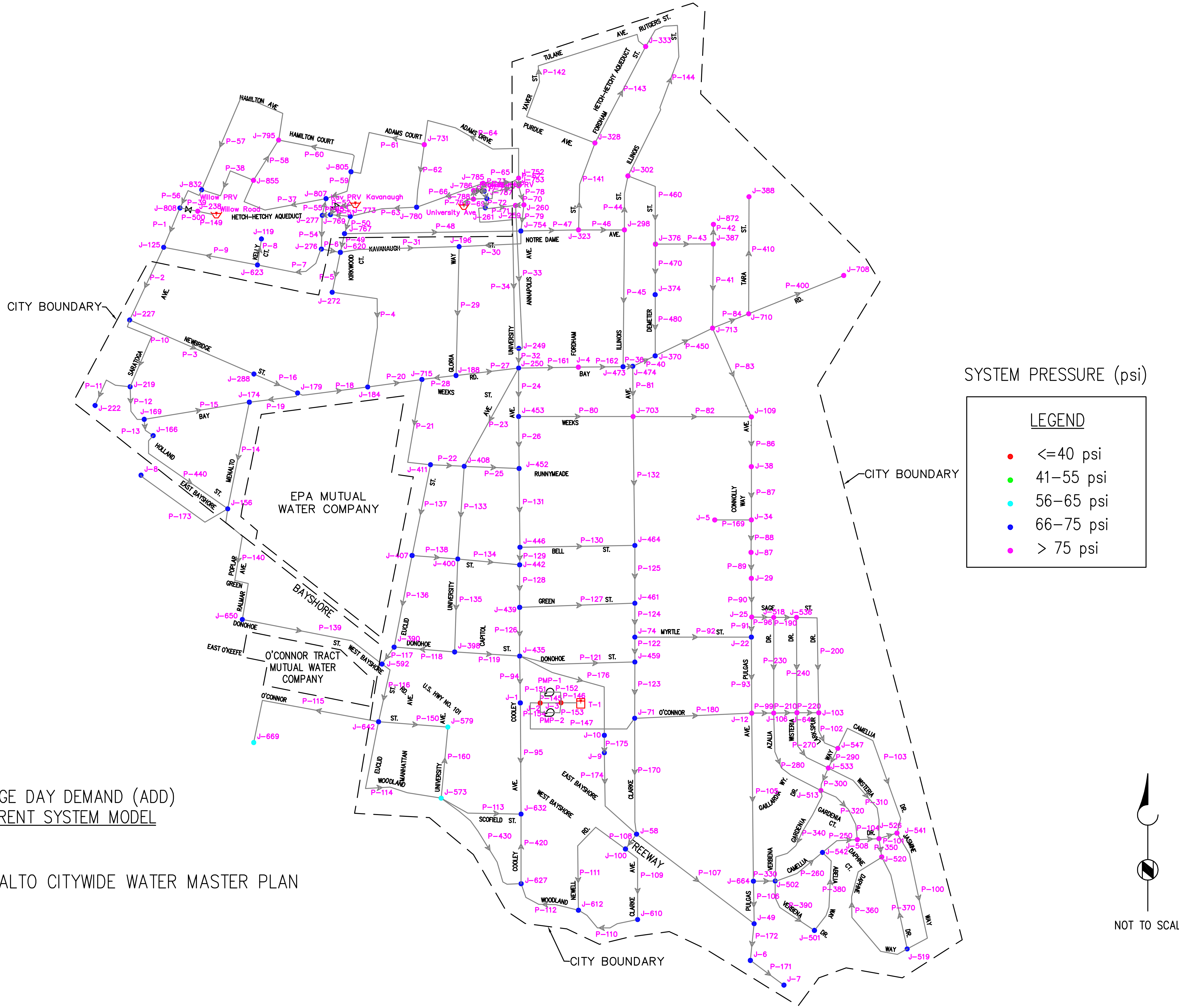
AVERAGE DAY DEMAND (ADD)

CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.1.2:
ADD-System Pressure



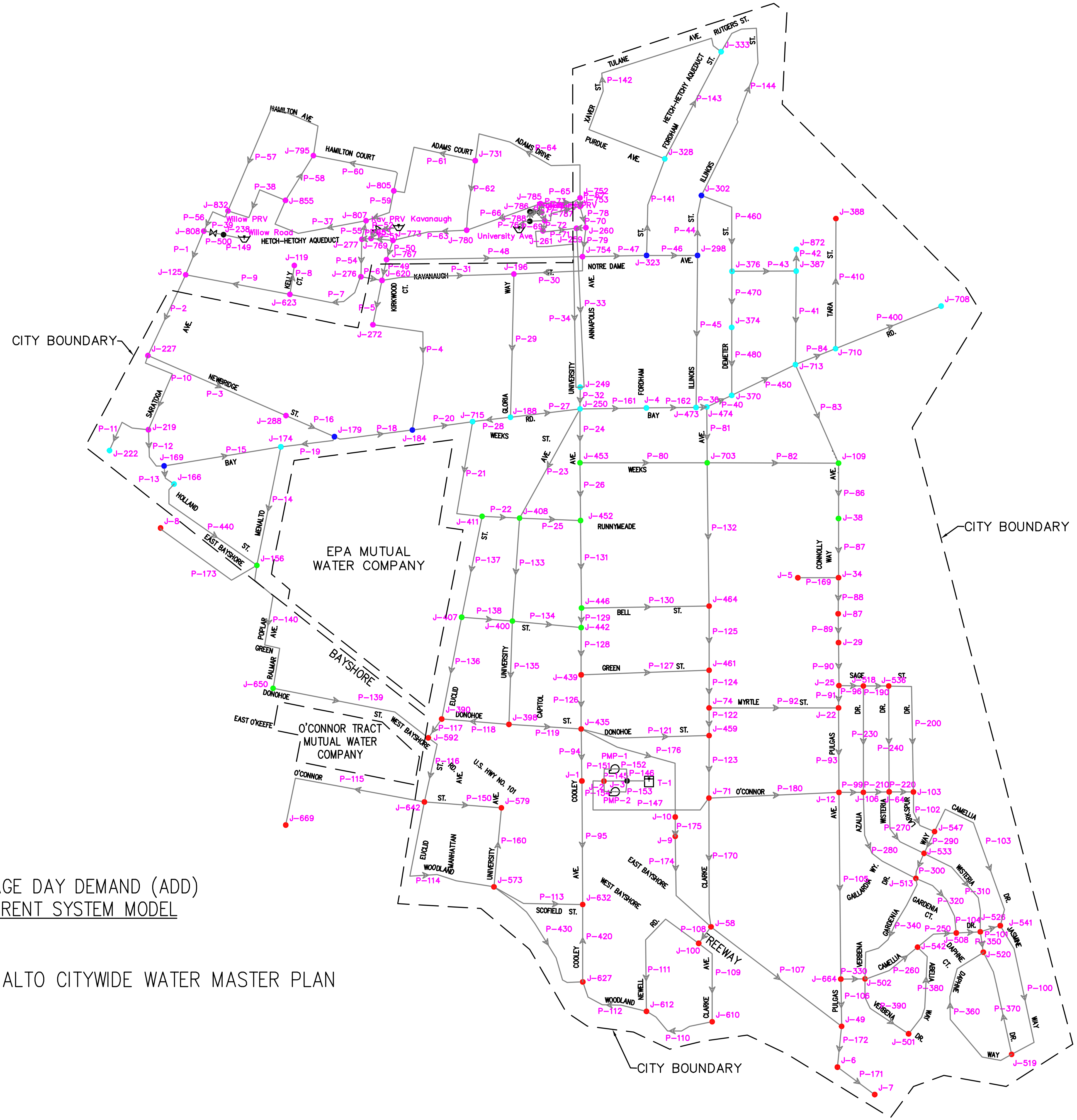
AVERAGE DAY DEMAND (ADD)

CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.1.3:
ADD-Available Fire Flow



AVAILABLE FIRE FLOW (gpm)

LEGEND

- <=1,000 gpm
- 1,001–1,500 gpm
- 1,501–2,000 gpm
- 2,001–2,500 gpm
- > 2,500 gpm

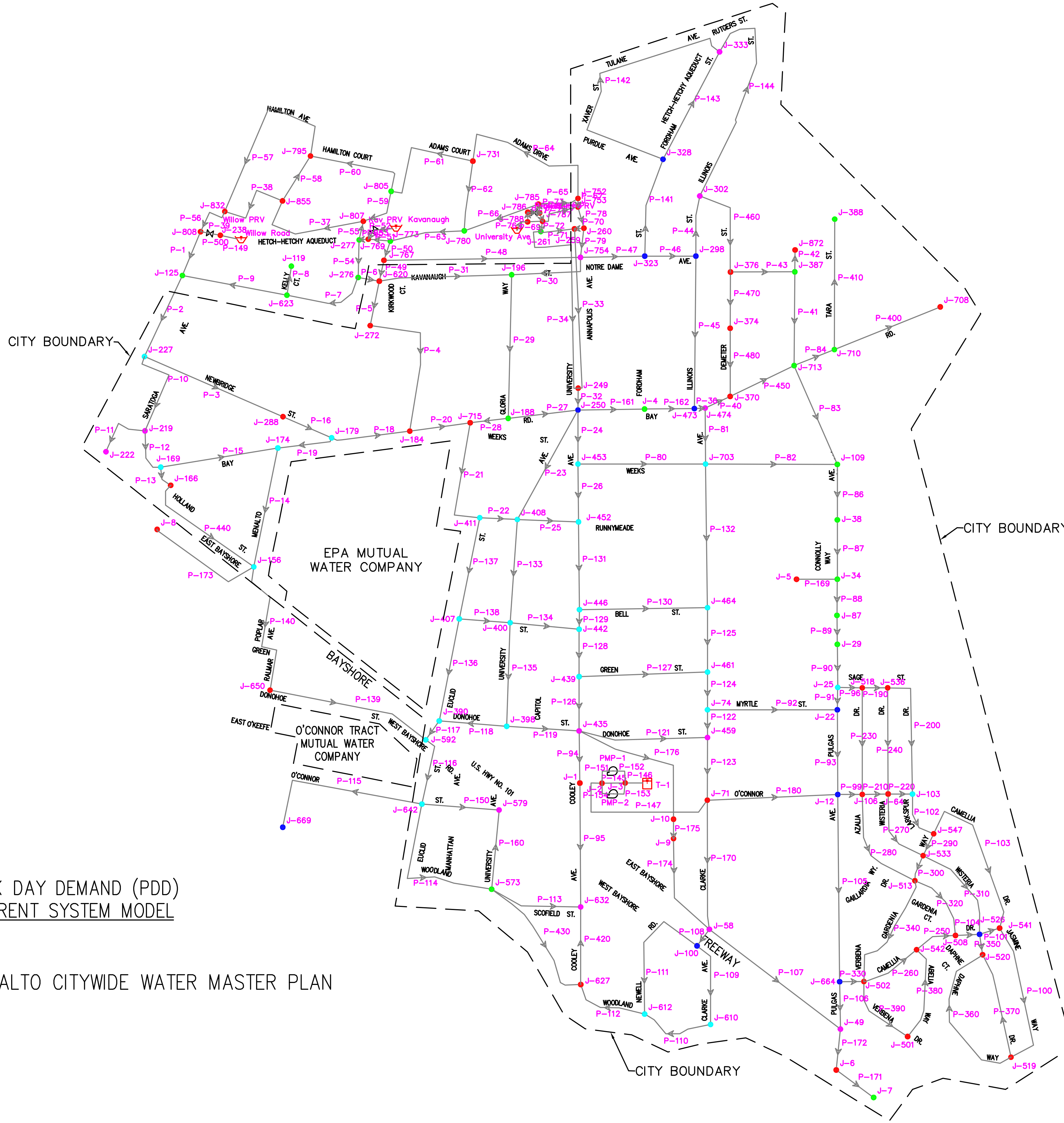
NOT TO SCALE

AVERAGE DAY DEMAND (ADD)
CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.2.1:
PDD-System Demands



SYSTEM DEMANDS (gpm)

LEGEND

- <=10 gpm
- 11-20 gpm
- 21-30 gpm
- 31-40 gpm
- > 40 gpm

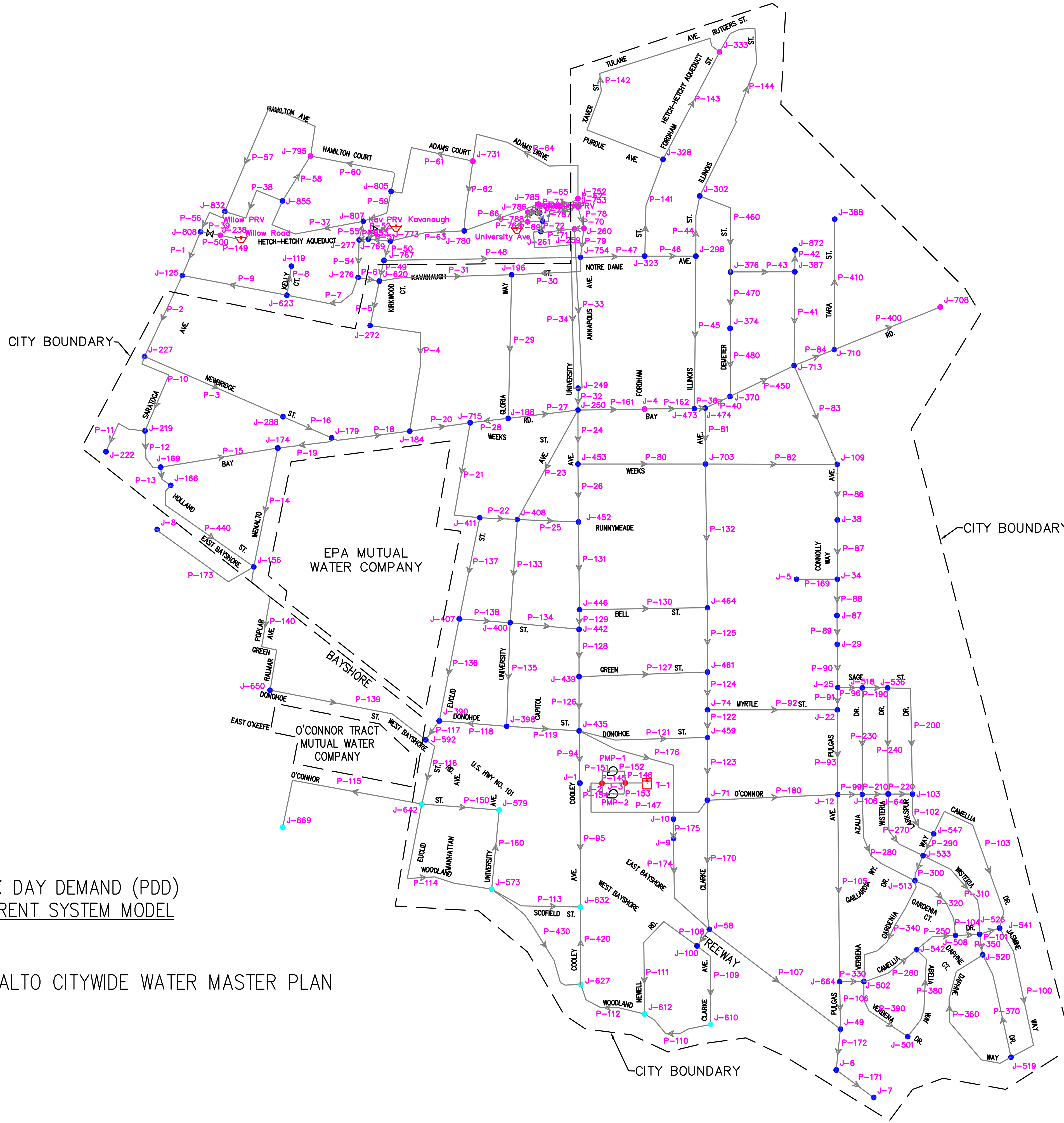
NOT TO SCALE

PEAK DAY DEMAND (PDD)
CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.2.2:
PDD-System Pressures



SYSTEM PRESSURE (psi)

LEGEND

- <=40 psi
- 41–55 psi
- 56–65 psi
- 66–75 psi
- > 75 psi

NOT TO SCALE

PEAK DAY DEMAND (PDD)
CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.2.3:
PDD-Available Fire Flow

AVAILABLE FIRE FLOW (gpm)

LEGEND

- <=1,000 gpm
- 1,001–1,500 gpm
- 1,501–2,000 gpm
- 2,001–2,500 gpm
- > 2,500 gpm

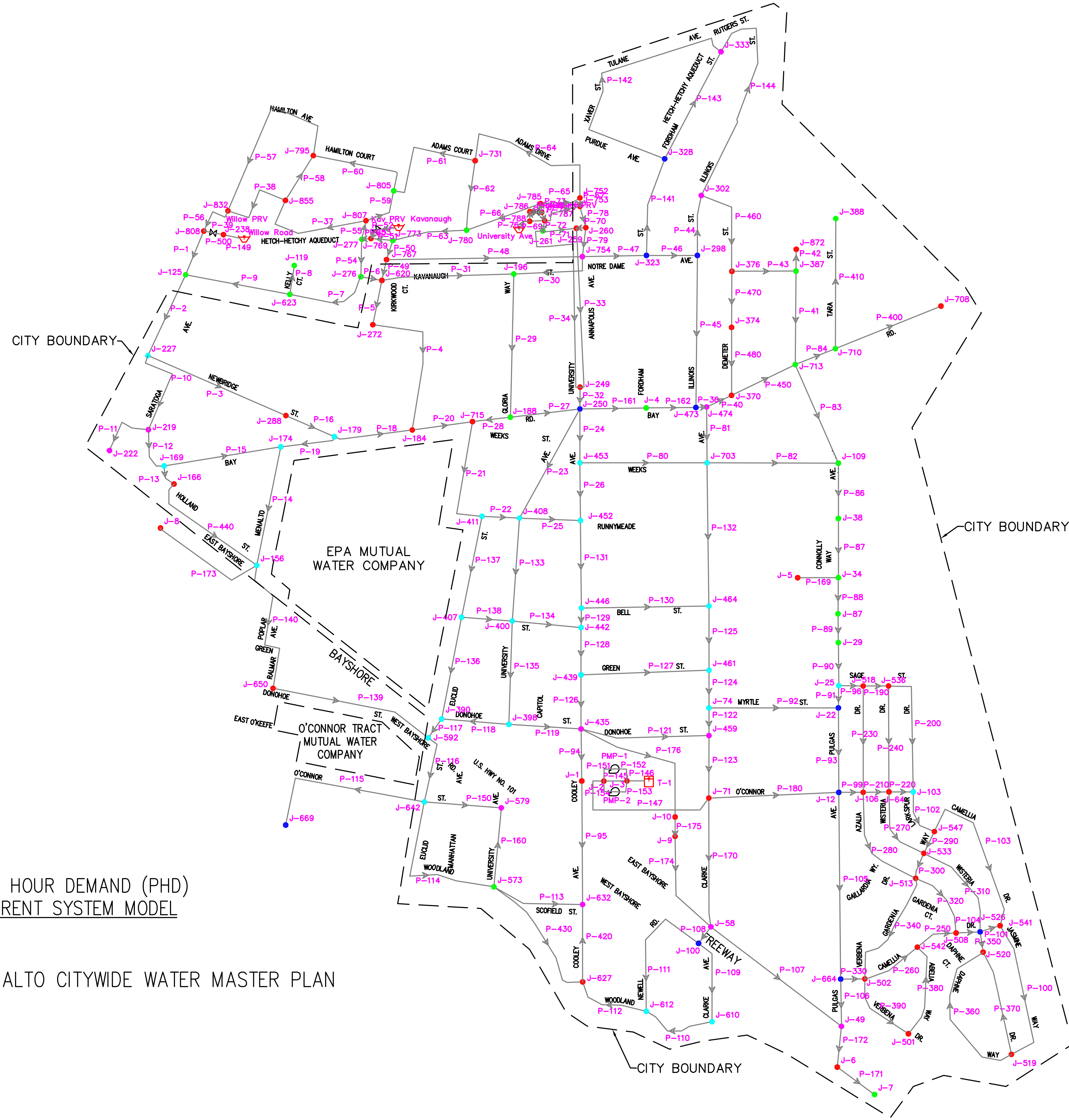
NOT TO SCALE

PEAK DAY DEMAND (PDD)
CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.3.1:
PHD-System Demands



SYSTEM DEMANDS (gpm)

LEGEND

- <=20 gpm
- 21–40 gpm
- 41–60 gpm
- 61–80 gpm
- > 80 gpm

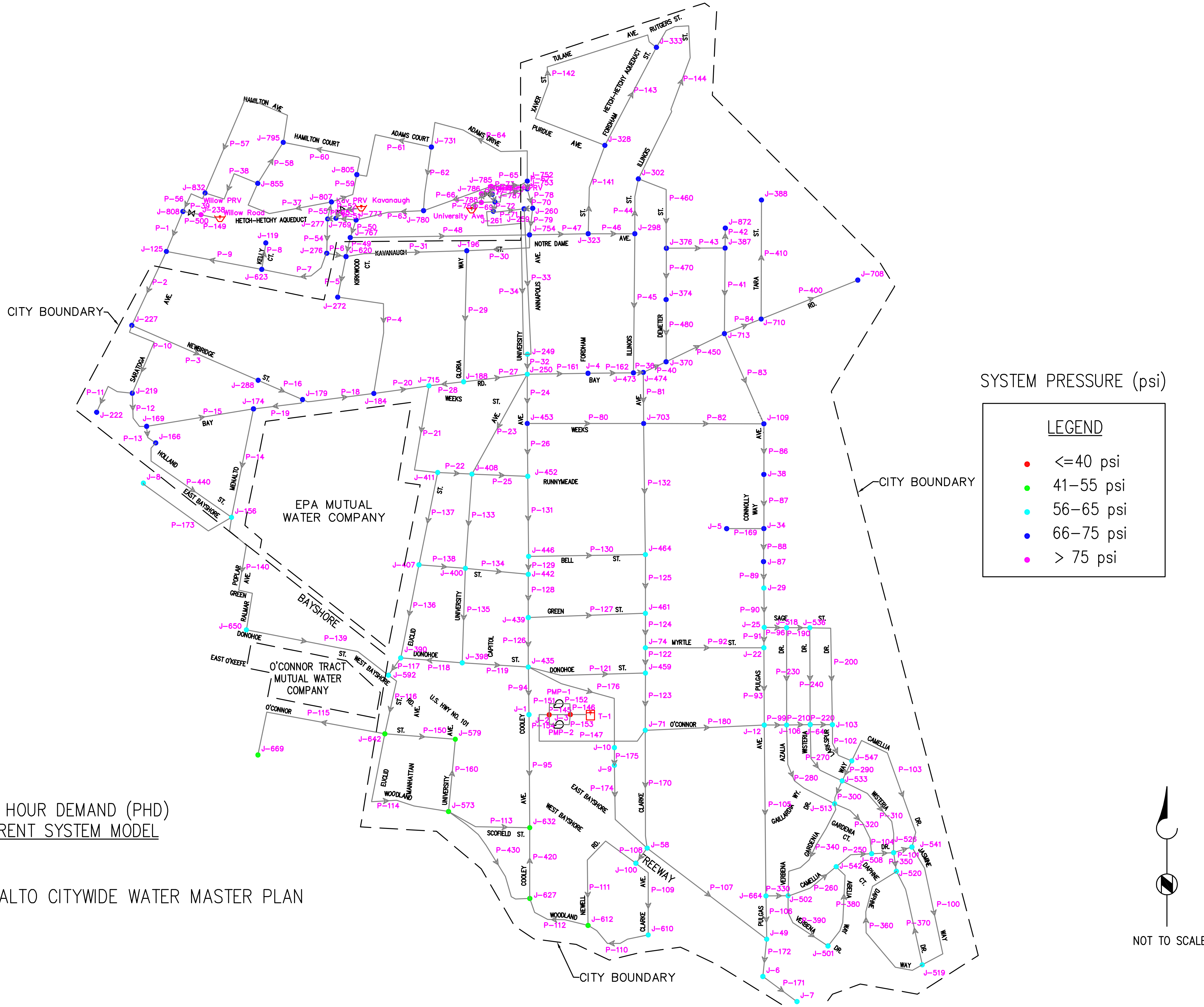
NOT TO SCALE

PEAK HOUR DEMAND (PHD)
CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.3.2:
PHD-System Pressures



PEAK HOUR DEMAND (PHD)
CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

9.3.3:
PHD-Available Fire Flow

AVAILABLE FIRE FLOW (gpm)

LEGEND

- <=1,000 gpm
- 1,001–1,500 gpm
- 1,501–2,000 gpm
- 2,001–2,500 gpm
- > 2,500 gpm

NOT TO SCALE

PEAK HOUR DEMAND (PHD)

CURRENT SYSTEM MODEL

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

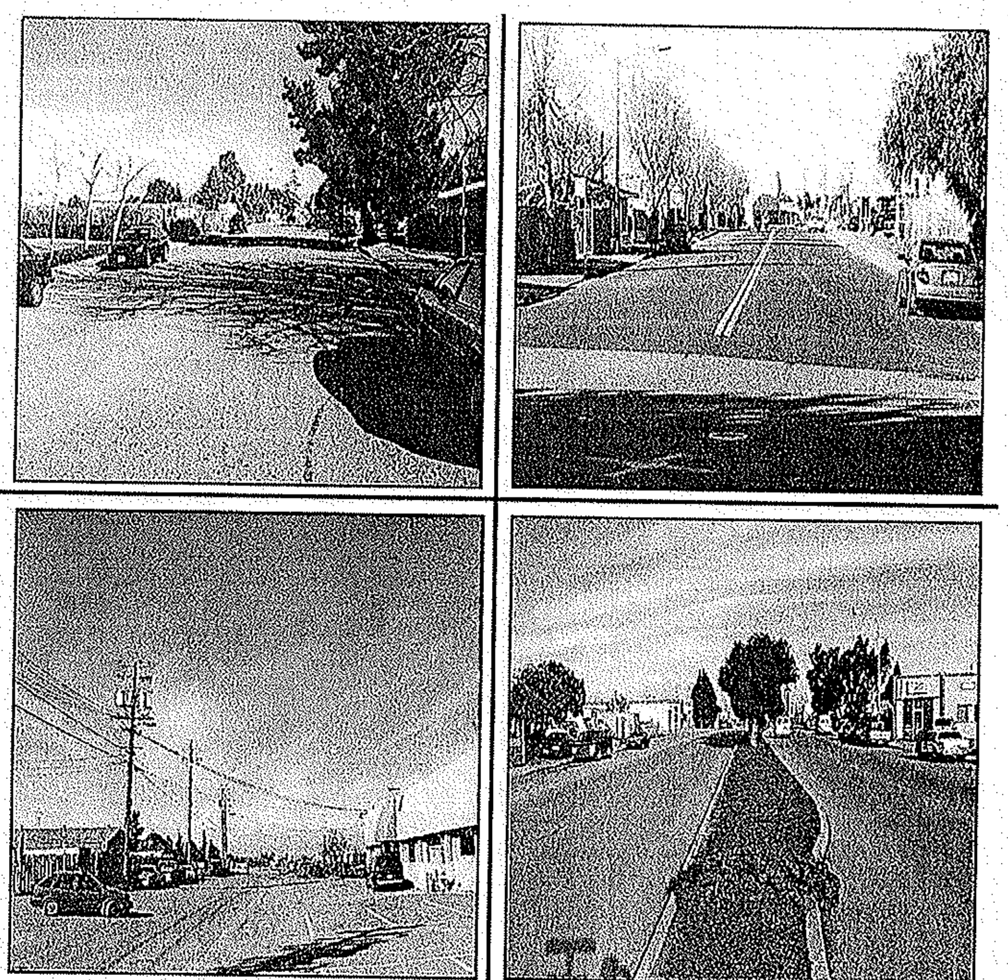
Appendix 10:
Future RBD Demands

CITY OF EAST PALO ALTO

RAVENSWOOD BUSINESS DISTRICT

Construction Cost Estimates for Infrastructure

October 31, 2008



Exp. 6/30/2009
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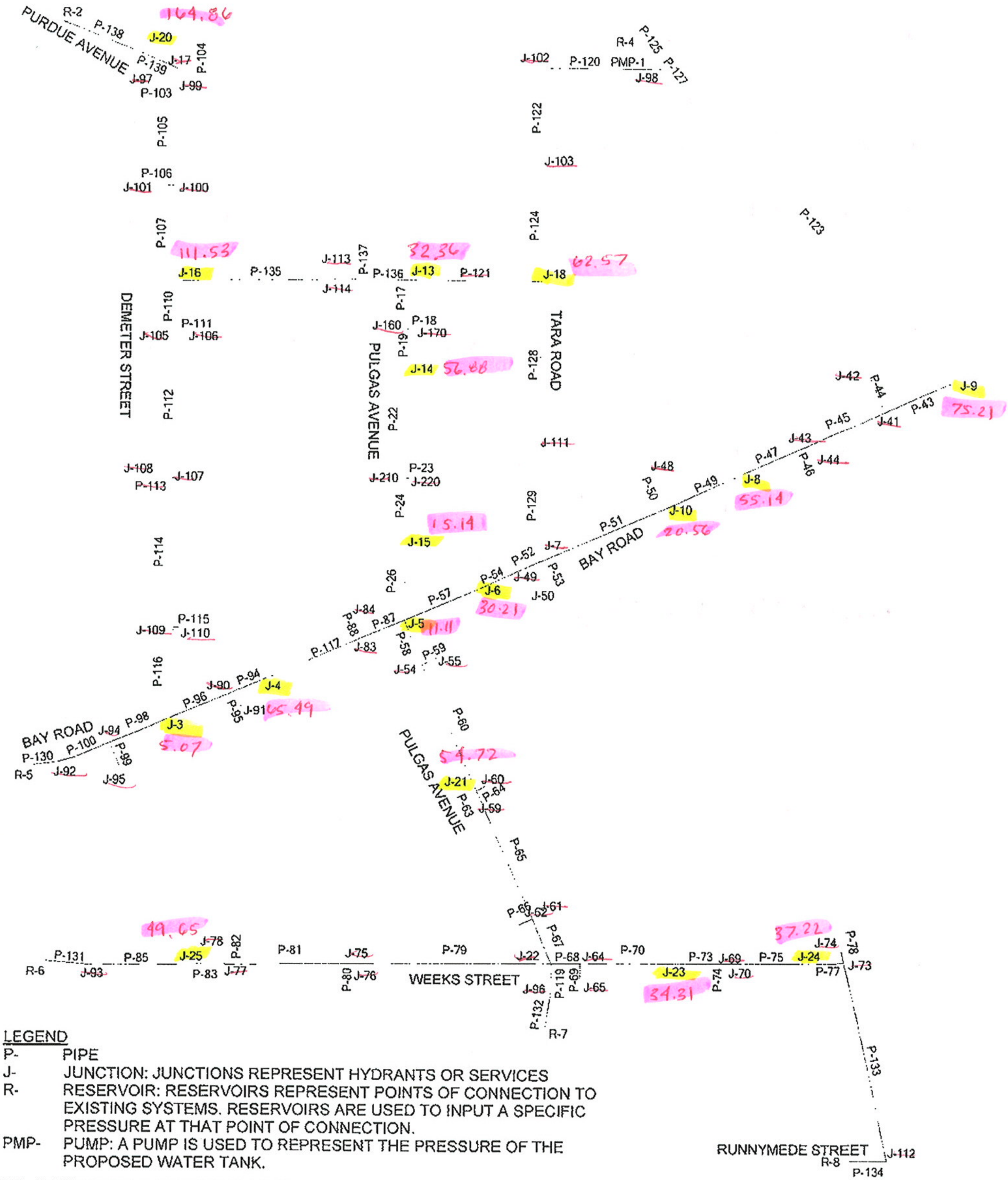
Scenario: AVERAGE DAILY DEMAND



LEGEND

P-	PIPE
J-	JUNCTION: JUNCTIONS REPRESENT HYDRANTS OR SERVICES
R-	RESERVOIR: RESERVOIRS REPRESENT POINTS OF CONNECTION TO EXISTING SYSTEMS. RESERVOIRS ARE USED TO INPUT A SPECIFIC PRESSURE AT THAT POINT OF CONNECTION.
PMP-	PUMP: A PUMP IS USED TO REPRESENT THE PRESSURE OF THE PROPOSED WATER TANK.

Title: RAVENSWOOD BUSINESS DISTRICT
p:\...\october 2008\water\10-10-08-w-bay-input.wcd
10/30/08 11:19:31 AM© Bentley Systems, Inc. Haestad Methods Solution Center Watertown, CT 06795 USA +1-203-755-1666

Project Engineer: Ryan O'Kane
WaterCAD v7.0 [07.00.061.00]

Scenario: AVERAGE DAILY DEMAND
Steady State Analysis
Junction Report

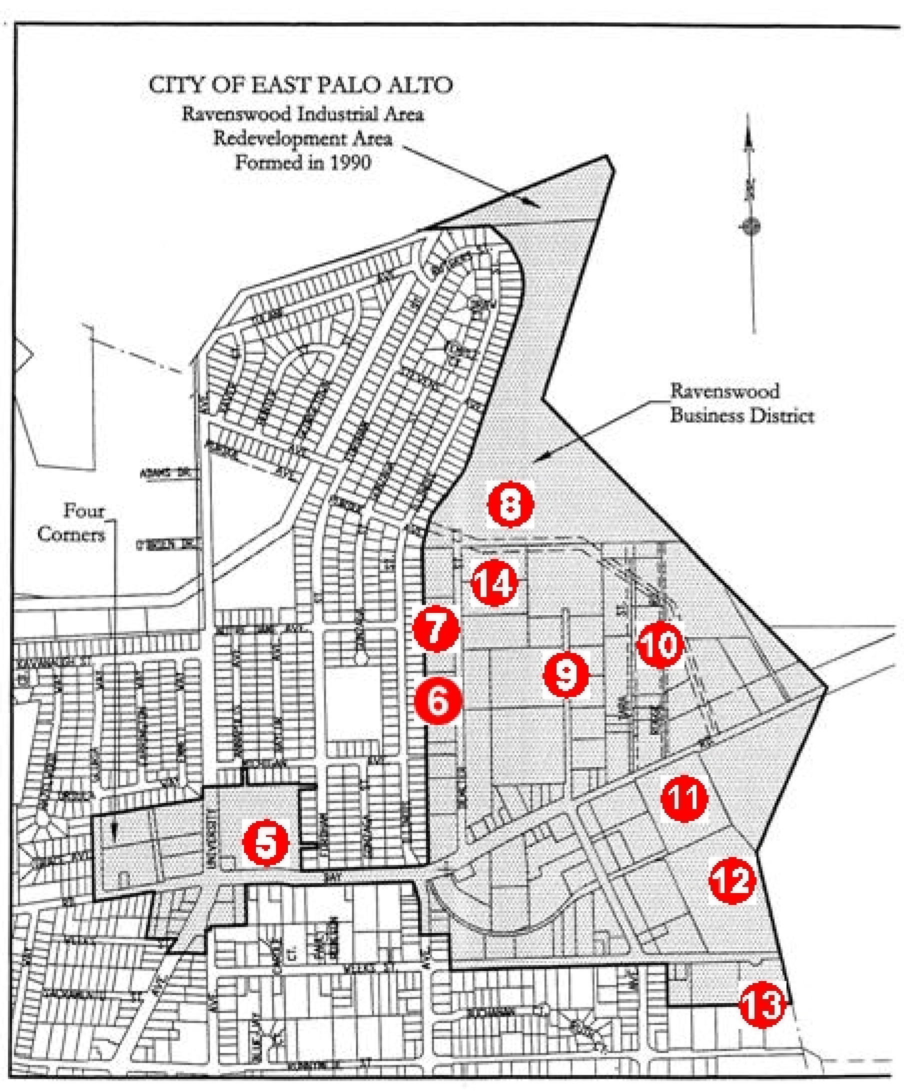
Label	Elevation (ft)	Zone	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	(gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Residual Pressure (psi)
J-3	12.10	Zone	Demand	7,300	Fixed	7,300	5.07	166	67	25
J-4	10.90	Zone	Demand	94,300	Fixed	94,300	65.49	167	68	25
J-5	8.70	Zone	Demand	16,000	Fixed	16,000	11.11	169	69	25
J-6	8.30	Zone	Demand	43,500	Fixed	43,500	30.21	169	70	25
J-7	8.00	Zone	Demand	0	Fixed	0		169	70	25
J-8	8.00	Zone	Demand	79,400	Fixed	79,400	55.14	169	70	25
J-9	8.00	Zone	Demand	108,300	Fixed	108,300	75.21	169	70	25
J-10	8.00	Zone	Demand	29,600	Fixed	29,600	20.56	169	70	25
J-13	9.60	Zone	Demand	46,600	Fixed	46,600	32.36	170	69	25
J-14	8.00	Zone	Demand	81,900	Fixed	81,900	56.88	169	70	25
J-15	8.80	Zone	Demand	21,800	Fixed	21,800	15.14	169	69	25
J-16	8.40	Zone	Demand	160,600	Fixed	160,600	111.53	171	71	25
J-17	8.00	Zone	Demand	0	Fixed	0		180	74	25
J-18	9.00	Zone	Demand	90,100	Fixed	90,100	62.57	169	69	25
J-20	8.00	Zone	Demand	237,400	Fixed	237,400	164.86	181	75	25
J-21	10.00	Zone	Demand	78,800	Fixed	78,800	54.72	170	69	25
J-22	8.70	Zone	Demand	0	Fixed	0		170	70	25
J-23	5.00	Zone	Demand	49,400	Fixed	49,400	34.31	170	71	25
J-24	5.00	Zone	Demand	53,600	Fixed	53,600	37.22	170	71	25
J-25	13.20	Zone	Demand	71,500	Fixed	71,500	49.65	177	71	25
J-41	8.00	Zone	Demand	0	Fixed	0		169	70	25
J-42	11.00	Zone	Demand	0	Fixed	0		169	68	25
J-43	8.00	Zone	Demand	0	Fixed	0		169	70	25
J-44	11.00	Zone	Demand	0	Fixed	0		169	68	25
J-48	11.00	Zone	Demand	0	Fixed	0		169	68	25
J-49	8.00	Zone	Demand	0	Fixed	0		169	68	25
J-50	11.80	Zone	Demand	0	Fixed	0		169	70	25
J-54	9.40	Zone	Demand	0	Fixed	0		169	68	25
J-55	11.90	Zone	Demand	0	Fixed	0		169	69	25
J-59	10.00	Zone	Demand	0	Fixed	0		169	68	25
J-60	13.00	Zone	Demand	0	Fixed	0		170	69	25
J-61	8.80	Zone	Demand	0	Fixed	0		170	68	25
J-62	11.90	Zone	Demand	0	Fixed	0		170	70	25
J-64	8.00	Zone	Demand	0	Fixed	0		170	68	25
J-65	11.20	Zone	Demand	0	Fixed	0		170	70	25
J-69	5.00	Zone	Demand	0	Fixed	0		170	69	25
J-70	11.50	Zone	Demand	0	Fixed	0		170	71	25
J-73	5.00	Zone	Demand	0	Fixed	0		170	69	25
J-74	11.60	Zone	Demand	0	Fixed	0		170	71	25
J-75	9.60	Zone	Demand	0	Fixed	0		170	69	25
J-76	12.70	Zone	Demand	0	Fixed	0		174	71	25
J-77	13.60	Zone	Demand	0	Fixed	0		174	70	25
J-78	15.50	Zone	Demand	0	Fixed	0		176	71	25
J-83	9.20	Zone	Demand	0	Fixed	0		176	70	25
J-84	12.00	Zone	Demand	0	Fixed	0		168	69	25
J-90	10.90	Zone	Demand	0	Fixed	0		168	68	25
J-91	14.00	Zone	Demand	0	Fixed	0		167	67	25
J-92	14.50	Zone	Demand	0	Fixed	0		167	66	25
J-93	14.00	Zone	Demand	0	Fixed	0		161	63	25
J-94	13.40	Zone	Demand	0	Fixed	0		179	71	25
J-95	16.00	Zone	Demand	0	Fixed	0		163	65	25
J-96	8.00	Zone	Demand	0	Fixed	0		163	64	25

Scenario: AVERAGE DAILY DEMAND
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Residual Pressure (psi)
J-97	11.50	Zone	Demand	0	Fixed	0	179	73	25
J-98	8.00	Zone	Demand	0	Fixed	0	169	70	25
J-99	8.00	Zone	Demand	0	Fixed	0	179	74	25
J-100	8.70	Zone	Demand	0	Fixed	0	175	72	25
J-101	11.20	Zone	Demand	0	Fixed	0	175	71	25
J-102	8.00	Zone	Demand	0	Fixed	0	169	70	25
J-103	8.00	Zone	Demand	0	Fixed	0	169	70	25
J-105	8.80	Zone	Demand	0	Fixed	0	171	70	25
J-106	12.30	Zone	Demand	0	Fixed	0	171	69	25
J-107	11.50	Zone	Demand	0	Fixed	0	169	68	25
J-108	14.80	Zone	Demand	0	Fixed	0	169	67	25
J-109	12.70	Zone	Demand	0	Fixed	0	167	67	25
J-110	15.80	Zone	Demand	0	Fixed	0	167	65	25
J-111	8.00	Zone	Demand	0	Fixed	0	169	70	25
J-112	12.00	Zone	Demand	0	Fixed	0	170	68	25
J-113	10.70	Zone	Demand	0	Fixed	0	170	69	25
J-114	10.70	Zone	Demand	0	Fixed	0	170	69	25
J-160	8.00	Zone	Demand	0	Fixed	0	169	70	25
J-170	11.00	Zone	Demand	0	Fixed	0	169	69	25
J-210	8.00	Zone	Demand	0	Fixed	0	169	70	25
J-220	11.00	Zone	Demand	0	Fixed	0	169	68	25

Map 8: Development / Investment Opportunities in RBD

5. Heart of the City -Bay Road & University Ave Mixed Use
6. 245 Demeter Street
7. 325 Demeter St.
8. 391 Demeter Street
9. J&R Land Incorporated
10. Tara Road Phase I
11. Site-Former Catalytica site
12. Site-9 acre site near Catalytica
13. Site -Weeks Street
14. Site - 350 Demeter Road



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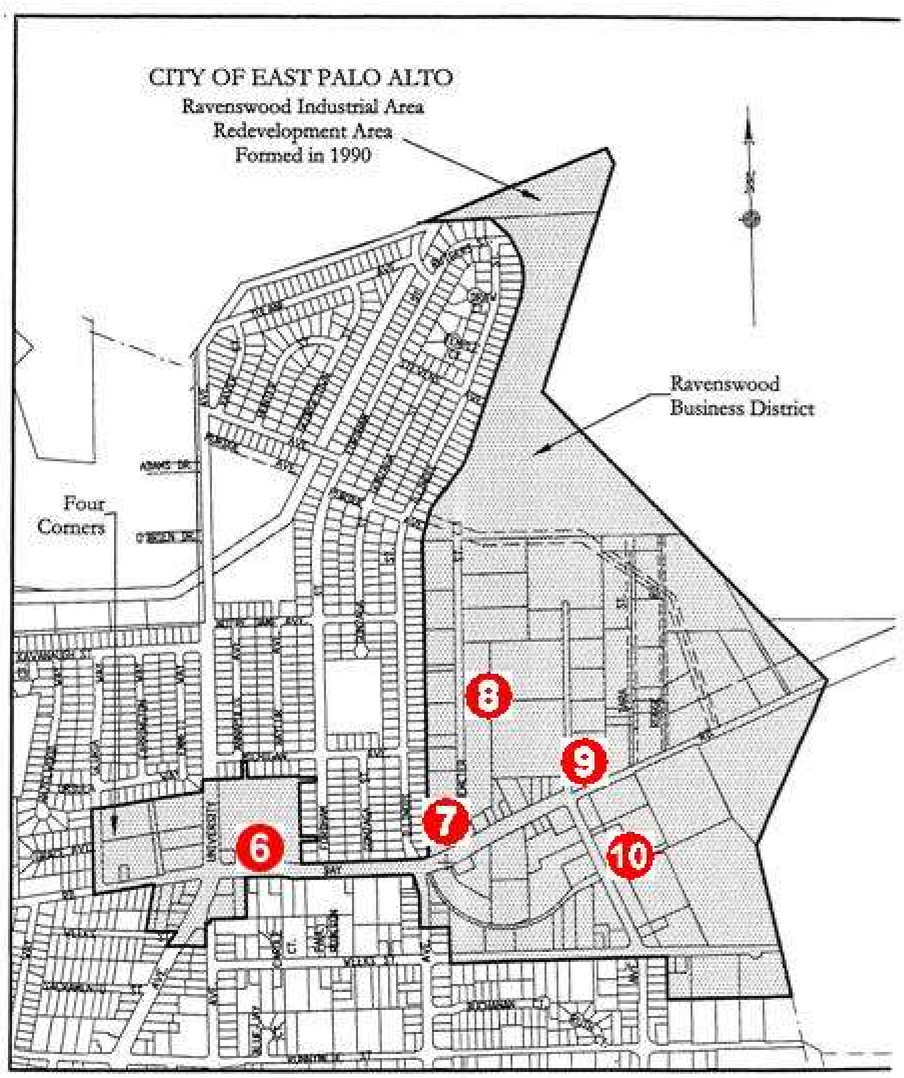
Map 6: Commercial Leasing Opportunities in RBD

6. Heart of the City -Bay Road & University Ave Mixed Use
7. 1801 Bay Road
8. 220 Demeter Street
9. 2509-2511 Pulgas Ave.
10. 2470 Pulgas Ave.



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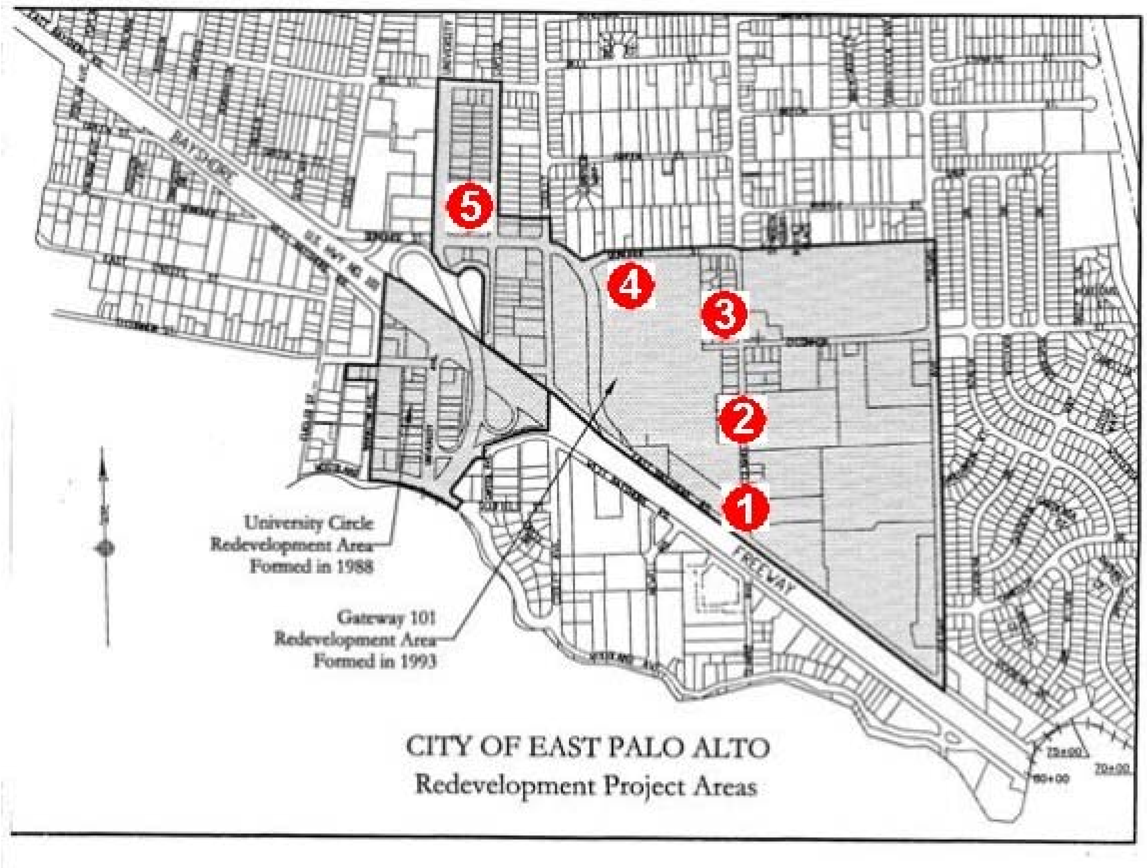

Map 4: Current Projects in the Ravenswood Project Area

6. Heart of the City -Bay Road & University Ave Mixed Use
7. J&R Land Incorporated
8. 2555 Pulgas
9. Tara Road Phase I
10. Byrd-Brock/DKB Homes
11. Olson Townhomes

Appendix 11:
Future Demands for EPA & O’Connor Tract Mutual Water Companies

From 2005 UWMP by IRM Table 11

Single-Family Residential

Year	# of accounts	AFY	gpm	AFY/account	gpm/account
2001	3344	1008	624.456	0.301435407	0.186739234
2005	3233	923	571.7985	0.28549335	0.17686313
2010	3120	1183	732.8685	0.379166667	0.23489375
2015	3024	1320	817.74	0.436507937	0.270416667
2020	2921	1539	953.4105	0.526874358	0.326398665
2025	2863	1568	971.376	0.547677262	0.339286064
2030	2578	1539	953.4105	0.596974399	0.36982564
					0.27

Multi-Family Residential

Year	# of accounts	AFY	gpm	AFY/account	gpm/account
2001	213	495	306.6525	2.323943662	1.439683099
2005	359	541	335.1495	1.506963788	0.933564067
2010	550	855	529.6725	1.554545455	0.963040909
2015	756	1170	724.815	1.547619048	0.95875
2020	973	1477	915.0015	1.517985612	0.940392086
2025	1227	1631	1010.405	1.329258354	0.82347555
2030	1553	1769	1095.896	1.139085641	0.705663554
					0.97

Year	Total AFY	Total gpm
2001	1882	1165.899
2005	1888	1169.616
2010	2633	1631.144
2015	3270	2025.765
2020	4012	2485.434
2025	4252	2634.114
2030	4392	2720.844

EPA Mutual Water Company

Single-Family Residential

1	15
2	19
3	25
4	14
5	36
6	40
7	50
8	46
9	30
10	32
11	17
12	12
13	12
14	12
15	14
16	16
17	23
18	32
19	12
20	14
21	29
22	28
23	8
24	20
25	12
	568

O'Connor Tract Mutual Water Company

Single-Family Residential

1	5
2	7
3	1
4	16
5	16
6	16
7	8
8	4
9	18
	91

Multi-Family Residential

9	14
10	15
	29

Demands

EPA Mutual Water Company

Single-Family Residential

Services	Demand per Service (gpm)	Demand (gpm)
568	0.27	154.53

Total Demand = **154.53** gpm

*Added to nodes (J-156, J-184, J-407, & J-650) 38.63 gpm @ each

O'Connor Tract Mutual Water Company

Single-Family Residential

Services	Demand per Service (gpm)	Demand (gpm)
91	0.27	24.76

Multi-Family Residential

Services	Demand per Service (gpm)	Demand (gpm)
29	0.97	28.02

Total Demand = **52.78** gpm

*Added to nodes (J-650 & J-592) 26.39 gpm @ each

5.2 Past, Current and Projected Water Deliveries by Sector

The City of East Palo Alto delivered 1,888 acre-feet of water to 3,855 customers in Fiscal Year (FY) 2004-2005. This amount is only slightly more than the city delivered in FY 2000-2001 (1,882 acre-feet to 3,825 customers), the first year after the system was taken over by the city from San Mateo County. This stagnation in deliveries appears to be due to an excessively wet water year.

Regardless of this decrease in usage, water deliveries are projected to increase in the next 25 years. Short-term projected rates of increase are derived from permits issued for residential and commercial developments as well as construction currently in progress. The basis for long-term projections of demand are the city's General Plan and future flows allowing for the Ravenswood Business District and associated areas of the city's Revitalization Plan (see Section 3.1.6).

Table 11 lists the past, current and projected water deliveries made by the City of East Palo Alto from 2001 through 2030 in 5-year increments. The resulting water use data is separated by sector into the following categories: single-family and multi-family residential usage, commercial and industrial usage, institutional and governmental usage, landscape and recreational usage, and agricultural usage.

Table 11: Past, Current and Projected Water Deliveries

Water Use Sectors	2001		2005		2010	
	Accounts	AFY	Accounts	AFY	Accounts	AFY
Single-Family Residential	3,344	1,008	3,233	923	3,120	1,183
Multi-Family Residential	213	495	359	541	550	855
Commercial	98	196	110	263	113	399
Industrial	118	96	111	89	114	106
Institutional/ Governmental	25	53	27	66	28	68
Other	27	34	15	6	19	22
Total	3,825	1,882	3,855	1,888	3,944	2,633

Water Use Sectors	2015		2020		2025		2030	
	Accs.	AFY	Accs.	AFY	Accs.	AFY	Accs.	AFY
Single-Family Residential	3,024	1,320	2,921	1,539	2,863	1,568	2,578	1,539
Multi-Family Residential	756	1,170	973	1,477	1,227	1,631	1,553	1,769
Commercial	116	487	120	638	123	677	127	699
Industrial	117	153	121	189	125	197	128	190
Institutional/ Governmental	29	114	30	136	30	145	31	164
Other	20	26	20	33	21	34	21	31
Total	4,062	3,270	4,185	4,012	4,389	4,252	4,438	4,392

EPA Mutual Water Company
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Bay Rd
Weeks St
Sacramento St
Runnymede
Oakdale Ave
Garden St
Green St
Glen Way
Lincoln St
Dumbarton Ave
Addison Ave
University Ave
Bayshore Fwy
Holland St
Haight St
Mello St
Westminster
Poplar Ave
Ralmar Ave
Oakwood Dr
E Bayshore Rd
W Bayshore Rd
101
© 2009 Tele Atlas
Imagery Date: Jul 2007
37°28'01.29" N 122°08'48.52" W elev 28 ft
Eye alt 3546 ft
Google


O'Connor Tract Mutual Water Company
1
2
3
4
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6
7
8
9
10
Poplar Ave
Ralmar Ave
Addison Ave
Oakwood Dr
Donohoe St
E Okeefe St
Oconnor St
Haight St
Bell St
Green St
Lincoln
Glen Way
Euclid Ave
E Bayshore Rd
W Bayshore Rd
Bayshore Fwy
101
Menalto Ave
Elliott Dr
Byers Dr
Manhattan Ave
Falk Ct
Oak Ct
N
© 2009 Tele Atlas
Imagery Date: Jul 2007
37°27'45.54" N 122°08'51.26" W elev 31 ft
Eye alt 2582 ft
©2009 Google

Appendix 12:
WaterCAD Calculations for Current System with RBD Demands

12.1.1:
ADD-Fire Flow Analysis report

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	false	1,000	531	1,000	531	20.0	62.5	20.0	20.0	J-2	5.6	J-3
J-2	true	false	1,000	0	1,000	0	20.0	20.6	20.0	60.6	J-669	5.6	J-3
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	false	1,500	1,084	1,507	1,092	20.0	73.7	20.0	20.0	J-2	5.6	J-3
J-5	true	false	1,000	616	1,000	616	20.0	31.5	20.0	20.0	J-2	5.6	J-3
J-6	true	false	1,000	527	1,000	527	20.0	50.2	20.0	20.0	J-2	5.6	J-3
J-7	true	false	1,000	527	1,008	535	20.0	49.1	20.0	20.0	J-2	5.6	J-3
J-8	true	false	1,000	755	1,000	755	20.0	20.0	20.0	20.1	J-2	5.6	J-3
J-9	true	false	1,000	518	1,000	518	20.0	67.4	20.0	20.0	J-2	5.6	J-3
J-10	true	false	1,000	518	1,000	518	20.0	67.4	20.0	20.0	J-2	5.6	J-3
J-12	true	false	2,500	534	2,523	557	20.0	70.5	20.0	20.0	J-2	5.6	J-3
J-22	true	false	1,000	540	1,026	566	20.0	69.9	20.0	20.0	J-2	5.6	J-3
J-25	true	false	1,000	551	1,014	565	20.0	70.4	20.0	20.0	J-2	5.6	J-3
J-29	true	false	1,000	577	1,007	584	20.0	70.1	20.0	20.0	J-2	5.6	J-3
J-34	true	false	1,000	616	1,007	623	20.0	69.9	20.0	20.0	J-2	5.6	J-3
J-38	true	false	1,000	667	1,007	674	20.0	69.9	20.0	20.0	J-2	5.6	J-3
J-49	true	false	1,000	527	1,030	558	20.0	62.9	20.0	20.0	J-2	5.6	J-3
J-58	true	false	1,000	507	1,035	542	20.0	67.0	20.0	20.0	J-2	5.6	J-3
J-64	true	false	1,000	537	1,006	543	20.0	69.5	20.0	20.0	J-2	5.6	J-3
J-71	true	false	1,000	495	1,000	495	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-74	true	false	1,000	520	1,016	537	20.0	70.1	20.0	20.0	J-2	5.6	J-3
J-87	true	false	1,000	595	1,007	602	20.0	70.0	20.0	20.0	J-2	5.6	J-3
J-100	true	false	1,000	508	1,024	531	20.0	64.8	20.0	20.0	J-2	5.6	J-3
J-103	true	false	1,000	538	1,019	557	20.0	68.9	20.0	20.0	J-2	5.6	J-3
J-106	true	false	1,000	534	1,006	540	20.0	70.5	20.0	20.0	J-2	5.6	J-3
J-109	true	false	1,000	748	1,134	882	20.0	70.4	20.0	20.0	J-2	5.6	J-3
J-119	true	true	1,000	2,561	1,010	2,571	20.0	43.8	20.0	20.0	J-2	5.6	J-3
J-125	true	true	1,000	2,424	1,010	2,434	20.0	67.8	20.0	20.0	J-2	5.6	J-3
J-156	true	false	1,000	907	1,020	927	20.0	46.3	20.0	20.0	J-2	5.6	J-3
J-166	true	true	1,000	1,525	1,000	1,525	20.0	20.0	20.0	20.1	J-2	5.6	J-3
J-169	true	true	1,000	1,682	1,020	1,702	20.0	37.2	20.0	20.0	J-2	5.6	J-3
J-174	true	true	1,000	1,146	1,020	1,166	20.0	49.9	20.0	20.0	J-2	5.6	J-3
J-179	true	false	3,000	1,468	3,020	1,488	20.0	64.5	20.0	20.0	J-2	5.6	J-3
J-184	true	true	1,000	1,371	1,000	1,371	20.0	64.2	20.0	20.0	J-2	5.6	J-3
J-188	true	true	1,000	1,206	1,007	1,213	20.0	65.0	20.0	20.0	J-2	5.6	J-3
J-196	true	true	1,000	2,100	1,009	2,109	20.0	68.0	20.0	20.0	J-2	5.6	J-3
J-219	true	true	1,000	1,704	1,030	1,734	20.0	44.0	20.0	20.0	J-2	5.6	J-3
J-222	true	true	1,000	1,704	1,030	1,734	20.0	30.7	20.0	20.0	J-2	5.6	J-3
J-227	true	true	1,000	1,827	1,020	1,846	20.0	65.8	20.0	20.0	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	true	1,000	1,131	1,000	1,131	20.0	65.7	20.0	20.0	J-2	5.6	J-3
J-250	true	true	1,000	1,122	1,025	1,148	20.0	65.7	20.0	20.0	J-2	5.6	J-3
J-259	true	true	1,000	3,063	1,000	3,063	20.0	72.0	20.0	20.0	J-2	5.6	J-3
J-260	true	true	1,000	3,342	1,000	3,342	20.0	72.1	20.0	20.0	J-2	5.6	J-3
J-261	true	true	1,000	3,839	1,011	3,849	20.0	69.2	20.0	20.0	J-2	5.6	J-3
J-272	true	true	1,000	1,876	1,000	1,876	20.0	63.7	20.0	20.0	J-2	5.6	J-3
J-276	true	true	1,000	2,664	1,009	2,673	20.0	68.0	20.0	20.0	J-2	5.6	J-3
J-277	true	true	1,000	3,023	1,009	3,032	20.0	70.1	20.0	20.0	J-2	5.6	J-3
J-288	true	true	1,000	1,504	1,000	1,504	20.0	64.7	20.0	20.0	J-2	5.6	J-3
J-298	true	true	1,000	1,236	1,021	1,257	20.0	70.9	20.0	20.0	J-2	5.6	J-3
J-302	true	true	1,000	1,135	1,195	1,330	20.0	69.0	20.0	20.0	J-2	5.6	J-3
J-323	true	true	1,000	1,502	1,021	1,523	20.0	70.6	20.0	20.0	J-2	5.6	J-3

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-328	true	true	1,000	1,298	1,021	1,319	20.0	34.6	20.0	20.0	J-2	5.6	J-3
J-333	true	true	1,000	1,231	1,032	1,263	20.0	47.8	20.0	20.0	J-2	5.6	J-3
J-370	true	false	3,500	973	3,571	1,043	20.0	69.2	20.0	20.0	J-2	5.6	J-3
J-374	true	true	1,000	1,017	1,000	1,017	20.0	59.2	20.0	20.0	J-2	5.6	J-3
J-376	true	true	1,000	1,050	1,000	1,050	20.0	68.5	20.0	20.0	J-2	5.6	J-3
J-387	true	true	1,000	1,024	1,069	1,093	20.0	68.6	20.0	20.0	J-2	5.6	J-3
J-388	true	false	1,000	446	1,071	516	20.0	20.0	20.0	20.4	J-2	5.6	J-3
J-390	true	false	1,000	577	1,016	593	20.0	63.8	20.0	20.0	J-2	5.6	J-3
J-398	true	false	1,000	567	1,016	584	20.0	64.7	20.0	20.0	J-2	5.6	J-3
J-400	true	false	2,250	654	2,266	670	20.0	66.3	20.0	20.0	J-2	5.6	J-3
J-407	true	false	1,000	654	1,016	671	20.0	65.8	20.0	20.0	J-2	5.6	J-3
J-408	true	false	1,500	837	1,520	857	20.0	67.4	20.0	20.0	J-2	5.6	J-3
J-411	true	false	1,000	878	1,016	894	20.0	67.3	20.0	20.0	J-2	5.6	J-3
J-435	true	false	1,000	526	1,036	562	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-439	true	false	1,000	566	1,016	583	20.0	67.5	20.0	20.0	J-2	5.6	J-3
J-442	true	false	1,000	645	1,016	661	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-446	true	false	1,000	659	1,016	676	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-452	true	false	1,000	790	1,016	806	20.0	67.6	20.0	20.0	J-2	5.6	J-3
J-453	true	false	1,000	879	1,016	896	20.0	67.6	20.0	20.0	J-2	5.6	J-3
J-459	true	false	1,000	503	1,036	539	20.0	69.2	20.0	20.0	J-2	5.6	J-3
J-461	true	false	1,000	556	1,016	572	20.0	69.6	20.0	20.0	J-2	5.6	J-3
J-464	true	false	1,000	628	1,016	644	20.0	69.2	20.0	20.0	J-2	5.6	J-3
J-473	true	true	1,000	1,045	1,021	1,066	20.0	67.3	20.0	20.0	J-2	5.6	J-3
J-474	true	false	1,000	988	1,030	1,018	20.0	67.7	20.0	20.0	J-2	5.6	J-3
J-501	true	false	1,000	532	1,006	538	20.0	60.4	20.0	20.0	J-2	5.6	J-3
J-502	true	false	1,000	532	1,006	538	20.0	63.7	20.0	20.0	J-2	5.6	J-3
J-508	true	false	1,000	534	1,006	540	20.0	68.5	20.0	20.0	J-2	5.6	J-3
J-513	true	false	1,000	534	1,006	540	20.0	69.1	20.0	20.0	J-2	5.6	J-3
J-518	true	false	1,000	552	1,006	558	20.0	70.4	20.0	20.0	J-2	5.6	J-3
J-519	true	false	1,000	534	1,006	540	20.0	62.3	20.0	20.0	J-2	5.6	J-3
J-520	true	false	1,000	534	1,006	540	20.0	67.6	20.0	20.0	J-2	5.6	J-3
J-526	true	false	1,000	534	1,021	555	20.0	68.5	20.0	20.0	J-2	5.6	J-3
J-533	true	false	1,000	535	1,006	541	20.0	69.1	20.0	20.0	J-2	5.6	J-3
J-536	true	false	1,000	543	1,006	550	20.0	69.4	20.0	20.0	J-2	5.6	J-3
J-541	true	false	1,000	534	1,006	540	20.0	68.0	20.0	20.0	J-2	5.6	J-3
J-542	true	false	1,000	533	1,006	539	20.0	65.9	20.0	20.0	J-2	5.6	J-3
J-547	true	false	1,000	536	1,006	542	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-573	true	false	1,000	562	1,012	574	20.0	57.9	20.0	20.0	J-2	5.6	J-3
J-579	true	false	2,500	566	2,539	606	20.0	57.1	20.0	20.0	J-2	5.6	J-3
J-592	true	false	3,500	578	3,518	595	20.0	63.4	20.0	20.0	J-2	5.6	J-3
J-610	true	false	1,000	518	1,018	536	20.0	61.1	20.0	20.0	J-2	5.6	J-3
J-612	true	false	1,000	524	1,019	543	20.0	59.9	20.0	20.0	J-2	5.6	J-3
J-620	true	true	1,000	2,424	1,006	2,430	20.0	69.6	20.0	20.0	J-2	5.6	J-3
J-623	true	true	1,000	2,561	1,010	2,571	20.0	64.1	20.0	20.0	J-2	5.6	J-3
J-627	true	false	1,000	536	1,000	536	20.0	59.8	20.0	20.0	J-2	5.6	J-3
J-632	true	false	1,000	541	1,041	581	20.0	59.5	20.0	20.0	J-2	5.6	J-3
J-642	true	false	1,000	567	1,015	583	20.0	59.7	20.0	20.0	J-2	5.6	J-3
J-650	true	false	1,500	718	1,500	718	20.0	50.1	20.0	20.0	J-2	5.6	J-3
J-664	true	false	1,000	529	1,026	555	20.0	63.7	20.0	20.0	J-2	5.6	J-3
J-669	true	false	1,000	567	1,022	590	20.0	53.6	20.0	20.0	J-2	5.6	J-3
J-703	true	false	1,000	806	1,016	822	20.0	70.6	20.0	20.0	J-2	5.6	J-3
J-708	true	false	1,000	931	1,136	1,067	20.0	68.5	20.0	20.0	J-2	5.6	J-3

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-710	true	false	1,000	931	1,060	990	20.0	69.1	20.0	20.0	J-2	5.6	J-3
J-713	true	false	1,000	930	1,089	1,019	20.0	70.1	20.0	20.0	J-2	5.6	J-3
J-715	true	true	1,000	1,092	1,003	1,094	20.0	65.8	20.0	20.0	J-2	5.6	J-3
J-731	true	true	1,000	3,833	1,004	3,837	20.0	68.4	20.0	20.0	J-2	5.6	J-3
J-752	true	true	1,000	4,215	1,004	4,219	20.0	72.7	20.0	20.0	J-2	5.6	J-3
J-753	true	true	1,000	4,203	1,004	4,207	20.0	71.9	20.0	20.0	J-2	5.6	J-3
J-754	true	true	1,000	2,490	1,032	2,522	20.0	70.7	20.0	20.0	J-2	5.6	J-3
J-767	true	true	1,000	2,874	1,006	2,879	20.0	69.0	20.0	20.0	J-2	5.6	J-3
J-769	true	true	1,000	3,041	1,000	3,041	20.0	70.5	20.0	20.0	J-2	5.6	J-3
J-773	true	true	1,000	3,150	1,008	3,158	20.0	70.0	20.0	20.0	J-2	5.6	J-3
J-780	true	true	1,000	3,761	1,013	3,774	20.0	69.8	20.0	20.0	J-2	5.6	J-3
J-785	true	true	1,000	4,846	1,004	4,849	20.0	73.1	20.0	20.0	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	true	1,000	5,000	1,000	5,000	20.0	72.4	20.0	20.1	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	true	1,000	5,000	1,000	5,000	20.0	72.6	20.0	20.2	J-2	5.6	J-3
J-795	true	true	1,000	2,917	1,006	2,923	20.0	64.8	20.0	20.0	J-2	5.6	J-3
J-805	true	true	1,000	3,204	1,011	3,215	20.0	54.4	20.0	20.0	J-2	5.6	J-3
J-807	true	true	1,000	3,036	1,006	3,043	20.0	69.2	20.0	20.0	J-2	5.6	J-3
J-808	true	true	1,000	2,726	1,000	2,726	20.0	67.4	20.0	20.0	J-2	5.6	J-3
J-832	true	true	1,000	2,760	1,006	2,766	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-855	true	true	1,000	2,936	1,006	2,942	20.0	65.6	20.0	20.0	J-2	5.6	J-3
J-872	true	true	1,000	1,025	1,035	1,060	20.0	66.4	20.0	20.0	J-2	5.6	J-3

12.1.2:
ADD-Junction Report

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	65.6	20.6
J-669	36.00	Zone-1	Demand	22	Pattern - 1	22	175.9	60.6
J-573	30.00	Zone-1	Demand	12	Pattern - 1	12	175.9	63.2
J-579	30.00	Zone-1	Demand	39	Pattern - 1	39	175.9	63.2
J-612	28.00	Zone-1	Demand	19	Pattern - 1	19	175.8	64.1
J-632	27.00	Zone-1	Demand	41	Pattern - 1	41	175.8	64.5
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	175.8	64.5
J-642	27.00	Zone-1	Demand	15	Pattern - 1	15	175.9	64.6
J-610	25.00	Zone-1	Demand	18	Pattern - 1	18	175.8	65.4
J-650	25.00	Zone-1	Demand	0	Pattern - 1	0	177.1	65.9
J-592	21.00	Zone-1	Demand	18	Pattern - 1	18	176.2	67.3
J-390	21.00	Zone-1	Demand	16	Pattern - 1	16	176.2	67.3
J-100	20.00	Zone-1	Demand	24	Pattern - 1	24	175.8	67.6
J-398	20.00	Zone-1	Demand	16	Pattern - 1	16	176.2	67.7
J-7	19.00	Zone-1	Demand	8	Fixed	8	175.5	67.9
J-6	19.00	Zone-1	Demand	0	Fixed	0	175.5	67.9
J-49	19.00	Zone-1	Demand	30	Pattern - 1	30	175.5	67.9
J-519	18.00	Zone-1	Demand	6	Pattern - 1	6	175.5	68.3
J-501	18.00	Zone-1	Demand	6	Pattern - 1	6	175.5	68.3
J-664	18.00	Zone-1	Demand	26	Pattern - 1	26	175.5	68.3
J-1	18.00	Zone-1	Demand	0	Fixed	0	175.9	68.5
J-250	20.00	Zone-1	Demand	25	Pattern - 1	25	178.5	68.7
J-502	17.00	Zone-1	Demand	6	Pattern - 1	6	175.5	68.7
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	178.5	68.7
J-188	20.00	Zone-1	Demand	7	Pattern - 1	7	178.9	68.9
J-400	17.00	Zone-1	Demand	16	Pattern - 1	16	176.7	69.2
J-407	17.00	Zone-1	Demand	16	Pattern - 1	16	176.7	69.2
J-184	20.00	Zone-1	Demand	0	Pattern - 1	0	179.8	69.3
J-715	19.00	Zone-1	Demand	3	Pattern - 1	3	178.9	69.3
J-58	15.00	Zone-1	Demand	35	Pattern - 1	35	175.8	69.7
J-435	15.00	Zone-1	Demand	36	Pattern - 1	36	176.0	69.8
J-8	17.00	Zone-1	Demand	0	Fixed	0	178.2	69.9
J-156	17.00	Zone-1	Demand	20	Pattern - 1	20	178.2	69.9
J-442	15.00	Zone-1	Demand	16	Pattern - 1	16	176.6	70.1
J-446	15.00	Zone-1	Demand	16	Pattern - 1	16	176.7	70.1
J-9	14.00	Zone-1	Demand	0	Fixed	0	175.9	70.2
J-10	14.00	Zone-1	Demand	0	Fixed	0	175.9	70.2
J-219	18.00	Zone-1	Demand	30	Pattern - 1	30	180.1	70.3
J-439	14.00	Zone-1	Demand	16	Pattern - 1	16	176.2	70.3
J-408	15.00	Zone-1	Demand	20	Pattern - 1	20	177.7	70.5
J-473	15.00	Zone-1	Demand	21	Pattern - 1	21	177.7	70.5
J-411	15.00	Zone-1	Demand	16	Pattern - 1	16	178.0	70.7
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	180.1	70.7
J-169	17.00	Zone-1	Demand	20	Pattern - 1	20	180.1	70.7
J-474	14.00	Zone-1	Demand	30	Pattern - 1	30	177.4	70.8
J-452	14.00	Zone-1	Demand	16	Pattern - 1	16	177.5	70.9
J-453	14.00	Zone-1	Demand	16	Pattern - 1	16	177.6	70.9
J-179	16.00	Zone-1	Demand	20	Pattern - 1	20	180.0	71.1
J-222	16.00	Zone-1	Demand	30	Pattern - 1	30	180.1	71.1
J-174	15.00	Zone-1	Demand	20	Pattern - 1	20	179.3	71.2
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	175.9	71.5
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	180.0	71.5
J-542	10.00	Zone-1	Demand	6	Pattern - 1	6	175.5	71.8

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-459	10.00	Zone-1	Demand	36	Pattern - 1	36	175.9	71.9
J-464	10.00	Zone-1	Demand	16	Pattern - 1	16	176.6	72.2
J-461	9.00	Zone-1	Demand	16	Pattern - 1	16	176.2	72.5
J-370	10.00	Zone-1	Demand	71	Pattern - 1	71	177.2	72.5
J-227	13.00	Zone-1	Demand	20	Pattern - 1	20	180.4	72.6
J-388	6.00	Zone-1	Demand	71	Pattern - 1	71	173.7	72.7
J-74	8.00	Zone-1	Demand	16	Pattern - 1	16	175.9	72.8
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	177.2	73.1
J-196	12.00	Zone-1	Demand	9	Pattern - 1	9	180.8	73.2
J-623	12.00	Zone-1	Demand	10	Pattern - 1	10	180.9	73.2
J-276	12.00	Zone-1	Demand	9	Pattern - 1	9	181.1	73.3
J-22	6.50	Zone-1	Demand	26	Pattern - 1	26	175.7	73.4
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	180.7	73.6
J-710	7.00	Zone-1	Demand	60	Pattern - 1	60	176.7	73.6
J-713	7.00	Zone-1	Demand	89	Pattern - 1	89	176.9	73.6
J-328	8.00	Zone-1	Demand	21	Pattern - 1	21	178.0	73.7
J-703	7.00	Zone-1	Demand	16	Pattern - 1	16	177.1	73.7
J-103	5.50	Zone-1	Demand	19	Pattern - 1	19	175.6	73.7
J-64	5.50	Zone-1	Demand	6	Pattern - 1	6	175.6	73.7
J-767	11.00	Zone-1	Demand	6	Pattern - 1	6	181.2	73.8
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	177.2	73.8
J-520	5.00	Zone-1	Demand	6	Pattern - 1	6	175.5	73.9
J-541	5.00	Zone-1	Demand	6	Pattern - 1	6	175.5	73.9
J-526	5.00	Zone-1	Demand	21	Pattern - 1	21	175.5	73.9
J-508	5.00	Zone-1	Demand	6	Pattern - 1	6	175.5	73.9
J-513	5.00	Zone-1	Demand	6	Pattern - 1	6	175.5	73.9
J-533	5.00	Zone-1	Demand	6	Pattern - 1	6	175.5	73.9
J-547	5.00	Zone-1	Demand	6	Pattern - 1	6	175.6	73.9
J-302	7.00	Zone-1	Demand	195	Pattern - 1	195	177.6	74.0
J-536	5.00	Zone-1	Demand	6	Pattern - 1	6	175.7	74.0
J-106	5.00	Zone-1	Demand	6	Pattern - 1	6	175.7	74.0
J-12	5.00	Zone-1	Demand	23	Pattern - 1	23	175.7	74.0
J-518	5.00	Zone-1	Demand	6	Pattern - 1	6	175.7	74.0
J-25	5.00	Zone-1	Demand	14	Pattern - 1	14	175.7	74.0
J-125	10.00	Zone-1	Demand	10	Pattern - 1	10	180.7	74.0
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	180.8	74.0
J-29	5.00	Zone-1	Demand	7	Pattern - 1	7	175.8	74.1
J-87	5.00	Zone-1	Demand	7	Pattern - 1	7	175.9	74.1
J-119	10.00	Zone-1	Demand	10	Pattern - 1	10	180.9	74.1
J-754	10.00	Zone-1	Demand	32	Pattern - 1	32	181.0	74.1
J-34	5.00	Zone-1	Demand	7	Pattern - 1	7	176.0	74.1
J-5	5.00	Zone-1	Demand	0	Fixed	0	176.0	74.1
J-872	6.00	Zone-1	Demand	35	Pattern - 1	35	177.0	74.1
J-620	10.00	Zone-1	Demand	6	Pattern - 1	6	181.0	74.1
J-387	6.00	Zone-1	Demand	69	Pattern - 1	69	177.0	74.1
J-38	5.00	Zone-1	Demand	7	Pattern - 1	7	176.2	74.2
J-277	10.00	Zone-1	Demand	9	Pattern - 1	9	181.3	74.3
J-773	10.00	Zone-1	Demand	8	Pattern - 1	8	181.4	74.3
J-109	5.00	Zone-1	Demand	134	Pattern - 1	134	176.4	74.3
J-323	8.00	Zone-1	Demand	21	Pattern - 1	21	179.5	74.3
J-298	7.00	Zone-1	Demand	21	Pattern - 1	21	178.5	74.4
J-780	10.00	Zone-1	Demand	13	Pattern - 1	13	181.8	74.5
J-832	9.00	Zone-1	Demand	6	Pattern - 1	6	180.8	74.5
J-708	4.50	Zone-1	Demand	136	Pattern - 1	136	176.6	74.6

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-333	5.50	Zone-1	Demand	32	Pattern - 1	32	177.7	74.6
J-261	10.00	Zone-1	Demand	11	Pattern - 1	11	182.2	74.6
J-807	9.00	Zone-1	Demand	6	Pattern - 1	6	181.3	74.7
J-805	9.00	Zone-1	Demand	11	Pattern - 1	11	181.3	74.7
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	181.3	74.7
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	182.4	74.7
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	182.4	74.7
J-753	9.00	Zone-1	Demand	4	Pattern - 1	4	182.0	75.0
J-855	8.00	Zone-1	Demand	6	Pattern - 1	6	181.1	75.0
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	181.6	75.3
J-731	8.00	Zone-1	Demand	4	Pattern - 1	4	181.8	75.4
J-795	6.50	Zone-1	Demand	6	Pattern - 1	6	181.1	75.7
J-752	7.00	Zone-1	Demand	4	Pattern - 1	4	182.0	75.9
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	181.6	76.1
J-785	6.00	Zone-1	Demand	4	Pattern - 1	4	182.2	76.4
J-4	0.00	Zone-1	Demand	7	Fixed	7	178.0	77.2
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	317.5	133.3
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	319.3	134.1
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

12.1.3:
ADD-Pipe Report

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-189	180.7	180.8	0.1	0.1
P-2	980	12	Ductile Iro	120	false	0.00	Open	306	180.7	180.4	0.3	0.3
P-3	1,500	12	Cast iron	78	false	0.00	Open	180	180.4	180.0	0.4	0.3
P-4	1,440	8	Cast iron	120	false	0.00	Open	-149	179.8	180.7	0.9	0.6
P-5	533	8	Ductile Iro	120	false	0.00	Open	-149	180.7	181.0	0.3	0.6
P-6	290	8	Ductile Iro	120	false	0.00	Open	-101	181.0	181.1	0.1	0.3
P-7	800	10	Ductile Iro	113	false	0.00	Open	-147	180.9	181.1	0.2	0.2
P-8	400	8	Ductile Iro	120	false	0.00	Open	10	180.9	180.9	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	127	180.9	180.7	0.2	0.2
P-10	930	8	Ductile Iro	120	false	0.00	Open	106	180.4	180.1	0.3	0.3
P-11	555	8	Ductile Iro	120	false	0.00	Open	30	180.1	180.1	0.0	0.0
P-12	450	8	Ductile Iro	120	false	0.00	Open	45	180.1	180.1	0.0	0.1
P-13	275	6	Ductile Iro	106	false	0.00	Open	15	180.1	180.1	0.0	0.0
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-72	178.2	179.3	1.1	0.8
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	-10	179.3	180.1	0.8	0.6
P-16	555	12	Ductile Iro	120	false	0.00	Open	180	180.0	180.0	0.1	0.1
P-18	800	8	Ductile Iro	120	false	0.00	Open	-80	179.8	180.0	0.2	0.2
P-19	620	6	Ductile Iro	106	false	0.00	Open	-81	179.3	180.0	0.6	1.0
P-20	650	8	Ductile Iro	120	false	0.00	Open	229	179.8	178.9	0.9	1.4
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	288	178.9	178.0	0.9	0.7
P-22	400	8	Ductile Iro	120	false	0.00	Open	169	178.0	177.7	0.3	0.8
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	-144	177.7	178.5	0.8	0.6
P-24	620	8	Ductile Iro	120	false	0.00	Open	229	178.5	177.6	0.9	1.4
P-25	650	8	Ductile Iro	120	false	0.00	Open	-105	177.5	177.7	0.2	0.3
P-26	600	8	Ductile Iro	120	false	0.00	Open	-89	177.5	177.6	0.1	0.2
P-27	740	8	Ductile Iro	120	false	0.00	Open	-149	178.5	178.9	0.5	0.6
P-28	380	8	Ductile Iro	120	false	0.00	Open	-62	178.9	178.9	0.0	0.1
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-218	178.9	180.8	1.9	1.3
P-30	890	10	Ductile Iro	113	false	0.00	Open	-108	180.8	181.0	0.1	0.1
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-119	180.8	181.0	0.2	0.2
P-32	75	12	Ductile Iro	120	false	0.00	Open	-524	178.5	178.5	0.1	0.9
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-261	178.5	181.6	3.1	1.8
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-263	178.5	182.2	3.6	1.8
P-36	100	10	Ductile Iro	120	false	0.00	Open	-642	177.4	177.7	0.3	3.1
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	146	181.3	181.1	0.2	0.2
P-38	900	8	Ductile Iro	120	false	0.00	Open	92	181.1	180.8	0.2	0.3
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	180.8	180.8	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	472	177.4	177.2	0.2	0.7
P-41	980	8	Ductile Iro	120	false	0.00	Open	-76	176.9	177.0	0.2	0.2
P-42	222	8	Ductile Iro	120	false	0.00	Open	35	177.0	177.0	0.0	0.0
P-43	620	10	Ductile Iro	120	false	0.00	Open	-180	177.0	177.2	0.2	0.3
P-44	610	10	Ductile Iro	99	false	0.00	Open	-353	177.6	178.5	0.9	1.5
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	395	178.5	177.7	0.8	0.5
P-46	520	12	Ductile Iro	120	false	0.00	Open	-769	178.5	179.5	0.9	1.8
P-47	666	12	Ductile Iro	120	false	0.00	Open	-861	179.5	181.0	1.5	2.2
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-110	181.0	181.2	0.3	0.1
P-49	220	8	Ductile Iro	120	false	0.00	Open	-173	181.0	181.2	0.2	0.8
P-50	200	10	Ductile Iro	113	false	0.00	Open	-288	181.2	181.4	0.2	0.8
P-51	220	10	Ductile Iro	113	false	0.00	Open	110	181.4	181.3	0.0	0.1
P-52	20	8	Ductile Iro	50	false	0.00	Open	292	320.0	319.8	0.2	10.9
P-53	5	10	Ductile Iro	113	false	0.00	Open	401	181.3	181.3	0.0	1.5
P-54	333	10	Ductile Iro	113	false	0.00	Open	257	181.3	181.1	0.2	0.6
P-55	100	10	Ductile Iro	113	false	0.00	Open	135	181.3	181.3	0.0	0.2

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	189	180.8	180.8	0.0	0.1
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-104	180.8	181.1	0.2	0.1
P-58	555	10	Ductile Iro	120	false	0.00	Open	-48	181.1	181.1	0.0	0.0
P-59	580	10	Ductile Iro	50	false	0.00	Open	-16	181.3	181.3	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-62	181.1	181.3	0.3	0.2
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-90	181.3	181.8	0.5	0.4
P-62	730	12	Ductile Iro	120	false	0.00	Open	53	181.8	181.8	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	405	181.8	181.4	0.4	0.6
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-147	181.8	182.0	0.1	0.1
P-65	330	12	Ductile Iro	120	false	0.00	Open	443	182.2	182.0	0.2	0.6
P-66	820	12	Ductile Iro	120	false	0.00	Open	365	182.2	181.8	0.4	0.5
P-67	5	12	Ductile Iro	120	false	0.00	Open	292	182.0	182.0	0.0	0.3
P-68	225	12	Ductile Iro	120	false	0.00	Open	-759	182.0	182.4	0.4	1.8
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	182.4	319.3	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	155	181.6	181.6	0.0	3.4
P-71	330	8	Ductile Iro	50	false	0.00	Open	-106	181.6	182.2	0.6	1.7
P-72	10	8	Ductile Iro	50	false	0.00	Open	380	182.4	182.2	0.2	17.9
P-73	100	12	Ductile Iro	120	false	0.00	Open	812	182.4	182.2	0.2	2.0
P-74	5	12	Ductile Iro	120	false	0.00	Open	1,139	182.4	182.4	0.0	3.7
P-75	5	10	Ductile Iro	50	false	0.00	Open	1,951	183.0	182.4	0.6	124.6
P-76	20	12	Ductile Iro	120	false	0.00	Open	1,951	319.5	319.3	0.2	10.1
P-77	15	10	Ductile Iro	50	false	0.00	Open	-1,951	317.5	319.3	1.9	124.6
P-78	100	12	Ductile Iro	120	false	0.00	Open	1,047	182.0	181.6	0.3	3.2
P-79	290	12	Ductile Iro	120	false	0.00	Open	893	181.6	181.0	0.7	2.4
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	123	177.6	177.1	0.6	0.4
P-81	600	8	Ductile Iro	120	false	0.00	Open	-141	177.1	177.4	0.3	0.6
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	129	177.1	176.4	0.6	0.5
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	-118	176.4	176.9	0.4	0.4
P-84	550	12	Ductile Iro	120	false	0.00	Open	267	176.9	176.7	0.1	0.3
P-85	15	6	Ductile Iro	50	false	0.00	Open	292	182.0	181.3	0.7	44.5
P-86	600	8	Ductile Iro	120	false	0.00	Open	113	176.4	176.2	0.2	0.4
P-87	620	8	Ductile Iro	120	false	0.00	Open	106	176.2	176.0	0.2	0.3
P-88	330	8	Ductile Iro	120	false	0.00	Open	98	176.0	175.9	0.1	0.3
P-89	310	8	Ductile Iro	120	false	0.00	Open	91	175.9	175.8	0.1	0.2
P-90	470	8	Ductile Iro	120	false	0.00	Open	84	175.8	175.7	0.1	0.2
P-91	180	6	Ductile Iro	120	false	0.00	Open	2	175.7	175.7	0.0	0.0
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	70	175.9	175.7	0.2	0.2
P-93	880	8	Ductile Iro	120	false	0.00	Open	46	175.7	175.7	0.1	0.1
P-94	512	8	Ductile Iro	50	false	0.00	Open	22	176.0	175.9	0.0	0.1
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	22	175.9	175.8	0.1	0.1
P-96	1	6	Ductile Iro	120	false	0.00	Open	68	175.7	175.7	0.0	0.6
P-99	1	6	Ductile Iro	120	false	0.00	Open	47	175.7	175.7	0.0	0.3
P-100	4	6	Ductile Iro	120	false	0.00	Open	8	175.5	175.5	0.0	0.0
P-101	240	6	Ductile Iro	120	false	0.00	Open	3	175.5	175.5	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	23	175.6	175.6	0.0	0.1
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	11	175.6	175.5	0.0	0.0
P-104	1	6	Ductile Iro	120	false	0.00	Open	-15	175.5	175.5	0.0	0.0
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-43	175.5	175.7	0.1	0.1
P-106	270	8	Ductile Iro	120	false	0.00	Open	2	175.5	175.5	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-36	175.5	175.8	0.3	0.2
P-108	240	12	Ductile Iro	120	false	0.00	Open	58	175.8	175.8	0.0	0.0
P-109	930	10	Ductile Iro	50	false	0.00	Open	22	175.8	175.8	0.0	0.0
P-110	670	10	Ductile Iro	50	false	0.00	Open	4	175.8	175.8	0.0	0.0

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	-12	175.8	175.8	0.0	0.0
P-112	770	10	Ductile Iro	50	false	0.00	Open	-3	175.8	175.8	0.0	0.0
P-113	900	8	Ductile Iro	50	false	0.00	Open	-16	175.8	175.9	0.0	0.1
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-30	175.9	175.9	0.1	0.0
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	22	175.9	175.9	0.0	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-111	175.9	176.2	0.2	0.4
P-117	245	8	Ductile Iro	120	false	0.00	Open	-61	176.2	176.2	0.0	0.1
P-118	620	8	Ductile Iro	120	false	0.00	Open	-17	176.2	176.2	0.0	0.0
P-119	840	8	Ductile Iro	120	false	0.00	Open	94	176.2	176.0	0.2	0.3
P-121	1,270	8	PVC	120	false	0.00	Open	49	176.0	175.9	0.1	0.1
P-122	290	8	Ductile Iro	120	false	0.00	Open	74	175.9	175.9	0.0	0.2
P-123	660	12	Ductile Iro	120	false	0.00	Open	87	175.9	175.9	0.0	0.0
P-124	380	8	Ductile Iro	120	false	0.00	Open	-160	175.9	176.2	0.3	0.7
P-125	660	8	Ductile Iro	120	false	0.00	Open	-148	176.2	176.6	0.4	0.6
P-126	580	8	Ductile Iro	120	false	0.00	Open	-124	176.0	176.2	0.3	0.4
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	28	176.2	176.2	0.0	0.0
P-128	530	8	Ductile Iro	120	false	0.00	Open	-169	176.2	176.6	0.4	0.8
P-129	130	8	Ductile Iro	120	false	0.00	Open	-115	176.6	176.7	0.0	0.4
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	47	176.7	176.6	0.1	0.1
P-131	910	8	Ductile Iro	120	false	0.00	Open	-178	176.7	177.5	0.8	0.9
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	118	177.1	176.6	0.5	0.4
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	188	177.7	176.7	1.0	1.0
P-134	310	8	Ductile Iro	120	false	0.00	Open	70	176.7	176.6	0.0	0.2
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	127	176.7	176.2	0.5	0.5
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-61	176.2	176.7	0.5	0.5
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	-103	176.7	178.0	1.3	1.3
P-138	470	8	Ductile Iro	120	false	0.00	Open	26	176.7	176.7	0.0	0.0
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	-68	176.2	177.1	0.9	0.6
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	-68	177.1	178.2	1.1	0.7
P-141	980	6	Ductile Iro	78	false	0.00	Open	72	179.5	178.0	1.4	1.4
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	20	178.0	177.7	0.4	0.1
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-30	177.7	178.0	0.4	0.3
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	19	177.7	177.6	0.0	0.0
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	65.6	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	65.6	175.9	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	43	175.9	175.9	0.0	0.1
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	65.6	65.6	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	65.6	65.6	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	-4	175.9	175.9	0.0	0.0
P-161	686	10	Ductile Iro	120	false	0.00	Open	275	178.5	178.0	0.4	0.7
P-162	514	10	Ductile Iro	120	false	0.00	Open	268	178.0	177.7	0.3	0.6
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	176.0	176.0	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	-19	175.8	175.9	0.0	0.0
P-171	362	8	PVC	120	false	0.00	Open	-8	175.5	175.5	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-8	175.5	175.5	0.0	0.0
P-173	1,035	6	PVC	99	false	0.00	Open	0	178.2	178.2	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-111	175.8	175.9	0.1	0.0
P-175	5	12	PVC	120	false	0.00	Open	-111	175.9	175.9	0.0	0.0
P-176	838	12	PVC	120	false	0.00	Open	-111	175.9	176.0	0.0	0.0

Scenario: ADD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	68	175.9	175.7	0.2	0.1
P-190	275	6	Ductile Iro	120	false	0.00	Open	41	175.7	175.7	0.1	0.2
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-18	175.6	175.7	0.1	0.1
P-210	275	6	Ductile Iro	120	false	0.00	Open	35	175.7	175.6	0.0	0.2
P-220	275	6	Ductile Iro	120	false	0.00	Open	-24	175.6	175.6	0.0	0.1
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	20	175.7	175.7	0.1	0.1
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	17	175.7	175.6	0.0	0.0
P-250	440	6	Ductile Iro	120	false	0.00	Open	-5	175.5	175.5	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-9	175.5	175.5	0.0	0.0
P-270	880	6	Ductile Iro	120	false	0.00	Open	22	175.6	175.5	0.1	0.1
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	26	175.7	175.5	0.1	0.1
P-290	330	6	Ductile Iro	120	false	0.00	Open	5	175.6	175.5	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	6	175.5	175.5	0.0	0.0
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	14	175.5	175.5	0.0	0.0
P-320	750	6	Ductile Iro	120	false	0.00	Open	16	175.5	175.5	0.0	0.0
P-330	275	6	Ductile Iro	120	false	0.00	Open	15	175.5	175.5	0.0	0.0
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	9	175.5	175.5	0.0	0.0
P-350	220	6	Ductile Iro	120	false	0.00	Open	5	175.5	175.5	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-1	175.5	175.5	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-1	175.5	175.5	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-2	175.5	175.5	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	9	175.5	175.5	0.0	0.0
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-136	176.6	176.7	0.1	0.1
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-71	173.7	176.7	3.0	2.0
P-420	880	8	Cast iron	120	false	0.00	Open	-3	175.8	175.8	0.0	0.0
P-430	1,210	4	Cast iron	120	false	0.00	Open	5	175.9	175.8	0.0	0.0
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	-15	178.2	180.1	1.8	1.4
P-450	682	12	Ductile Iro	120	false	0.00	Open	-398	176.9	177.2	0.4	0.5
P-460	990	10	Ductile Iro	99	false	0.00	Open	177	177.6	177.2	0.4	0.4
P-470	330	6	Ductile Iro	85	false	0.00	Open	-3	177.2	177.2	0.0	0.0
P-480	880	6	Ductile Iro	85	false	0.00	Open	3	177.2	177.2	0.0	0.0
P-490	1	10	Ductile Iro	50	false	0.00	Open	1,951	317.5	317.3	0.1	124.6
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

12.2.1:
PDD-Fire Flow Analysis Report

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	false	1,000	0	1,000	0	20.0	65.1	20.0	19.8	J-2	5.6	J-3
J-2	true	false	1,000	0	1,000	0	20.0	19.8	20.0	57.3	J-669	5.6	J-3
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	false	1,500	0	1,511	11	20.0	74.9	20.0	19.8	J-2	5.6	J-3
J-5	true	false	1,000	0	1,000	0	20.0	70.8	20.0	19.8	J-2	5.6	J-3
J-6	true	false	1,000	0	1,000	0	20.0	64.3	20.0	19.8	J-2	5.6	J-3
J-7	true	false	1,000	0	1,012	12	20.0	64.3	20.0	19.8	J-2	5.6	J-3
J-8	true	false	1,000	0	1,000	0	20.0	67.7	20.0	19.8	J-2	5.6	J-3
J-9	true	false	1,000	0	1,000	0	20.0	66.9	20.0	19.8	J-2	5.6	J-3
J-10	true	false	1,000	0	1,000	0	20.0	66.9	20.0	19.8	J-2	5.6	J-3
J-12	true	false	2,500	0	2,535	35	20.0	70.5	20.0	19.8	J-2	5.6	J-3
J-22	true	false	1,000	0	1,038	38	20.0	69.9	20.0	19.8	J-2	5.6	J-3
J-25	true	false	1,000	0	1,021	21	20.0	70.6	20.0	19.8	J-2	5.6	J-3
J-29	true	false	1,000	0	1,011	11	20.0	70.7	20.0	19.8	J-2	5.6	J-3
J-34	true	false	1,000	0	1,011	11	20.0	70.8	20.0	19.8	J-2	5.6	J-3
J-38	true	false	1,000	0	1,011	11	20.0	71.0	20.0	19.8	J-2	5.6	J-3
J-49	true	false	1,000	0	1,046	46	20.0	64.3	20.0	19.8	J-2	5.6	J-3
J-58	true	false	1,000	0	1,053	53	20.0	66.4	20.0	19.8	J-2	5.6	J-3
J-64	true	false	1,000	0	1,010	10	20.0	70.3	20.0	19.8	J-2	5.6	J-3
J-71	true	false	1,000	0	1,000	0	20.0	68.1	20.0	19.8	J-2	5.6	J-3
J-74	true	false	1,000	0	1,025	25	20.0	69.5	20.0	19.8	J-2	5.6	J-3
J-87	true	false	1,000	0	1,011	11	20.0	70.7	20.0	19.8	J-2	5.6	J-3
J-100	true	false	1,000	0	1,036	36	20.0	64.2	20.0	19.8	J-2	5.6	J-3
J-103	true	false	1,000	0	1,029	29	20.0	70.2	20.0	19.8	J-2	5.6	J-3
J-106	true	false	1,000	0	1,010	10	20.0	70.5	20.0	19.8	J-2	5.6	J-3
J-109	true	false	1,000	0	1,201	201	20.0	71.2	20.0	19.8	J-2	5.6	J-3
J-119	true	false	1,000	0	1,015	15	20.0	73.3	20.0	19.8	J-2	5.6	J-3
J-125	true	false	1,000	0	1,015	15	20.0	73.1	20.0	19.8	J-2	5.6	J-3
J-156	true	false	1,000	0	1,029	29	20.0	67.7	20.0	19.8	J-2	5.6	J-3
J-166	true	false	1,000	0	1,000	0	20.0	69.4	20.0	19.8	J-2	5.6	J-3
J-169	true	false	1,000	0	1,029	29	20.0	69.4	20.0	19.8	J-2	5.6	J-3
J-174	true	false	1,000	0	1,029	29	20.0	69.6	20.0	19.8	J-2	5.6	J-3
J-179	true	false	3,000	0	3,029	29	20.0	69.7	20.0	19.8	J-2	5.6	J-3
J-184	true	false	1,000	0	1,000	0	20.0	67.9	20.0	19.8	J-2	5.6	J-3
J-188	true	false	1,000	0	1,010	10	20.0	67.1	20.0	19.8	J-2	5.6	J-3
J-196	true	false	1,000	0	1,014	14	20.0	72.3	20.0	19.8	J-2	5.6	J-3
J-219	true	false	1,000	0	1,045	45	20.0	69.0	20.0	19.8	J-2	5.6	J-3
J-222	true	false	1,000	0	1,045	45	20.0	69.9	20.0	19.8	J-2	5.6	J-3
J-227	true	false	1,000	0	1,029	29	20.0	71.5	20.0	19.8	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	false	1,000	0	1,000	0	20.0	66.7	20.0	19.8	J-2	5.6	J-3
J-250	true	false	1,000	0	1,038	38	20.0	66.6	20.0	19.8	J-2	5.6	J-3
J-259	true	false	1,000	0	1,000	0	20.0	75.5	20.0	19.8	J-2	5.6	J-3
J-260	true	false	1,000	0	1,000	0	20.0	74.7	20.0	19.8	J-2	5.6	J-3
J-261	true	false	1,000	0	1,016	16	20.0	74.3	20.0	19.8	J-2	5.6	J-3
J-272	true	false	1,000	0	1,000	0	20.0	72.6	20.0	19.8	J-2	5.6	J-3
J-276	true	false	1,000	0	1,013	13	20.0	72.6	20.0	19.8	J-2	5.6	J-3
J-277	true	false	1,000	0	1,013	13	20.0	73.6	20.0	19.8	J-2	5.6	J-3
J-288	true	false	1,000	0	1,000	0	20.0	70.2	20.0	19.8	J-2	5.6	J-3
J-298	true	false	1,000	0	1,031	31	20.0	72.3	20.0	19.8	J-2	5.6	J-3
J-302	true	false	1,000	0	1,292	292	20.0	71.5	20.0	19.8	J-2	5.6	J-3
J-323	true	false	1,000	0	1,031	31	20.0	72.7	20.0	19.8	J-2	5.6	J-3

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-328	true	false	1,000	0	1,031	31	20.0	71.4	20.0	19.8	J-2	5.6	J-3
J-333	true	false	1,000	0	1,047	47	20.0	72.2	20.0	19.8	J-2	5.6	J-3
J-370	true	false	3,500	0	3,606	106	20.0	69.8	20.0	19.8	J-2	5.6	J-3
J-374	true	false	1,000	0	1,000	0	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-376	true	false	1,000	0	1,000	0	20.0	71.1	20.0	19.8	J-2	5.6	J-3
J-387	true	false	1,000	0	1,103	103	20.0	71.4	20.0	19.8	J-2	5.6	J-3
J-388	true	false	1,000	0	1,106	106	20.0	68.3	20.0	19.8	J-2	5.6	J-3
J-390	true	false	1,000	0	1,025	25	20.0	64.1	20.0	19.8	J-2	5.6	J-3
J-398	true	false	1,000	0	1,025	25	20.0	64.5	20.0	19.8	J-2	5.6	J-3
J-400	true	false	2,250	0	2,275	25	20.0	66.3	20.0	19.8	J-2	5.6	J-3
J-407	true	false	1,000	0	1,025	25	20.0	66.3	20.0	19.8	J-2	5.6	J-3
J-408	true	false	1,500	0	1,530	30	20.0	68.1	20.0	19.8	J-2	5.6	J-3
J-411	true	false	1,000	0	1,025	25	20.0	68.4	20.0	19.8	J-2	5.6	J-3
J-435	true	false	1,000	0	1,054	54	20.0	66.5	20.0	19.8	J-2	5.6	J-3
J-439	true	false	1,000	0	1,025	25	20.0	67.2	20.0	19.8	J-2	5.6	J-3
J-442	true	false	1,000	0	1,025	25	20.0	67.1	20.0	19.8	J-2	5.6	J-3
J-446	true	false	1,000	0	1,025	25	20.0	67.1	20.0	19.8	J-2	5.6	J-3
J-452	true	false	1,000	0	1,025	25	20.0	68.3	20.0	19.8	J-2	5.6	J-3
J-453	true	false	1,000	0	1,025	25	20.0	68.4	20.0	19.8	J-2	5.6	J-3
J-459	true	false	1,000	0	1,054	54	20.0	68.6	20.0	19.8	J-2	5.6	J-3
J-461	true	false	1,000	0	1,025	25	20.0	69.3	20.0	19.8	J-2	5.6	J-3
J-464	true	false	1,000	0	1,025	25	20.0	69.2	20.0	19.8	J-2	5.6	J-3
J-473	true	false	1,000	0	1,031	31	20.0	68.1	20.0	19.8	J-2	5.6	J-3
J-474	true	false	1,000	0	1,045	45	20.0	68.2	20.0	19.8	J-2	5.6	J-3
J-501	true	false	1,000	0	1,010	10	20.0	64.8	20.0	19.8	J-2	5.6	J-3
J-502	true	false	1,000	0	1,010	10	20.0	65.2	20.0	19.8	J-2	5.6	J-3
J-508	true	false	1,000	0	1,010	10	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-513	true	false	1,000	0	1,010	10	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-518	true	false	1,000	0	1,010	10	20.0	70.6	20.0	19.8	J-2	5.6	J-3
J-519	true	false	1,000	0	1,010	10	20.0	64.8	20.0	19.8	J-2	5.6	J-3
J-520	true	false	1,000	0	1,010	10	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-526	true	false	1,000	0	1,031	31	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-533	true	false	1,000	0	1,010	10	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-536	true	false	1,000	0	1,010	10	20.0	70.5	20.0	19.8	J-2	5.6	J-3
J-541	true	false	1,000	0	1,010	10	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-542	true	false	1,000	0	1,010	10	20.0	68.2	20.0	19.8	J-2	5.6	J-3
J-547	true	false	1,000	0	1,010	10	20.0	70.4	20.0	19.8	J-2	5.6	J-3
J-573	true	false	1,000	0	1,018	18	20.0	59.9	20.0	19.8	J-2	5.6	J-3
J-579	true	false	2,500	0	2,559	59	20.0	59.9	20.0	19.8	J-2	5.6	J-3
J-592	true	false	3,500	0	3,527	27	20.0	64.1	20.0	19.8	J-2	5.6	J-3
J-610	true	false	1,000	0	1,027	27	20.0	62.0	20.0	19.8	J-2	5.6	J-3
J-612	true	false	1,000	0	1,028	28	20.0	60.7	20.0	19.8	J-2	5.6	J-3
J-620	true	false	1,000	0	1,009	9	20.0	73.3	20.0	19.8	J-2	5.6	J-3
J-623	true	false	1,000	0	1,015	15	20.0	72.4	20.0	19.8	J-2	5.6	J-3
J-627	true	false	1,000	0	1,000	0	20.0	61.1	20.0	19.8	J-2	5.6	J-3
J-632	true	false	1,000	0	1,061	61	20.0	61.1	20.0	19.8	J-2	5.6	J-3
J-642	true	false	1,000	0	1,023	23	20.0	61.2	20.0	19.8	J-2	5.6	J-3
J-650	true	false	1,500	0	1,500	0	20.0	63.2	20.0	19.8	J-2	5.6	J-3
J-664	true	false	1,000	0	1,040	40	20.0	64.8	20.0	19.8	J-2	5.6	J-3
J-669	true	false	1,000	0	1,034	34	20.0	57.3	20.0	19.8	J-2	5.6	J-3
J-703	true	false	1,000	0	1,025	25	20.0	70.9	20.0	19.8	J-2	5.6	J-3
J-708	true	false	1,000	0	1,205	205	20.0	71.6	20.0	19.8	J-2	5.6	J-3

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-710	true	false	1,000	0	1,090	90	20.0	70.6	20.0	19.8	J-2	5.6	J-3
J-713	true	false	1,000	0	1,133	133	20.0	70.8	20.0	19.8	J-2	5.6	J-3
J-715	true	false	1,000	0	1,004	4	20.0	67.4	20.0	19.8	J-2	5.6	J-3
J-731	true	false	1,000	0	1,006	6	20.0	74.9	20.0	19.8	J-2	5.6	J-3
J-752	true	false	1,000	0	1,006	6	20.0	75.4	20.0	19.8	J-2	5.6	J-3
J-753	true	false	1,000	0	1,005	5	20.0	74.5	20.0	19.8	J-2	5.6	J-3
J-754	true	false	1,000	0	1,049	49	20.0	73.2	20.0	19.8	J-2	5.6	J-3
J-767	true	false	1,000	0	1,009	9	20.0	73.1	20.0	19.8	J-2	5.6	J-3
J-769	true	false	1,000	0	1,000	0	20.0	74.1	20.0	19.8	J-2	5.6	J-3
J-773	true	false	1,000	0	1,011	11	20.0	73.7	20.0	19.8	J-2	5.6	J-3
J-780	true	false	1,000	0	1,019	19	20.0	74.0	20.0	19.8	J-2	5.6	J-3
J-785	true	false	1,000	0	1,005	5	20.0	76.0	20.0	19.8	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	false	1,000	0	1,000	0	20.0	74.4	20.0	19.8	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	false	1,000	0	1,000	0	20.0	74.5	20.0	19.8	J-2	5.6	J-3
J-795	true	false	1,000	0	1,009	9	20.0	74.9	20.0	19.8	J-2	5.6	J-3
J-805	true	false	1,000	0	1,016	16	20.0	74.1	20.0	19.8	J-2	5.6	J-3
J-807	true	false	1,000	0	1,009	9	20.0	74.1	20.0	19.8	J-2	5.6	J-3
J-808	true	false	1,000	0	1,000	0	20.0	73.2	20.0	19.8	J-2	5.6	J-3
J-832	true	false	1,000	0	1,009	9	20.0	73.6	20.0	19.8	J-2	5.6	J-3
J-855	true	false	1,000	0	1,009	9	20.0	74.3	20.0	19.8	J-2	5.6	J-3
J-872	true	false	1,000	0	1,053	53	20.0	71.3	20.0	19.8	J-2	5.6	J-3

12.2.2:
PDD-Junction Report

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	63.7	19.8
J-669	36.00	Zone-1	Demand	34	Pattern - 1	34	168.2	57.3
J-573	30.00	Zone-1	Demand	18	Pattern - 1	18	168.1	59.9
J-579	30.00	Zone-1	Demand	59	Pattern - 1	59	168.1	59.9
J-612	28.00	Zone-1	Demand	28	Pattern - 1	28	168.0	60.7
J-632	27.00	Zone-1	Demand	61	Pattern - 1	61	168.0	61.1
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	168.0	61.1
J-642	27.00	Zone-1	Demand	23	Pattern - 1	23	168.2	61.2
J-610	25.00	Zone-1	Demand	27	Pattern - 1	27	168.0	62.0
J-650	25.00	Zone-1	Demand	0	Pattern - 1	0	170.8	63.2
J-592	21.00	Zone-1	Demand	27	Pattern - 1	27	168.8	64.1
J-390	21.00	Zone-1	Demand	25	Pattern - 1	25	168.8	64.1
J-100	20.00	Zone-1	Demand	36	Pattern - 1	36	168.1	64.2
J-7	19.00	Zone-1	Demand	12	Fixed	12	167.4	64.3
J-6	19.00	Zone-1	Demand	0	Fixed	0	167.4	64.3
J-49	19.00	Zone-1	Demand	46	Pattern - 1	46	167.4	64.3
J-398	20.00	Zone-1	Demand	25	Pattern - 1	25	168.8	64.5
J-519	18.00	Zone-1	Demand	10	Pattern - 1	10	167.4	64.8
J-501	18.00	Zone-1	Demand	10	Pattern - 1	10	167.4	64.8
J-664	18.00	Zone-1	Demand	40	Pattern - 1	40	167.4	64.8
J-1	18.00	Zone-1	Demand	0	Fixed	0	168.3	65.1
J-502	17.00	Zone-1	Demand	10	Pattern - 1	10	167.4	65.2
J-400	17.00	Zone-1	Demand	25	Pattern - 1	25	169.9	66.3
J-407	17.00	Zone-1	Demand	25	Pattern - 1	25	169.9	66.3
J-58	15.00	Zone-1	Demand	53	Pattern - 1	53	168.1	66.4
J-435	15.00	Zone-1	Demand	54	Pattern - 1	54	168.4	66.5
J-250	20.00	Zone-1	Demand	38	Pattern - 1	38	173.7	66.6
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	173.8	66.7
J-9	14.00	Zone-1	Demand	0	Fixed	0	168.3	66.9
J-10	14.00	Zone-1	Demand	0	Fixed	0	168.3	66.9
J-188	20.00	Zone-1	Demand	10	Pattern - 1	10	174.7	67.1
J-442	15.00	Zone-1	Demand	25	Pattern - 1	25	169.8	67.1
J-446	15.00	Zone-1	Demand	25	Pattern - 1	25	169.9	67.1
J-439	14.00	Zone-1	Demand	25	Pattern - 1	25	168.9	67.2
J-715	19.00	Zone-1	Demand	4	Pattern - 1	4	174.6	67.4
J-156	17.00	Zone-1	Demand	29	Pattern - 1	29	173.2	67.7
J-8	17.00	Zone-1	Demand	0	Fixed	0	173.2	67.7
J-184	20.00	Zone-1	Demand	0	Pattern - 1	0	176.5	67.9
J-408	15.00	Zone-1	Demand	30	Pattern - 1	30	172.0	68.1
J-473	15.00	Zone-1	Demand	31	Pattern - 1	31	172.0	68.1
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	168.1	68.1
J-474	14.00	Zone-1	Demand	45	Pattern - 1	45	171.4	68.2
J-542	10.00	Zone-1	Demand	10	Pattern - 1	10	167.4	68.2
J-388	6.00	Zone-1	Demand	106	Pattern - 1	106	163.5	68.3
J-452	14.00	Zone-1	Demand	25	Pattern - 1	25	171.5	68.3
J-411	15.00	Zone-1	Demand	25	Pattern - 1	25	172.7	68.4
J-453	14.00	Zone-1	Demand	25	Pattern - 1	25	171.9	68.4
J-459	10.00	Zone-1	Demand	54	Pattern - 1	54	168.1	68.6
J-219	18.00	Zone-1	Demand	45	Pattern - 1	45	177.3	69.0
J-464	10.00	Zone-1	Demand	25	Pattern - 1	25	169.7	69.2
J-461	9.00	Zone-1	Demand	25	Pattern - 1	25	168.8	69.3
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	177.2	69.4
J-169	17.00	Zone-1	Demand	29	Pattern - 1	29	177.2	69.4

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-74	8.00	Zone-1	Demand	25	Pattern - 1	25	168.2	69.5
J-174	15.00	Zone-1	Demand	29	Pattern - 1	29	175.5	69.6
J-179	16.00	Zone-1	Demand	29	Pattern - 1	29	176.9	69.7
J-370	10.00	Zone-1	Demand	106	Pattern - 1	106	171.0	69.8
J-222	16.00	Zone-1	Demand	45	Pattern - 1	45	177.2	69.9
J-22	6.50	Zone-1	Demand	38	Pattern - 1	38	167.8	69.9
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	177.0	70.2
J-103	5.50	Zone-1	Demand	29	Pattern - 1	29	167.5	70.2
J-64	5.50	Zone-1	Demand	10	Pattern - 1	10	167.6	70.3
J-520	5.00	Zone-1	Demand	10	Pattern - 1	10	167.4	70.4
J-541	5.00	Zone-1	Demand	10	Pattern - 1	10	167.4	70.4
J-526	5.00	Zone-1	Demand	31	Pattern - 1	31	167.4	70.4
J-508	5.00	Zone-1	Demand	10	Pattern - 1	10	167.4	70.4
J-513	5.00	Zone-1	Demand	10	Pattern - 1	10	167.5	70.4
J-533	5.00	Zone-1	Demand	10	Pattern - 1	10	167.5	70.4
J-547	5.00	Zone-1	Demand	10	Pattern - 1	10	167.5	70.4
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	171.0	70.4
J-536	5.00	Zone-1	Demand	10	Pattern - 1	10	167.7	70.5
J-106	5.00	Zone-1	Demand	10	Pattern - 1	10	167.7	70.5
J-12	5.00	Zone-1	Demand	35	Pattern - 1	35	167.7	70.5
J-518	5.00	Zone-1	Demand	10	Pattern - 1	10	167.8	70.6
J-25	5.00	Zone-1	Demand	21	Pattern - 1	21	167.8	70.6
J-710	7.00	Zone-1	Demand	90	Pattern - 1	90	169.9	70.6
J-29	5.00	Zone-1	Demand	11	Pattern - 1	11	168.0	70.7
J-87	5.00	Zone-1	Demand	11	Pattern - 1	11	168.2	70.7
J-713	7.00	Zone-1	Demand	133	Pattern - 1	133	170.2	70.8
J-34	5.00	Zone-1	Demand	11	Pattern - 1	11	168.4	70.8
J-5	5.00	Zone-1	Demand	0	Fixed	0	168.4	70.8
J-703	7.00	Zone-1	Demand	25	Pattern - 1	25	170.7	70.9
J-38	5.00	Zone-1	Demand	11	Pattern - 1	11	168.8	71.0
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	171.0	71.1
J-109	5.00	Zone-1	Demand	201	Pattern - 1	201	169.3	71.2
J-872	6.00	Zone-1	Demand	53	Pattern - 1	53	170.6	71.3
J-387	6.00	Zone-1	Demand	103	Pattern - 1	103	170.6	71.4
J-328	8.00	Zone-1	Demand	31	Pattern - 1	31	172.7	71.4
J-302	7.00	Zone-1	Demand	292	Pattern - 1	292	171.8	71.5
J-227	13.00	Zone-1	Demand	29	Pattern - 1	29	177.9	71.5
J-708	4.50	Zone-1	Demand	205	Pattern - 1	205	169.7	71.6
J-333	5.50	Zone-1	Demand	47	Pattern - 1	47	171.9	72.2
J-196	12.00	Zone-1	Demand	14	Pattern - 1	14	178.7	72.3
J-298	7.00	Zone-1	Demand	31	Pattern - 1	31	173.8	72.3
J-623	12.00	Zone-1	Demand	15	Pattern - 1	15	179.0	72.4
J-276	12.00	Zone-1	Demand	13	Pattern - 1	13	179.4	72.6
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	178.4	72.6
J-323	8.00	Zone-1	Demand	31	Pattern - 1	31	175.7	72.7
J-767	11.00	Zone-1	Demand	9	Pattern - 1	9	179.5	73.1
J-125	10.00	Zone-1	Demand	15	Pattern - 1	15	178.6	73.1
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	178.7	73.2
J-754	10.00	Zone-1	Demand	49	Pattern - 1	49	178.9	73.2
J-119	10.00	Zone-1	Demand	15	Pattern - 1	15	179.0	73.3
J-620	10.00	Zone-1	Demand	9	Pattern - 1	9	179.2	73.3
J-832	9.00	Zone-1	Demand	9	Pattern - 1	9	178.8	73.6
J-277	10.00	Zone-1	Demand	13	Pattern - 1	13	179.9	73.6
J-773	10.00	Zone-1	Demand	11	Pattern - 1	11	179.9	73.7

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-780	10.00	Zone-1	Demand	19	Pattern - 1	19	180.7	74.0
J-807	9.00	Zone-1	Demand	9	Pattern - 1	9	179.8	74.1
J-805	9.00	Zone-1	Demand	16	Pattern - 1	16	179.8	74.1
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	179.9	74.1
J-855	8.00	Zone-1	Demand	9	Pattern - 1	9	179.3	74.3
J-261	10.00	Zone-1	Demand	16	Pattern - 1	16	181.4	74.3
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	181.7	74.4
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	181.8	74.5
J-753	9.00	Zone-1	Demand	5	Pattern - 1	5	180.9	74.5
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	180.3	74.7
J-731	8.00	Zone-1	Demand	6	Pattern - 1	6	180.7	74.9
J-4	0.00	Zone-1	Demand	11	Fixed	11	172.7	74.9
J-795	6.50	Zone-1	Demand	9	Pattern - 1	9	179.3	74.9
J-752	7.00	Zone-1	Demand	6	Pattern - 1	6	181.0	75.4
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	180.3	75.5
J-785	6.00	Zone-1	Demand	5	Pattern - 1	5	181.4	76.0
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	315.4	132.4
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	319.1	134.0
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

12.2.3:
PDD-Pipe Report

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-288	178.6	178.7	0.1	0.3
P-2	980	12	Ductile Iro	120	false	0.00	Open	463	178.6	177.9	0.7	0.7
P-3	1,500	12	Cast iron	78	false	0.00	Open	274	177.9	177.0	0.9	0.6
P-4	1,440	8	Cast iron	120	false	0.00	Open	-225	176.5	178.4	1.9	1.3
P-5	533	8	Ductile Iro	120	false	0.00	Open	-225	178.4	179.2	0.7	1.3
P-6	290	8	Ductile Iro	120	false	0.00	Open	-167	179.2	179.4	0.2	0.8
P-7	800	10	Ductile Iro	113	false	0.00	Open	-222	179.0	179.4	0.4	0.5
P-8	400	8	Ductile Iro	120	false	0.00	Open	15	179.0	179.0	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	191	179.0	178.6	0.4	0.3
P-10	930	8	Ductile Iro	120	false	0.00	Open	159	177.9	177.3	0.7	0.7
P-11	555	8	Ductile Iro	120	false	0.00	Open	45	177.3	177.2	0.0	0.1
P-12	450	8	Ductile Iro	120	false	0.00	Open	68	177.3	177.2	0.1	0.1
P-13	275	6	Ductile Iro	106	false	0.00	Open	23	177.2	177.2	0.0	0.1
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-108	173.2	175.5	2.3	1.8
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	-15	175.5	177.2	1.7	1.4
P-16	555	12	Ductile Iro	120	false	0.00	Open	274	177.0	176.9	0.1	0.3
P-18	800	8	Ductile Iro	120	false	0.00	Open	-123	176.5	176.9	0.3	0.4
P-19	620	6	Ductile Iro	106	false	0.00	Open	-122	175.5	176.9	1.4	2.2
P-20	650	8	Ductile Iro	120	false	0.00	Open	348	176.5	174.6	1.9	3.0
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	434	174.6	172.7	1.9	1.5
P-22	400	8	Ductile Iro	120	false	0.00	Open	255	172.7	172.0	0.7	1.7
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	-215	172.0	173.7	1.7	1.2
P-24	620	8	Ductile Iro	120	false	0.00	Open	343	173.7	171.9	1.8	2.9
P-25	650	8	Ductile Iro	120	false	0.00	Open	-158	171.5	172.0	0.5	0.7
P-26	600	8	Ductile Iro	120	false	0.00	Open	-133	171.5	171.9	0.3	0.5
P-27	740	8	Ductile Iro	120	false	0.00	Open	-227	173.7	174.7	1.0	1.4
P-28	380	8	Ductile Iro	120	false	0.00	Open	-90	174.6	174.7	0.1	0.2
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-328	174.7	178.7	4.0	2.7
P-30	890	10	Ductile Iro	113	false	0.00	Open	-148	178.7	178.9	0.2	0.2
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-194	178.7	179.2	0.5	0.4
P-32	75	12	Ductile Iro	120	false	0.00	Open	-781	173.7	173.8	0.1	1.9
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-389	173.8	180.3	6.5	3.7
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-391	173.8	181.4	7.6	3.7
P-36	100	10	Ductile Iro	120	false	0.00	Open	-963	171.4	172.0	0.7	6.7
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	222	179.8	179.3	0.5	0.4
P-38	900	8	Ductile Iro	120	false	0.00	Open	139	179.3	178.8	0.5	0.5
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	178.7	178.7	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	707	171.4	171.0	0.4	1.5
P-41	980	8	Ductile Iro	120	false	0.00	Open	-114	170.2	170.6	0.4	0.4
P-42	222	8	Ductile Iro	120	false	0.00	Open	53	170.6	170.6	0.0	0.1
P-43	620	10	Ductile Iro	120	false	0.00	Open	-270	170.6	171.0	0.4	0.6
P-44	610	10	Ductile Iro	99	false	0.00	Open	-529	171.8	173.8	1.9	3.1
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	593	173.8	172.0	1.7	1.1
P-46	520	12	Ductile Iro	120	false	0.00	Open	-1,153	173.8	175.7	2.0	3.8
P-47	666	12	Ductile Iro	120	false	0.00	Open	-1,292	175.7	178.9	3.1	4.7
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-182	178.9	179.5	0.6	0.3
P-49	220	8	Ductile Iro	120	false	0.00	Open	-261	179.2	179.5	0.4	1.8
P-50	200	10	Ductile Iro	113	false	0.00	Open	-451	179.5	179.9	0.4	1.8
P-51	220	10	Ductile Iro	113	false	0.00	Open	90	179.9	179.9	0.0	0.1
P-52	20	8	Ductile Iro	50	false	0.00	Open	544	320.0	319.3	0.7	34.7
P-53	5	10	Ductile Iro	113	false	0.00	Open	634	179.9	179.9	0.0	3.4
P-54	333	10	Ductile Iro	113	false	0.00	Open	402	179.9	179.4	0.5	1.5
P-55	100	10	Ductile Iro	113	false	0.00	Open	219	179.9	179.8	0.0	0.5

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	288	178.8	178.7	0.1	0.3
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-158	178.8	179.3	0.5	0.2
P-58	555	10	Ductile Iro	120	false	0.00	Open	-74	179.3	179.3	0.0	0.1
P-59	580	10	Ductile Iro	50	false	0.00	Open	-12	179.8	179.8	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-93	179.3	179.8	0.5	0.4
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-122	179.8	180.7	0.9	0.7
P-62	730	12	Ductile Iro	120	false	0.00	Open	63	180.7	180.7	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	553	180.7	179.9	0.8	1.0
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-191	180.7	181.0	0.2	0.1
P-65	330	12	Ductile Iro	120	false	0.00	Open	646	181.4	181.0	0.4	1.3
P-66	820	12	Ductile Iro	120	false	0.00	Open	509	181.4	180.7	0.7	0.8
P-67	5	12	Ductile Iro	120	false	0.00	Open	449	181.0	180.9	0.0	0.7
P-68	225	12	Ductile Iro	120	false	0.00	Open	-1,097	180.9	181.7	0.8	3.5
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	181.7	319.1	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	235	180.3	180.3	0.0	7.3
P-71	330	8	Ductile Iro	50	false	0.00	Open	-154	180.3	181.4	1.1	3.4
P-72	10	8	Ductile Iro	50	false	0.00	Open	561	181.7	181.4	0.4	36.8
P-73	100	12	Ductile Iro	120	false	0.00	Open	1,161	181.8	181.4	0.4	3.9
P-74	5	12	Ductile Iro	120	false	0.00	Open	1,659	181.8	181.7	0.0	7.5
P-75	5	10	Ductile Iro	50	false	0.00	Open	2,820	183.0	181.8	1.2	246.5
P-76	20	12	Ductile Iro	120	false	0.00	Open	2,820	319.5	319.1	0.4	20.0
P-77	15	10	Ductile Iro	50	false	0.00	Open	-2,820	315.4	319.1	3.7	246.6
P-78	100	12	Ductile Iro	120	false	0.00	Open	1,541	180.9	180.3	0.7	6.5
P-79	290	12	Ductile Iro	120	false	0.00	Open	1,306	180.3	178.9	1.4	4.8
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	185	171.9	170.7	1.2	0.9
P-81	600	8	Ductile Iro	120	false	0.00	Open	-211	170.7	171.4	0.7	1.2
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	194	170.7	169.3	1.3	1.0
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	-177	169.3	170.2	0.9	0.9
P-84	550	12	Ductile Iro	120	false	0.00	Open	400	170.2	169.9	0.3	0.5
P-85	15	6	Ductile Iro	50	false	0.00	Open	544	182.0	179.9	2.1	141.1
P-86	600	8	Ductile Iro	120	false	0.00	Open	169	169.3	168.8	0.5	0.8
P-87	620	8	Ductile Iro	120	false	0.00	Open	158	168.8	168.4	0.4	0.7
P-88	330	8	Ductile Iro	120	false	0.00	Open	147	168.4	168.2	0.2	0.6
P-89	310	8	Ductile Iro	120	false	0.00	Open	136	168.2	168.0	0.2	0.5
P-90	470	8	Ductile Iro	120	false	0.00	Open	125	168.0	167.8	0.2	0.5
P-91	180	6	Ductile Iro	120	false	0.00	Open	3	167.8	167.8	0.0	0.0
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	104	168.2	167.8	0.4	0.3
P-93	880	8	Ductile Iro	120	false	0.00	Open	69	167.8	167.7	0.1	0.2
P-94	512	8	Ductile Iro	50	false	0.00	Open	33	168.4	168.3	0.1	0.2
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	33	168.3	168.0	0.2	0.2
P-96	1	6	Ductile Iro	120	false	0.00	Open	101	167.8	167.8	0.0	1.2
P-99	1	6	Ductile Iro	120	false	0.00	Open	71	167.7	167.7	0.0	0.7
P-100	4	6	Ductile Iro	120	false	0.00	Open	12	167.4	167.4	0.0	0.0
P-101	240	6	Ductile Iro	120	false	0.00	Open	5	167.4	167.4	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	34	167.5	167.5	0.1	0.2
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	17	167.5	167.4	0.1	0.0
P-104	1	6	Ductile Iro	120	false	0.00	Open	-22	167.4	167.4	0.0	0.1
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-65	167.4	167.7	0.3	0.1
P-106	270	8	Ductile Iro	120	false	0.00	Open	3	167.4	167.4	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-55	167.4	168.1	0.7	0.4
P-108	240	12	Ductile Iro	120	false	0.00	Open	87	168.1	168.1	0.0	0.0
P-109	930	10	Ductile Iro	50	false	0.00	Open	33	168.1	168.0	0.1	0.1
P-110	670	10	Ductile Iro	50	false	0.00	Open	6	168.0	168.0	0.0	0.0

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	-18	168.0	168.1	0.1	0.1
P-112	770	10	Ductile Iro	50	false	0.00	Open	-4	168.0	168.0	0.0	0.0
P-113	900	8	Ductile Iro	50	false	0.00	Open	-24	168.0	168.1	0.1	0.1
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-45	168.1	168.2	0.1	0.1
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	34	168.2	168.2	0.0	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-166	168.2	168.8	0.5	0.8
P-117	245	8	Ductile Iro	120	false	0.00	Open	-91	168.8	168.8	0.1	0.2
P-118	620	8	Ductile Iro	120	false	0.00	Open	-25	168.8	168.8	0.0	0.0
P-119	840	8	Ductile Iro	120	false	0.00	Open	141	168.8	168.4	0.5	0.6
P-121	1,270	8	PVC	120	false	0.00	Open	73	168.4	168.1	0.2	0.2
P-122	290	8	Ductile Iro	120	false	0.00	Open	111	168.2	168.1	0.1	0.4
P-123	660	12	Ductile Iro	120	false	0.00	Open	130	168.1	168.1	0.0	0.1
P-124	380	8	Ductile Iro	120	false	0.00	Open	-240	168.2	168.8	0.6	1.5
P-125	660	8	Ductile Iro	120	false	0.00	Open	-223	168.8	169.7	0.9	1.3
P-126	580	8	Ductile Iro	120	false	0.00	Open	-186	168.4	168.9	0.5	0.9
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	42	168.9	168.8	0.1	0.1
P-128	530	8	Ductile Iro	120	false	0.00	Open	-253	168.9	169.8	0.9	1.7
P-129	130	8	Ductile Iro	120	false	0.00	Open	-172	169.8	169.9	0.1	0.8
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	70	169.9	169.7	0.2	0.2
P-131	910	8	Ductile Iro	120	false	0.00	Open	-266	169.9	171.5	1.7	1.8
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	177	170.7	169.7	1.0	0.9
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	282	172.0	169.9	2.1	2.0
P-134	310	8	Ductile Iro	120	false	0.00	Open	106	169.9	169.8	0.1	0.3
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	191	169.9	168.8	1.1	1.0
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-91	168.8	169.9	1.1	1.0
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	-155	169.9	172.7	2.8	2.7
P-138	470	8	Ductile Iro	120	false	0.00	Open	39	169.9	169.9	0.0	0.1
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	-102	168.8	170.8	2.0	1.3
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	-102	170.8	173.2	2.4	1.6
P-141	980	6	Ductile Iro	78	false	0.00	Open	107	175.7	172.7	3.0	3.1
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	31	172.7	171.9	0.8	0.3
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-45	171.9	172.7	0.8	0.6
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	29	171.9	171.8	0.1	0.0
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	63.7	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	63.7	168.1	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	65	168.2	168.1	0.1	0.1
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	63.7	63.7	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	63.7	63.7	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	-6	168.1	168.1	0.0	0.0
P-161	686	10	Ductile Iro	120	false	0.00	Open	413	173.7	172.7	1.0	1.4
P-162	514	10	Ductile Iro	120	false	0.00	Open	402	172.7	172.0	0.7	1.3
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	168.4	168.4	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	-28	168.1	168.1	0.0	0.0
P-171	362	8	PVC	120	false	0.00	Open	-12	167.4	167.4	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-12	167.4	167.4	0.0	0.0
P-173	1,035	6	PVC	99	false	0.00	Open	0	173.2	173.2	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-166	168.1	168.3	0.2	0.1
P-175	5	12	PVC	120	false	0.00	Open	-166	168.3	168.3	0.0	0.1
P-176	838	12	PVC	120	false	0.00	Open	-166	168.3	168.4	0.1	0.1

Scenario: PDD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	102	168.1	167.7	0.4	0.3
P-190	275	6	Ductile Iro	120	false	0.00	Open	62	167.8	167.7	0.1	0.5
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-27	167.5	167.7	0.1	0.1
P-210	275	6	Ductile Iro	120	false	0.00	Open	53	167.7	167.6	0.1	0.4
P-220	275	6	Ductile Iro	120	false	0.00	Open	-36	167.5	167.6	0.0	0.2
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	30	167.8	167.7	0.1	0.1
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	25	167.7	167.6	0.1	0.1
P-250	440	6	Ductile Iro	120	false	0.00	Open	-7	167.4	167.4	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-14	167.4	167.4	0.0	0.0
P-270	880	6	Ductile Iro	120	false	0.00	Open	32	167.6	167.5	0.1	0.1
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	38	167.7	167.5	0.2	0.2
P-290	330	6	Ductile Iro	120	false	0.00	Open	7	167.5	167.5	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	9	167.5	167.5	0.0	0.0
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	21	167.5	167.4	0.1	0.1
P-320	750	6	Ductile Iro	120	false	0.00	Open	24	167.5	167.4	0.1	0.1
P-330	275	6	Ductile Iro	120	false	0.00	Open	23	167.4	167.4	0.0	0.1
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	14	167.5	167.4	0.0	0.0
P-350	220	6	Ductile Iro	120	false	0.00	Open	7	167.4	167.4	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-1	167.4	167.4	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-2	167.4	167.4	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-3	167.4	167.4	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	13	167.4	167.4	0.0	0.0
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-205	169.7	169.9	0.2	0.2
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-106	163.5	169.9	6.4	4.3
P-420	880	8	Cast iron	120	false	0.00	Open	-4	168.0	168.0	0.0	0.0
P-430	1,210	4	Cast iron	120	false	0.00	Open	8	168.1	168.0	0.1	0.1
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	-23	173.2	177.2	3.9	3.0
P-450	682	12	Ductile Iro	120	false	0.00	Open	-597	170.2	171.0	0.8	1.1
P-460	990	10	Ductile Iro	99	false	0.00	Open	265	171.8	171.0	0.9	0.9
P-470	330	6	Ductile Iro	85	false	0.00	Open	-5	171.0	171.0	0.0	0.0
P-480	880	6	Ductile Iro	85	false	0.00	Open	5	171.0	171.0	0.0	0.0
P-490	1	10	Ductile Iro	50	false	0.00	Open	2,820	315.4	315.2	0.2	246.6
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

12.3.1:
PHD-Fire Flow Analysis Report

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	false	1,000	0	1,000	0	20.0	49.0	20.0	15.8	J-2	5.6	J-3
J-2	true	false	1,000	0	1,000	0	20.0	15.8	20.0	41.2	J-669	5.6	J-3
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	false	1,500	0	1,522	22	20.0	63.8	20.0	15.8	J-2	5.6	J-3
J-5	true	false	1,000	0	1,000	0	20.0	54.9	20.0	15.8	J-2	5.6	J-3
J-6	true	false	1,000	0	1,000	0	20.0	47.3	20.0	15.8	J-2	5.6	J-3
J-7	true	false	1,000	0	1,023	23	20.0	47.3	20.0	15.8	J-2	5.6	J-3
J-8	true	false	1,000	0	1,000	0	20.0	57.5	20.0	15.8	J-2	5.6	J-3
J-9	true	false	1,000	0	1,000	0	20.0	50.8	20.0	15.8	J-2	5.6	J-3
J-10	true	false	1,000	0	1,000	0	20.0	50.8	20.0	15.8	J-2	5.6	J-3
J-12	true	false	2,500	0	2,570	70	20.0	53.8	20.0	15.8	J-2	5.6	J-3
J-22	true	false	1,000	0	1,077	77	20.0	53.3	20.0	15.8	J-2	5.6	J-3
J-25	true	false	1,000	0	1,041	41	20.0	54.0	20.0	15.8	J-2	5.6	J-3
J-29	true	false	1,000	0	1,022	22	20.0	54.3	20.0	15.8	J-2	5.6	J-3
J-34	true	false	1,000	0	1,022	22	20.0	54.9	20.0	15.8	J-2	5.6	J-3
J-38	true	false	1,000	0	1,022	22	20.0	55.5	20.0	15.8	J-2	5.6	J-3
J-49	true	false	1,000	0	1,091	91	20.0	47.3	20.0	15.8	J-2	5.6	J-3
J-58	true	false	1,000	0	1,106	106	20.0	50.1	20.0	15.8	J-2	5.6	J-3
J-64	true	false	1,000	0	1,019	19	20.0	53.4	20.0	15.8	J-2	5.6	J-3
J-71	true	false	1,000	0	1,000	0	20.0	51.8	20.0	15.8	J-2	5.6	J-3
J-74	true	false	1,000	0	1,049	49	20.0	53.4	20.0	15.8	J-2	5.6	J-3
J-87	true	false	1,000	0	1,022	22	20.0	54.6	20.0	15.8	J-2	5.6	J-3
J-100	true	false	1,000	0	1,071	71	20.0	47.9	20.0	15.8	J-2	5.6	J-3
J-103	true	false	1,000	0	1,058	58	20.0	53.3	20.0	15.8	J-2	5.6	J-3
J-106	true	false	1,000	0	1,019	19	20.0	53.8	20.0	15.8	J-2	5.6	J-3
J-109	true	false	1,000	0	1,403	403	20.0	56.3	20.0	15.8	J-2	5.6	J-3
J-119	true	false	1,000	0	1,031	31	20.0	69.7	20.0	15.8	J-2	5.6	J-3
J-125	true	false	1,000	0	1,031	31	20.0	69.4	20.0	15.8	J-2	5.6	J-3
J-156	true	false	1,000	0	1,059	59	20.0	57.5	20.0	15.8	J-2	5.6	J-3
J-166	true	false	1,000	0	1,000	0	20.0	64.0	20.0	15.8	J-2	5.6	J-3
J-169	true	false	1,000	0	1,059	59	20.0	64.0	20.0	15.8	J-2	5.6	J-3
J-174	true	false	1,000	0	1,059	59	20.0	62.0	20.0	15.8	J-2	5.6	J-3
J-179	true	false	3,000	0	3,059	59	20.0	63.8	20.0	15.8	J-2	5.6	J-3
J-184	true	false	1,000	0	1,000	0	20.0	61.4	20.0	15.8	J-2	5.6	J-3
J-188	true	false	1,000	0	1,020	20	20.0	58.2	20.0	15.8	J-2	5.6	J-3
J-196	true	false	1,000	0	1,028	28	20.0	68.0	20.0	15.8	J-2	5.6	J-3
J-219	true	false	1,000	0	1,091	91	20.0	63.7	20.0	15.8	J-2	5.6	J-3
J-222	true	false	1,000	0	1,091	91	20.0	64.5	20.0	15.8	J-2	5.6	J-3
J-227	true	false	1,000	0	1,059	59	20.0	66.9	20.0	15.8	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	false	1,000	0	1,000	0	20.0	56.8	20.0	15.8	J-2	5.6	J-3
J-250	true	false	1,000	0	1,075	75	20.0	56.6	20.0	15.8	J-2	5.6	J-3
J-259	true	false	1,000	0	1,000	0	20.0	72.8	20.0	15.8	J-2	5.6	J-3
J-260	true	false	1,000	0	1,000	0	20.0	72.0	20.0	15.8	J-2	5.6	J-3
J-261	true	false	1,000	0	1,032	32	20.0	72.6	20.0	15.8	J-2	5.6	J-3
J-272	true	false	1,000	0	1,000	0	20.0	68.2	20.0	15.8	J-2	5.6	J-3
J-276	true	false	1,000	0	1,027	27	20.0	69.3	20.0	15.8	J-2	5.6	J-3
J-277	true	false	1,000	0	1,027	27	20.0	70.9	20.0	15.8	J-2	5.6	J-3
J-288	true	false	1,000	0	1,000	0	20.0	64.5	20.0	15.8	J-2	5.6	J-3
J-298	true	false	1,000	0	1,063	63	20.0	62.4	20.0	15.8	J-2	5.6	J-3
J-302	true	false	1,000	0	1,585	585	20.0	59.4	20.0	15.8	J-2	5.6	J-3
J-323	true	false	1,000	0	1,063	63	20.0	65.0	20.0	15.8	J-2	5.6	J-3

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-328	true	false	1,000	0	1,063	63	20.0	60.3	20.0	15.8	J-2	5.6	J-3
J-333	true	false	1,000	0	1,095	95	20.0	60.2	20.0	15.8	J-2	5.6	J-3
J-370	true	false	3,500	0	3,712	212	20.0	56.7	20.0	15.8	J-2	5.6	J-3
J-374	true	false	1,000	0	1,000	0	20.0	57.4	20.0	15.8	J-2	5.6	J-3
J-376	true	false	1,000	0	1,000	0	20.0	58.0	20.0	15.8	J-2	5.6	J-3
J-387	true	false	1,000	0	1,207	207	20.0	57.8	20.0	15.8	J-2	5.6	J-3
J-388	true	false	1,000	0	1,212	212	20.0	46.8	20.0	15.8	J-2	5.6	J-3
J-390	true	false	1,000	0	1,049	49	20.0	48.6	20.0	15.8	J-2	5.6	J-3
J-398	true	false	1,000	0	1,049	49	20.0	49.1	20.0	15.8	J-2	5.6	J-3
J-400	true	false	2,250	0	2,299	49	20.0	52.0	20.0	15.8	J-2	5.6	J-3
J-407	true	false	1,000	0	1,049	49	20.0	52.1	20.0	15.8	J-2	5.6	J-3
J-408	true	false	1,500	0	1,560	60	20.0	56.2	20.0	15.8	J-2	5.6	J-3
J-411	true	false	1,000	0	1,049	49	20.0	57.3	20.0	15.8	J-2	5.6	J-3
J-435	true	false	1,000	0	1,109	109	20.0	50.5	20.0	15.8	J-2	5.6	J-3
J-439	true	false	1,000	0	1,049	49	20.0	51.8	20.0	15.8	J-2	5.6	J-3
J-442	true	false	1,000	0	1,049	49	20.0	52.7	20.0	15.8	J-2	5.6	J-3
J-446	true	false	1,000	0	1,049	49	20.0	52.9	20.0	15.8	J-2	5.6	J-3
J-452	true	false	1,000	0	1,049	49	20.0	55.9	20.0	15.8	J-2	5.6	J-3
J-453	true	false	1,000	0	1,049	49	20.0	56.4	20.0	15.8	J-2	5.6	J-3
J-459	true	false	1,000	0	1,109	109	20.0	52.3	20.0	15.8	J-2	5.6	J-3
J-461	true	false	1,000	0	1,049	49	20.0	53.8	20.0	15.8	J-2	5.6	J-3
J-464	true	false	1,000	0	1,049	49	20.0	54.7	20.0	15.8	J-2	5.6	J-3
J-473	true	false	1,000	0	1,063	63	20.0	56.2	20.0	15.8	J-2	5.6	J-3
J-474	true	false	1,000	0	1,089	89	20.0	55.6	20.0	15.8	J-2	5.6	J-3
J-501	true	false	1,000	0	1,019	19	20.0	47.7	20.0	15.8	J-2	5.6	J-3
J-502	true	false	1,000	0	1,019	19	20.0	48.1	20.0	15.8	J-2	5.6	J-3
J-508	true	false	1,000	0	1,019	19	20.0	53.3	20.0	15.8	J-2	5.6	J-3
J-513	true	false	1,000	0	1,019	19	20.0	53.4	20.0	15.8	J-2	5.6	J-3
J-518	true	false	1,000	0	1,019	19	20.0	54.0	20.0	15.8	J-2	5.6	J-3
J-519	true	false	1,000	0	1,019	19	20.0	47.7	20.0	15.8	J-2	5.6	J-3
J-520	true	false	1,000	0	1,019	19	20.0	53.3	20.0	15.8	J-2	5.6	J-3
J-526	true	false	1,000	0	1,062	62	20.0	53.3	20.0	15.8	J-2	5.6	J-3
J-533	true	false	1,000	0	1,019	19	20.0	53.4	20.0	15.8	J-2	5.6	J-3
J-536	true	false	1,000	0	1,019	19	20.0	53.8	20.0	15.8	J-2	5.6	J-3
J-541	true	false	1,000	0	1,019	19	20.0	53.3	20.0	15.8	J-2	5.6	J-3
J-542	true	false	1,000	0	1,019	19	20.0	51.1	20.0	15.8	J-2	5.6	J-3
J-547	true	false	1,000	0	1,019	19	20.0	53.4	20.0	15.8	J-2	5.6	J-3
J-573	true	false	1,000	0	1,037	37	20.0	43.6	20.0	15.8	J-2	5.6	J-3
J-579	true	false	2,500	0	2,618	118	20.0	43.6	20.0	15.8	J-2	5.6	J-3
J-592	true	false	3,500	0	3,553	53	20.0	48.5	20.0	15.8	J-2	5.6	J-3
J-610	true	false	1,000	0	1,054	54	20.0	45.6	20.0	15.8	J-2	5.6	J-3
J-612	true	false	1,000	0	1,057	57	20.0	44.3	20.0	15.8	J-2	5.6	J-3
J-620	true	false	1,000	0	1,018	18	20.0	69.7	20.0	15.8	J-2	5.6	J-3
J-623	true	false	1,000	0	1,031	31	20.0	68.9	20.0	15.8	J-2	5.6	J-3
J-627	true	false	1,000	0	1,000	0	20.0	44.8	20.0	15.8	J-2	5.6	J-3
J-632	true	false	1,000	0	1,122	122	20.0	44.8	20.0	15.8	J-2	5.6	J-3
J-642	true	false	1,000	0	1,046	46	20.0	45.1	20.0	15.8	J-2	5.6	J-3
J-650	true	false	1,500	0	1,500	0	20.0	50.1	20.0	15.8	J-2	5.6	J-3
J-664	true	false	1,000	0	1,079	79	20.0	47.7	20.0	15.8	J-2	5.6	J-3
J-669	true	false	1,000	0	1,067	67	20.0	41.2	20.0	15.8	J-2	5.6	J-3
J-703	true	false	1,000	0	1,049	49	20.0	57.5	20.0	15.8	J-2	5.6	J-3
J-708	true	false	1,000	0	1,409	409	20.0	57.2	20.0	15.8	J-2	5.6	J-3

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-710	true	false	1,000	0	1,179	179	20.0	56.4	20.0	15.8	J-2	5.6	J-3
J-713	true	false	1,000	0	1,267	267	20.0	56.8	20.0	15.8	J-2	5.6	J-3
J-715	true	false	1,000	0	1,008	8	20.0	58.6	20.0	15.8	J-2	5.6	J-3
J-731	true	false	1,000	0	1,012	12	20.0	72.7	20.0	15.8	J-2	5.6	J-3
J-752	true	false	1,000	0	1,012	12	20.0	73.4	20.0	15.8	J-2	5.6	J-3
J-753	true	false	1,000	0	1,011	11	20.0	72.5	20.0	15.8	J-2	5.6	J-3
J-754	true	false	1,000	0	1,097	97	20.0	69.1	20.0	15.8	J-2	5.6	J-3
J-767	true	false	1,000	0	1,018	18	20.0	69.8	20.0	15.8	J-2	5.6	J-3
J-769	true	false	1,000	0	1,000	0	20.0	71.3	20.0	15.8	J-2	5.6	J-3
J-773	true	false	1,000	0	1,023	23	20.0	70.9	20.0	15.8	J-2	5.6	J-3
J-780	true	false	1,000	0	1,039	39	20.0	71.8	20.0	15.8	J-2	5.6	J-3
J-785	true	false	1,000	0	1,011	11	20.0	74.5	20.0	15.8	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	false	1,000	0	1,000	0	20.0	73.2	20.0	15.8	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	false	1,000	0	1,000	0	20.0	73.3	20.0	15.8	J-2	5.6	J-3
J-795	true	false	1,000	0	1,018	18	20.0	71.7	20.0	15.8	J-2	5.6	J-3
J-805	true	false	1,000	0	1,033	33	20.0	71.3	20.0	15.8	J-2	5.6	J-3
J-807	true	false	1,000	0	1,018	18	20.0	71.2	20.0	15.8	J-2	5.6	J-3
J-808	true	false	1,000	0	1,000	0	20.0	69.6	20.0	15.8	J-2	5.6	J-3
J-832	true	false	1,000	0	1,018	18	20.0	70.2	20.0	15.8	J-2	5.6	J-3
J-855	true	false	1,000	0	1,018	18	20.0	71.1	20.0	15.8	J-2	5.6	J-3
J-872	true	false	1,000	0	1,106	106	20.0	57.8	20.0	15.8	J-2	5.6	J-3

12.3.2:
PHD-Junction Report

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	54.5	15.8
J-669	36.00	Zone-1	Demand	67	Pattern - 1	67	130.9	41.2
J-573	30.00	Zone-1	Demand	37	Pattern - 1	37	130.6	43.6
J-579	30.00	Zone-1	Demand	118	Pattern - 1	118	130.6	43.6
J-612	28.00	Zone-1	Demand	57	Pattern - 1	57	130.3	44.3
J-632	27.00	Zone-1	Demand	122	Pattern - 1	122	130.3	44.8
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	130.3	44.8
J-642	27.00	Zone-1	Demand	46	Pattern - 1	46	131.0	45.1
J-610	25.00	Zone-1	Demand	54	Pattern - 1	54	130.3	45.6
J-388	6.00	Zone-1	Demand	212	Pattern - 1	212	114.0	46.8
J-7	19.00	Zone-1	Demand	23	Fixed	23	128.0	47.3
J-6	19.00	Zone-1	Demand	0	Fixed	0	128.0	47.3
J-49	19.00	Zone-1	Demand	91	Pattern - 1	91	128.1	47.3
J-519	18.00	Zone-1	Demand	19	Pattern - 1	19	127.9	47.7
J-501	18.00	Zone-1	Demand	19	Pattern - 1	19	128.0	47.7
J-664	18.00	Zone-1	Demand	79	Pattern - 1	79	128.1	47.7
J-100	20.00	Zone-1	Demand	71	Pattern - 1	71	130.5	47.9
J-502	17.00	Zone-1	Demand	19	Pattern - 1	19	128.1	48.1
J-592	21.00	Zone-1	Demand	53	Pattern - 1	53	132.9	48.5
J-390	21.00	Zone-1	Demand	49	Pattern - 1	49	133.1	48.6
J-1	18.00	Zone-1	Demand	0	Fixed	0	131.1	49.0
J-398	20.00	Zone-1	Demand	49	Pattern - 1	49	133.2	49.1
J-58	15.00	Zone-1	Demand	106	Pattern - 1	106	130.5	50.1
J-650	25.00	Zone-1	Demand	0	Pattern - 1	0	140.6	50.1
J-435	15.00	Zone-1	Demand	109	Pattern - 1	109	131.5	50.5
J-9	14.00	Zone-1	Demand	0	Fixed	0	131.1	50.8
J-10	14.00	Zone-1	Demand	0	Fixed	0	131.1	50.8
J-542	10.00	Zone-1	Demand	19	Pattern - 1	19	128.0	51.1
J-439	14.00	Zone-1	Demand	49	Pattern - 1	49	133.4	51.8
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	130.5	51.8
J-400	17.00	Zone-1	Demand	49	Pattern - 1	49	137.0	52.0
J-407	17.00	Zone-1	Demand	49	Pattern - 1	49	137.1	52.1
J-459	10.00	Zone-1	Demand	109	Pattern - 1	109	130.7	52.3
J-442	15.00	Zone-1	Demand	49	Pattern - 1	49	136.6	52.7
J-446	15.00	Zone-1	Demand	49	Pattern - 1	49	137.0	52.9
J-520	5.00	Zone-1	Demand	19	Pattern - 1	19	127.9	53.3
J-541	5.00	Zone-1	Demand	19	Pattern - 1	19	127.9	53.3
J-526	5.00	Zone-1	Demand	62	Pattern - 1	62	128.0	53.3
J-508	5.00	Zone-1	Demand	19	Pattern - 1	19	128.0	53.3
J-103	5.50	Zone-1	Demand	58	Pattern - 1	58	128.5	53.3
J-22	6.50	Zone-1	Demand	77	Pattern - 1	77	129.5	53.3
J-74	8.00	Zone-1	Demand	49	Pattern - 1	49	131.1	53.4
J-64	5.50	Zone-1	Demand	19	Pattern - 1	19	128.7	53.4
J-513	5.00	Zone-1	Demand	19	Pattern - 1	19	128.2	53.4
J-533	5.00	Zone-1	Demand	19	Pattern - 1	19	128.2	53.4
J-547	5.00	Zone-1	Demand	19	Pattern - 1	19	128.2	53.4
J-536	5.00	Zone-1	Demand	19	Pattern - 1	19	129.0	53.8
J-106	5.00	Zone-1	Demand	19	Pattern - 1	19	129.1	53.8
J-12	5.00	Zone-1	Demand	70	Pattern - 1	70	129.1	53.8
J-461	9.00	Zone-1	Demand	49	Pattern - 1	49	133.1	53.8
J-518	5.00	Zone-1	Demand	19	Pattern - 1	19	129.5	54.0
J-25	5.00	Zone-1	Demand	41	Pattern - 1	41	129.5	54.0
J-29	5.00	Zone-1	Demand	22	Pattern - 1	22	130.3	54.3

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-87	5.00	Zone-1	Demand	22	Pattern - 1	22	130.9	54.6
J-464	10.00	Zone-1	Demand	49	Pattern - 1	49	136.2	54.7
J-34	5.00	Zone-1	Demand	22	Pattern - 1	22	131.6	54.9
J-5	5.00	Zone-1	Demand	0	Fixed	0	131.6	54.9
J-38	5.00	Zone-1	Demand	22	Pattern - 1	22	133.1	55.5
J-474	14.00	Zone-1	Demand	89	Pattern - 1	89	142.2	55.6
J-452	14.00	Zone-1	Demand	49	Pattern - 1	49	143.0	55.9
J-408	15.00	Zone-1	Demand	60	Pattern - 1	60	144.6	56.2
J-473	15.00	Zone-1	Demand	63	Pattern - 1	63	144.6	56.2
J-109	5.00	Zone-1	Demand	403	Pattern - 1	403	134.8	56.3
J-710	7.00	Zone-1	Demand	179	Pattern - 1	179	137.0	56.4
J-453	14.00	Zone-1	Demand	49	Pattern - 1	49	144.0	56.4
J-250	20.00	Zone-1	Demand	75	Pattern - 1	75	150.5	56.6
J-370	10.00	Zone-1	Demand	212	Pattern - 1	212	140.9	56.7
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	151.0	56.8
J-713	7.00	Zone-1	Demand	267	Pattern - 1	267	138.1	56.8
J-708	4.50	Zone-1	Demand	409	Pattern - 1	409	136.4	57.2
J-411	15.00	Zone-1	Demand	49	Pattern - 1	49	147.1	57.3
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	140.8	57.4
J-703	7.00	Zone-1	Demand	49	Pattern - 1	49	139.7	57.5
J-8	17.00	Zone-1	Demand	0	Fixed	0	149.7	57.5
J-156	17.00	Zone-1	Demand	59	Pattern - 1	59	149.7	57.5
J-872	6.00	Zone-1	Demand	106	Pattern - 1	106	139.4	57.8
J-387	6.00	Zone-1	Demand	207	Pattern - 1	207	139.4	57.8
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	140.8	58.0
J-188	20.00	Zone-1	Demand	20	Pattern - 1	20	154.4	58.2
J-715	19.00	Zone-1	Demand	8	Pattern - 1	8	154.1	58.6
J-302	7.00	Zone-1	Demand	585	Pattern - 1	585	143.9	59.4
J-333	5.50	Zone-1	Demand	95	Pattern - 1	95	144.3	60.2
J-328	8.00	Zone-1	Demand	63	Pattern - 1	63	147.2	60.3
J-184	20.00	Zone-1	Demand	0	Pattern - 1	0	161.6	61.4
J-174	15.00	Zone-1	Demand	59	Pattern - 1	59	158.1	62.0
J-298	7.00	Zone-1	Demand	63	Pattern - 1	63	150.8	62.4
J-219	18.00	Zone-1	Demand	91	Pattern - 1	91	164.9	63.7
J-4	0.00	Zone-1	Demand	22	Fixed	22	147.1	63.8
J-179	16.00	Zone-1	Demand	59	Pattern - 1	59	163.1	63.8
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	164.6	64.0
J-169	17.00	Zone-1	Demand	59	Pattern - 1	59	164.7	64.0
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	163.7	64.5
J-222	16.00	Zone-1	Demand	91	Pattern - 1	91	164.8	64.5
J-323	8.00	Zone-1	Demand	63	Pattern - 1	63	158.0	65.0
J-227	13.00	Zone-1	Demand	59	Pattern - 1	59	167.3	66.9
J-196	12.00	Zone-1	Demand	28	Pattern - 1	28	168.8	68.0
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	168.3	68.2
J-623	12.00	Zone-1	Demand	31	Pattern - 1	31	170.9	68.9
J-754	10.00	Zone-1	Demand	97	Pattern - 1	97	169.3	69.1
J-276	12.00	Zone-1	Demand	27	Pattern - 1	27	171.8	69.3
J-125	10.00	Zone-1	Demand	31	Pattern - 1	31	170.0	69.4
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	170.6	69.6
J-620	10.00	Zone-1	Demand	18	Pattern - 1	18	170.8	69.7
J-119	10.00	Zone-1	Demand	31	Pattern - 1	31	170.8	69.7
J-767	11.00	Zone-1	Demand	18	Pattern - 1	18	172.1	69.8
J-832	9.00	Zone-1	Demand	18	Pattern - 1	18	170.8	70.2
J-277	10.00	Zone-1	Demand	27	Pattern - 1	27	173.5	70.9

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-773	10.00	Zone-1	Demand	23	Pattern - 1	23	173.5	70.9
J-855	8.00	Zone-1	Demand	18	Pattern - 1	18	172.1	71.1
J-807	9.00	Zone-1	Demand	18	Pattern - 1	18	173.3	71.2
J-805	9.00	Zone-1	Demand	33	Pattern - 1	33	173.4	71.3
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	173.5	71.3
J-795	6.50	Zone-1	Demand	18	Pattern - 1	18	172.0	71.7
J-780	10.00	Zone-1	Demand	39	Pattern - 1	39	175.7	71.8
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	174.0	72.0
J-753	9.00	Zone-1	Demand	11	Pattern - 1	11	176.3	72.5
J-261	10.00	Zone-1	Demand	32	Pattern - 1	32	177.6	72.6
J-731	8.00	Zone-1	Demand	12	Pattern - 1	12	175.7	72.7
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	173.9	72.8
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	178.8	73.2
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	179.0	73.3
J-752	7.00	Zone-1	Demand	12	Pattern - 1	12	176.3	73.4
J-785	6.00	Zone-1	Demand	11	Pattern - 1	11	177.7	74.5
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	306.1	128.4
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	318.2	133.6
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

12.3.3:
PHD-Pipe Report

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-691	170.0	170.6	0.7	1.5
P-2	980	12	Ductile Iro	120	false	0.00	Open	960	170.0	167.3	2.7	2.7
P-3	1,500	12	Cast iron	78	false	0.00	Open	581	167.3	163.7	3.6	2.4
P-4	1,440	8	Cast iron	120	false	0.00	Open	-443	161.6	168.3	6.7	4.7
P-5	533	8	Ductile Iro	120	false	0.00	Open	-443	168.3	170.8	2.5	4.7
P-6	290	8	Ductile Iro	120	false	0.00	Open	-382	170.8	171.8	1.0	3.6
P-7	800	10	Ductile Iro	113	false	0.00	Open	-361	170.9	171.8	1.0	1.2
P-8	400	8	Ductile Iro	120	false	0.00	Open	31	170.9	170.8	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	299	170.9	170.0	0.9	0.8
P-10	930	8	Ductile Iro	120	false	0.00	Open	320	167.3	164.9	2.4	2.6
P-11	555	8	Ductile Iro	120	false	0.00	Open	91	164.9	164.8	0.1	0.2
P-12	450	8	Ductile Iro	120	false	0.00	Open	139	164.9	164.7	0.2	0.5
P-13	275	6	Ductile Iro	106	false	0.00	Open	48	164.7	164.6	0.1	0.4
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-219	149.7	158.1	8.4	6.5
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	-32	158.1	164.7	6.5	5.4
P-16	555	12	Ductile Iro	120	false	0.00	Open	581	163.7	163.1	0.6	1.1
P-18	800	8	Ductile Iro	120	false	0.00	Open	-277	161.6	163.1	1.6	2.0
P-19	620	6	Ductile Iro	106	false	0.00	Open	-246	158.1	163.1	5.0	8.1
P-20	650	8	Ductile Iro	120	false	0.00	Open	719	161.6	154.1	7.5	11.5
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	875	154.1	147.1	7.0	5.6
P-22	400	8	Ductile Iro	120	false	0.00	Open	516	147.1	144.6	2.5	6.2
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	-426	144.6	150.5	5.9	4.4
P-24	620	8	Ductile Iro	120	false	0.00	Open	683	150.5	144.0	6.5	10.4
P-25	650	8	Ductile Iro	120	false	0.00	Open	-318	143.0	144.6	1.7	2.5
P-26	600	8	Ductile Iro	120	false	0.00	Open	-263	143.0	144.0	1.1	1.8
P-27	740	8	Ductile Iro	120	false	0.00	Open	-468	150.5	154.4	3.8	5.2
P-28	380	8	Ductile Iro	120	false	0.00	Open	-164	154.1	154.4	0.3	0.7
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-652	154.4	168.8	14.4	9.6
P-30	890	10	Ductile Iro	113	false	0.00	Open	-250	168.8	169.3	0.5	0.6
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-430	168.8	170.8	2.0	1.7
P-32	75	12	Ductile Iro	120	false	0.00	Open	-1,542	150.5	151.0	0.5	6.6
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-771	151.0	173.9	22.9	13.1
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-771	151.0	177.6	26.6	13.1
P-36	100	10	Ductile Iro	120	false	0.00	Open	-1,922	142.2	144.6	2.4	24.0
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	366	173.3	172.1	1.3	1.1
P-38	900	8	Ductile Iro	120	false	0.00	Open	226	172.1	170.8	1.2	1.4
P-39	120	8	Ductile Iro	50	false	0.00	Open	227	171.5	170.6	0.8	6.9
P-40	242	12	Ductile Iro	120	false	0.00	Open	1,415	142.2	140.9	1.4	5.6
P-41	980	8	Ductile Iro	120	false	0.00	Open	-226	138.1	139.4	1.3	1.4
P-42	222	8	Ductile Iro	120	false	0.00	Open	106	139.4	139.4	0.1	0.3
P-43	620	10	Ductile Iro	120	false	0.00	Open	-539	139.4	140.8	1.4	2.3
P-44	610	10	Ductile Iro	99	false	0.00	Open	-1,056	143.9	150.8	6.9	11.3
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	1,181	150.8	144.6	6.2	4.0
P-46	520	12	Ductile Iro	120	false	0.00	Open	-2,301	150.8	158.0	7.2	13.8
P-47	666	12	Ductile Iro	120	false	0.00	Open	-2,578	158.0	169.3	11.3	17.0
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-403	169.3	172.1	2.8	1.5
P-49	220	8	Ductile Iro	120	false	0.00	Open	-508	170.8	172.1	1.3	6.0
P-50	200	10	Ductile Iro	113	false	0.00	Open	-929	172.1	173.5	1.4	7.0
P-51	220	10	Ductile Iro	113	false	0.00	Open	8	173.5	173.5	0.0	0.0
P-52	20	8	Ductile Iro	50	false	0.00	Open	1,152	320.0	317.2	2.8	139.4
P-53	5	10	Ductile Iro	113	false	0.00	Open	1,160	173.5	173.5	0.1	10.5
P-54	333	10	Ductile Iro	113	false	0.00	Open	770	173.5	171.8	1.6	4.9
P-55	100	10	Ductile Iro	113	false	0.00	Open	363	173.5	173.3	0.1	1.2

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	464	170.8	170.6	0.2	0.7
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-256	170.8	172.0	1.1	0.6
P-58	555	10	Ductile Iro	120	false	0.00	Open	-121	172.0	172.1	0.1	0.1
P-59	580	10	Ductile Iro	50	false	0.00	Open	-21	173.3	173.4	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-154	172.0	173.4	1.4	1.1
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-208	173.4	175.7	2.4	2.0
P-62	730	12	Ductile Iro	120	false	0.00	Open	83	175.7	175.7	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	959	175.7	173.5	2.2	2.7
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-303	175.7	176.3	0.6	0.3
P-65	330	12	Ductile Iro	120	false	0.00	Open	1,243	177.7	176.3	1.5	4.4
P-66	820	12	Ductile Iro	120	false	0.00	Open	915	177.7	175.7	2.0	2.5
P-67	5	12	Ductile Iro	120	false	0.00	Open	927	176.3	176.3	0.0	2.6
P-68	225	12	Ductile Iro	120	false	0.00	Open	-2,082	176.3	178.8	2.6	11.4
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	178.8	318.2	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	476	174.0	173.9	0.1	27.1
P-71	330	8	Ductile Iro	50	false	0.00	Open	-295	173.9	177.6	3.7	11.2
P-72	10	8	Ductile Iro	50	false	0.00	Open	1,097	178.8	177.6	1.3	127.3
P-73	100	12	Ductile Iro	120	false	0.00	Open	2,168	179.0	177.7	1.2	12.3
P-74	5	12	Ductile Iro	120	false	0.00	Open	3,179	179.0	178.8	0.1	25.0
P-75	5	10	Ductile Iro	50	false	0.00	Open	5,347	183.0	179.0	4.0	806.6
P-76	20	12	Ductile Iro	120	false	0.00	Open	5,347	319.5	318.2	1.3	65.6
P-77	15	10	Ductile Iro	50	false	0.00	Open	-5,347	306.1	318.2	12.1	806.6
P-78	100	12	Ductile Iro	120	false	0.00	Open	2,998	176.3	174.0	2.2	22.5
P-79	290	12	Ductile Iro	120	false	0.00	Open	2,522	174.0	169.3	4.7	16.3
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	370	144.0	139.7	4.3	3.4
P-81	600	8	Ductile Iro	120	false	0.00	Open	-418	139.7	142.2	2.5	4.2
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	387	139.7	134.8	4.9	3.7
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	-352	134.8	138.1	3.3	3.1
P-84	550	12	Ductile Iro	120	false	0.00	Open	800	138.1	137.0	1.1	1.9
P-85	15	6	Ductile Iro	50	false	0.00	Open	1,152	182.0	173.5	8.5	566.0
P-86	600	8	Ductile Iro	120	false	0.00	Open	337	134.8	133.1	1.7	2.8
P-87	620	8	Ductile Iro	120	false	0.00	Open	315	133.1	131.6	1.5	2.5
P-88	330	8	Ductile Iro	120	false	0.00	Open	293	131.6	130.9	0.7	2.2
P-89	310	8	Ductile Iro	120	false	0.00	Open	271	130.9	130.3	0.6	1.9
P-90	470	8	Ductile Iro	120	false	0.00	Open	248	130.3	129.5	0.8	1.6
P-91	180	6	Ductile Iro	120	false	0.00	Open	5	129.5	129.5	0.0	0.0
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	209	131.1	129.5	1.5	1.2
P-93	880	8	Ductile Iro	120	false	0.00	Open	138	129.5	129.1	0.5	0.5
P-94	512	8	Ductile Iro	50	false	0.00	Open	66	131.5	131.1	0.4	0.7
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	66	131.1	130.3	0.8	0.7
P-96	1	6	Ductile Iro	120	false	0.00	Open	202	129.5	129.5	0.0	4.5
P-99	1	6	Ductile Iro	120	false	0.00	Open	143	129.1	129.1	0.0	2.3
P-100	4	6	Ductile Iro	120	false	0.00	Open	25	127.9	127.9	0.0	0.1
P-101	240	6	Ductile Iro	120	false	0.00	Open	10	128.0	127.9	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	68	128.5	128.2	0.3	0.6
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	34	128.2	127.9	0.3	0.2
P-104	1	6	Ductile Iro	120	false	0.00	Open	-45	128.0	128.0	0.0	0.3
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-130	128.1	129.1	0.9	0.5
P-106	270	8	Ductile Iro	120	false	0.00	Open	5	128.1	128.1	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-109	128.1	130.5	2.4	1.4
P-108	240	12	Ductile Iro	120	false	0.00	Open	173	130.5	130.5	0.0	0.1
P-109	930	10	Ductile Iro	50	false	0.00	Open	66	130.5	130.3	0.2	0.2
P-110	670	10	Ductile Iro	50	false	0.00	Open	12	130.3	130.3	0.0	0.0

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

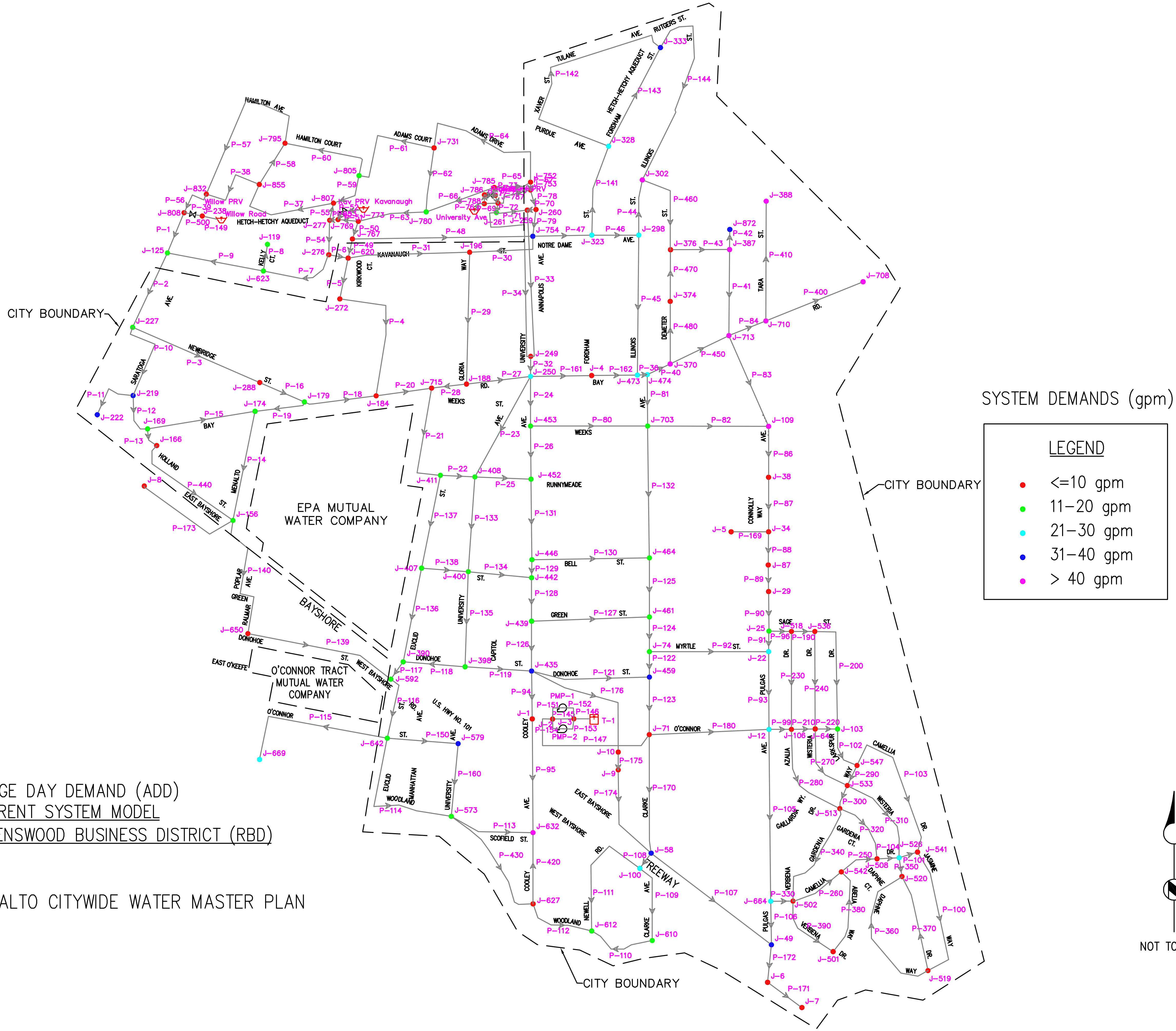
Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	-36	130.3	130.5	0.2	0.2
P-112	770	10	Ductile Iro	50	false	0.00	Open	-9	130.3	130.3	0.0	0.0
P-113	900	8	Ductile Iro	50	false	0.00	Open	-49	130.3	130.6	0.4	0.4
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-90	130.6	131.0	0.4	0.2
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	67	131.0	130.9	0.1	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-334	131.0	132.9	1.9	2.8
P-117	245	8	Ductile Iro	120	false	0.00	Open	-179	132.9	133.1	0.2	0.9
P-118	620	8	Ductile Iro	120	false	0.00	Open	-47	133.1	133.2	0.0	0.1
P-119	840	8	Ductile Iro	120	false	0.00	Open	284	133.2	131.5	1.7	2.1
P-121	1,270	8	PVC	120	false	0.00	Open	147	131.5	130.7	0.8	0.6
P-122	290	8	Ductile Iro	120	false	0.00	Open	221	131.1	130.7	0.4	1.3
P-123	660	12	Ductile Iro	120	false	0.00	Open	260	130.7	130.5	0.2	0.2
P-124	380	8	Ductile Iro	120	false	0.00	Open	-480	131.1	133.1	2.1	5.4
P-125	660	8	Ductile Iro	120	false	0.00	Open	-444	133.1	136.2	3.1	4.7
P-126	580	8	Ductile Iro	120	false	0.00	Open	-371	131.5	133.4	2.0	3.4
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	86	133.4	133.1	0.3	0.2
P-128	530	8	Ductile Iro	120	false	0.00	Open	-506	133.4	136.6	3.2	6.0
P-129	130	8	Ductile Iro	120	false	0.00	Open	-341	136.6	137.0	0.4	2.9
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	142	137.0	136.2	0.7	0.6
P-131	910	8	Ductile Iro	120	false	0.00	Open	-532	137.0	143.0	6.0	6.6
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	352	139.7	136.2	3.5	3.1
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	564	144.6	137.0	7.6	7.3
P-134	310	8	Ductile Iro	120	false	0.00	Open	214	137.0	136.6	0.4	1.2
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	380	137.0	133.2	3.8	3.5
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-181	133.1	137.1	3.9	3.6
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	-310	137.1	147.1	10.0	9.8
P-138	470	8	Ductile Iro	120	false	0.00	Open	80	137.1	137.0	0.1	0.2
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	-208	132.9	140.6	7.6	4.7
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	-208	140.6	149.7	9.2	5.9
P-141	980	6	Ductile Iro	78	false	0.00	Open	215	158.0	147.2	10.8	11.0
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	61	147.2	144.3	2.9	1.1
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-91	144.3	147.2	2.9	2.2
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	57	144.3	143.9	0.3	0.2
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	54.5	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	54.5	130.5	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	227	320.5	320.5	0.0	1.4
P-150	770	8	Ductile Iro	120	false	0.00	Open	130	131.0	130.6	0.4	0.5
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	54.5	54.5	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	54.5	54.5	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	-12	130.6	130.6	0.0	0.0
P-161	686	10	Ductile Iro	120	false	0.00	Open	825	150.5	147.1	3.4	5.0
P-162	514	10	Ductile Iro	120	false	0.00	Open	804	147.1	144.6	2.5	4.8
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	131.6	131.6	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	-56	130.5	130.5	0.0	0.0
P-171	362	8	PVC	120	false	0.00	Open	-23	128.0	128.0	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-23	128.0	128.1	0.1	0.2
P-173	1,035	6	PVC	99	false	0.00	Open	0	149.7	149.7	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-333	130.5	131.1	0.6	0.4
P-175	5	12	PVC	120	false	0.00	Open	-333	131.1	131.1	0.0	0.4
P-176	838	12	PVC	120	false	0.00	Open	-333	131.1	131.5	0.3	0.4

Scenario: PHD-Calibrated-Calculated FF w/ future RBD
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	204	130.5	129.1	1.5	1.1
P-190	275	6	Ductile Iro	120	false	0.00	Open	124	129.5	129.0	0.5	1.8
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-55	128.5	129.0	0.5	0.4
P-210	275	6	Ductile Iro	120	false	0.00	Open	105	129.1	128.7	0.4	1.3
P-220	275	6	Ductile Iro	120	false	0.00	Open	-71	128.5	128.7	0.2	0.6
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	59	129.5	129.1	0.5	0.5
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	50	129.0	128.7	0.3	0.3
P-250	440	6	Ductile Iro	120	false	0.00	Open	-15	128.0	128.0	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-28	128.0	128.1	0.1	0.1
P-270	880	6	Ductile Iro	120	false	0.00	Open	65	128.7	128.2	0.5	0.5
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	77	129.1	128.2	0.9	0.7
P-290	330	6	Ductile Iro	120	false	0.00	Open	15	128.2	128.2	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	19	128.2	128.2	0.0	0.1
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	41	128.2	128.0	0.3	0.2
P-320	750	6	Ductile Iro	120	false	0.00	Open	49	128.2	128.0	0.2	0.3
P-330	275	6	Ductile Iro	120	false	0.00	Open	45	128.1	128.1	0.1	0.3
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	27	128.2	128.1	0.1	0.1
P-350	220	6	Ductile Iro	120	false	0.00	Open	14	128.0	127.9	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-2	127.9	127.9	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-3	127.9	127.9	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-7	128.0	128.0	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	26	128.1	128.0	0.1	0.1
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-409	136.4	137.0	0.6	0.6
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-212	114.0	137.0	23.1	15.5
P-420	880	8	Cast iron	120	false	0.00	Open	-7	130.3	130.3	0.0	0.0
P-430	1,210	4	Cast iron	120	false	0.00	Open	16	130.6	130.3	0.4	0.3
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	-48	149.7	164.6	14.8	11.2
P-450	682	12	Ductile Iro	120	false	0.00	Open	-1,193	138.1	140.9	2.8	4.1
P-460	990	10	Ductile Iro	99	false	0.00	Open	529	143.9	140.8	3.1	3.1
P-470	330	6	Ductile Iro	85	false	0.00	Open	-10	140.8	140.8	0.0	0.0
P-480	880	6	Ductile Iro	85	false	0.00	Open	10	140.9	140.8	0.0	0.0
P-490	1	10	Ductile Iro	50	false	0.00	Open	5,347	306.1	305.3	0.8	806.6
P-500	5	8	Asbestos (	50	false	0.00	Open	227	320.5	320.5	0.0	6.9

Appendix 13:
WaterCAD Exhibits for Current System with RBD Demands

13.1.1:
ADD-System Demands



SYSTEM DEMANDS (gpm)

LEGEND

- <=10 gpm
- 11–20 gpm
- 21–30 gpm
- 31–40 gpm
- > 40 gpm

AVERAGE DAY DEMAND (ADD)

CURRENT SYSTEM MODEL

WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

13.1.2:
ADD-System Pressure

SYSTEM PRESSURE (psi)

LEGEND

●	<=40 psi
●	41–55 psi
●	56–65 psi
●	66–75 psi
●	> 75 psi

NOT TO SCALE

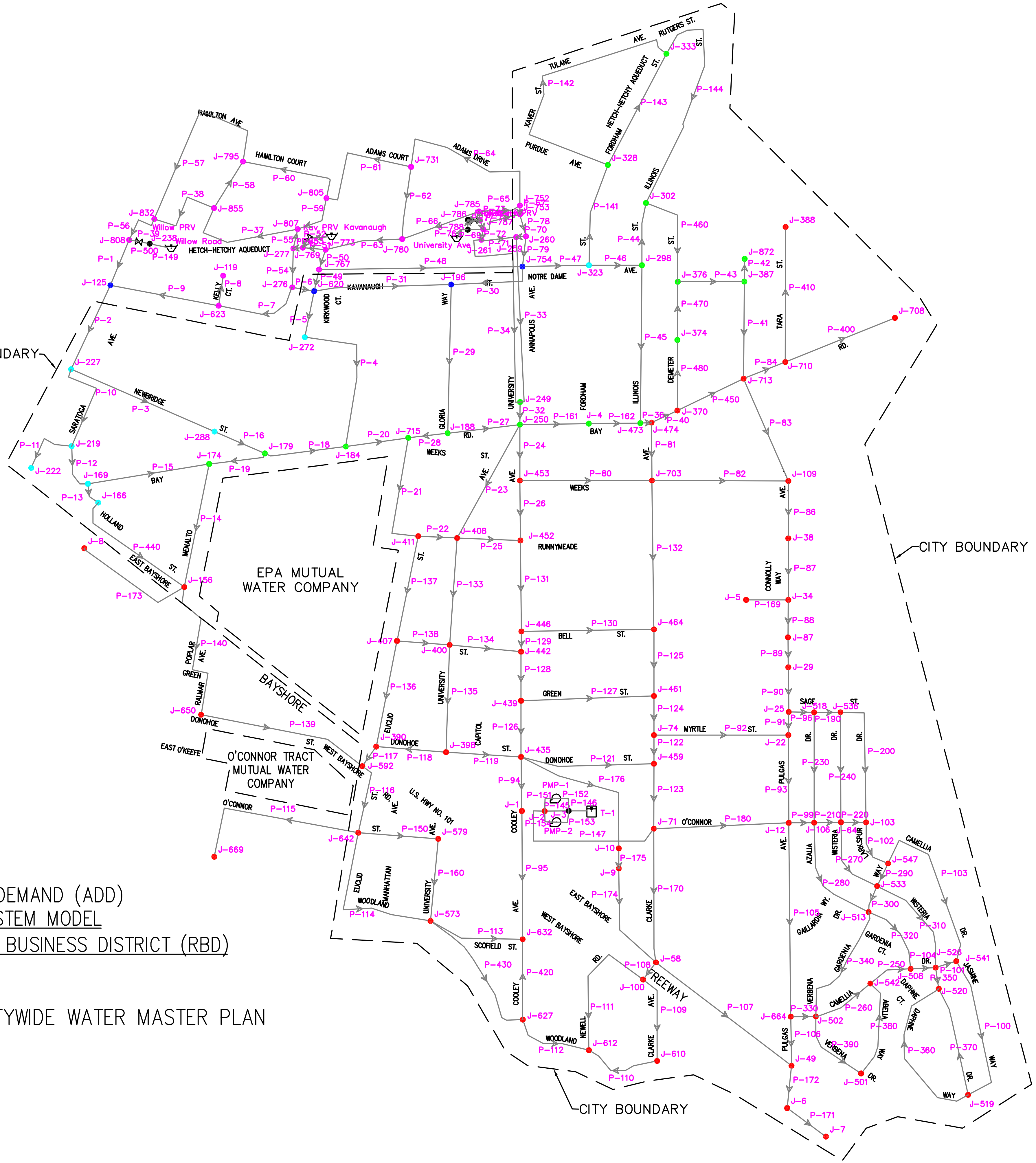
AVERAGE DAY DEMAND (ADD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

13.1.3:
ADD-Available Fire Flow

AVAILABLE FIRE FLOW (gpm)



LEGEND

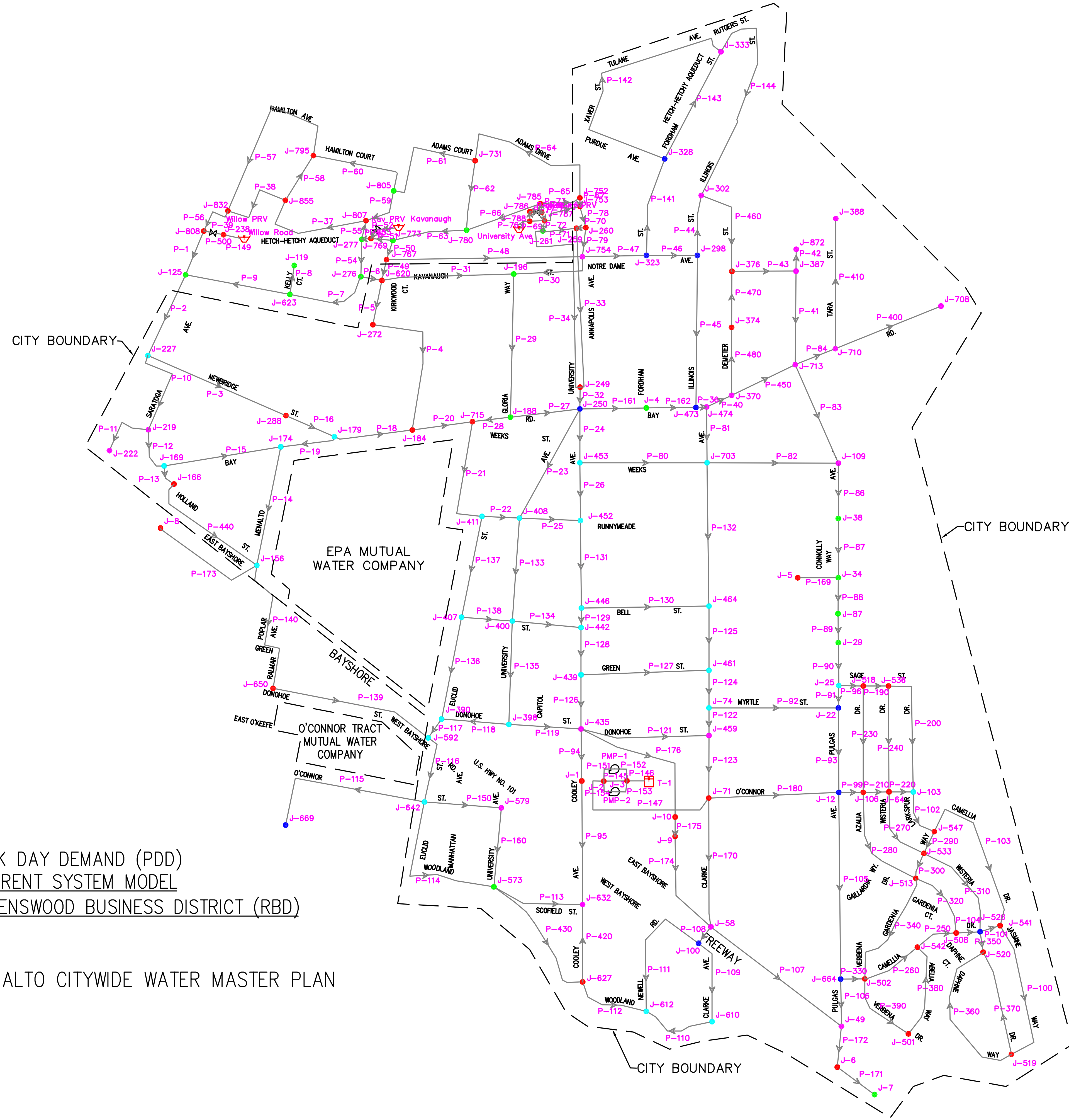
- <=1,000 gpm
- 1,001–1,500 gpm
- 1,501–2,000 gpm
- 2,001–2,500 gpm
- > 2,500 gpm

AVERAGE DAY DEMAND (ADD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

13.2.1:
PDD-System Demands



SYSTEM DEMANDS (gpm)

LEGEND

- <=10 gpm
- 11–20 gpm
- 21–30 gpm
- 31–40 gpm
- > 40 gpm

NOT TO SCALE

PEAK DAY DEMAND (PDD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

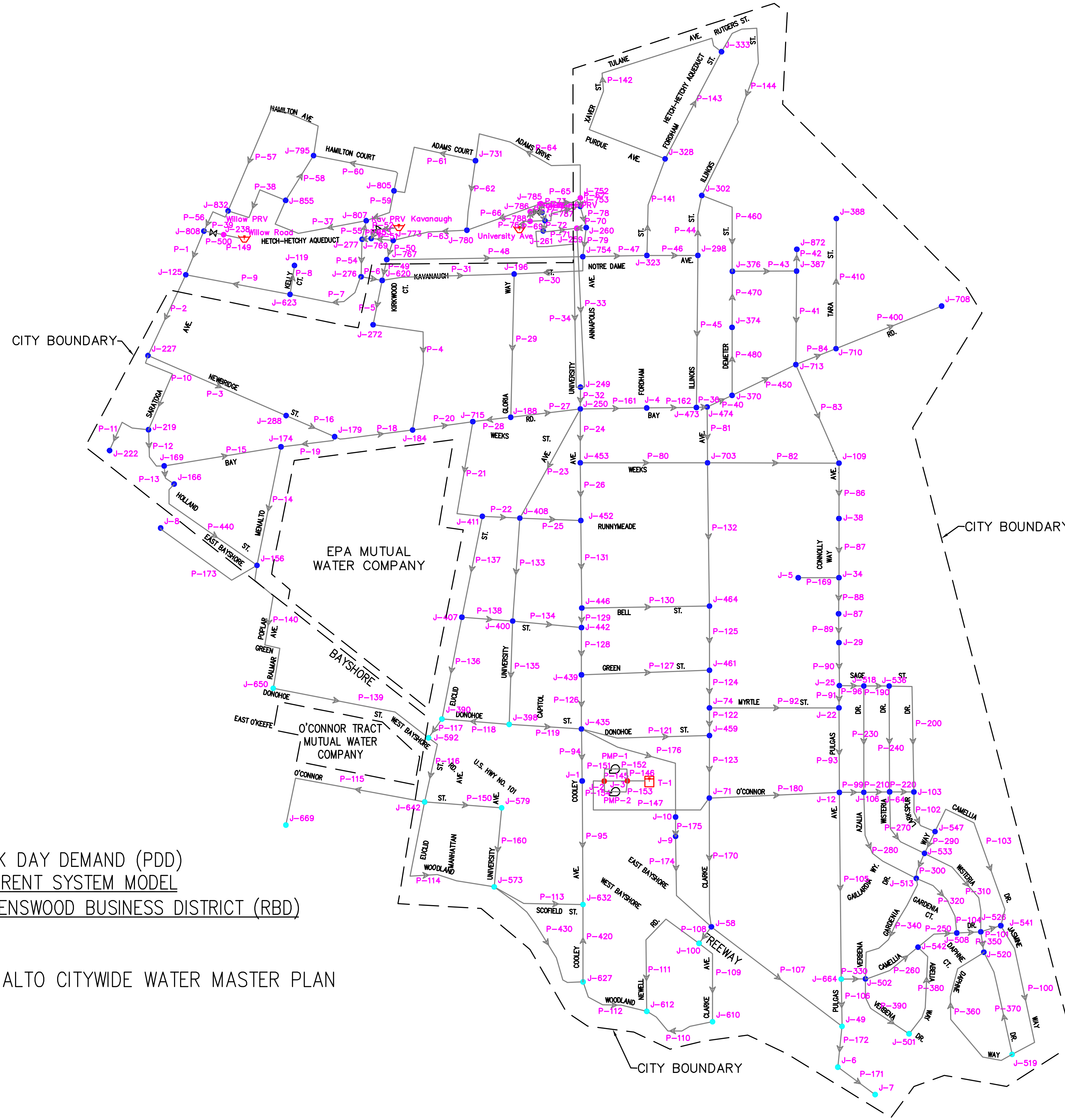
CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

13.2.2:
PDD-System Pressure

PEAK DAY DEMAND (PDD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

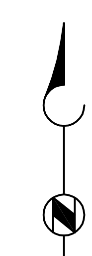
CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN



SYSTEM PRESSURE (psi)

LEGEND

- <=40 psi
- 41–55 psi
- 56–65 psi
- 66–75 psi
- > 75 psi



NOT TO SCALE

EXHIBIT XX

13.2.3:
PDD-Available Fire Flow

AVAILABLE FIRE FLOW (gpm)

LEGEND

- <=1,000 gpm
- 1,001–1,500 gpm
- 1,501–2,000 gpm
- 2,001–2,500 gpm
- > 2,500 gpm

NOT TO SCALE

PEAK DAY DEMAND (PDD)

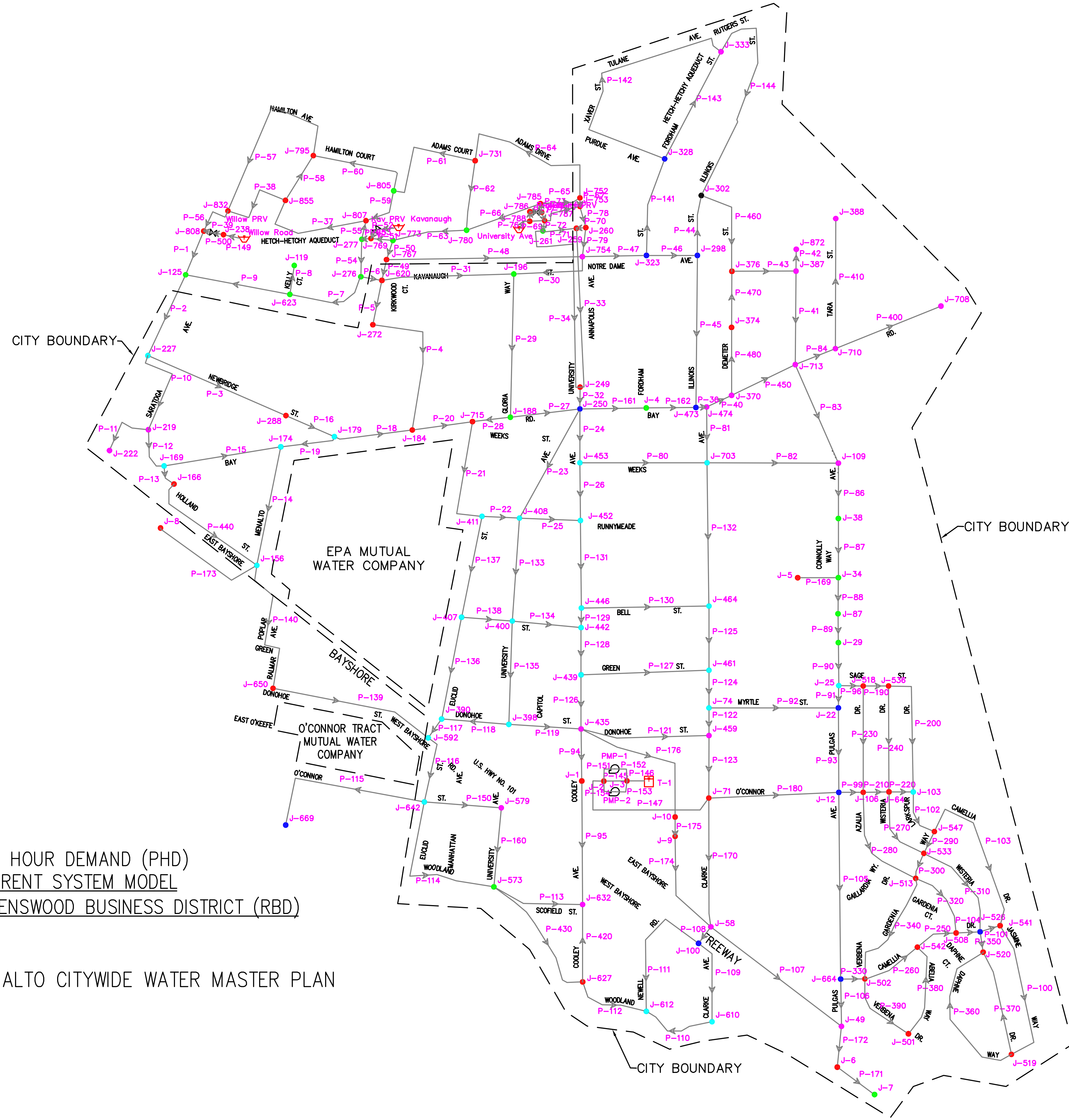
CURRENT SYSTEM MODEL

WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

13.3.1:
PHD-System Demands



SYSTEM DEMANDS (gpm)

LEGEND

●	<=10 gpm
●	11–20 gpm
●	21–30 gpm
●	31–40 gpm
●	> 40 gpm

NOT TO SCALE

PEAK HOUR DEMAND (PHD)

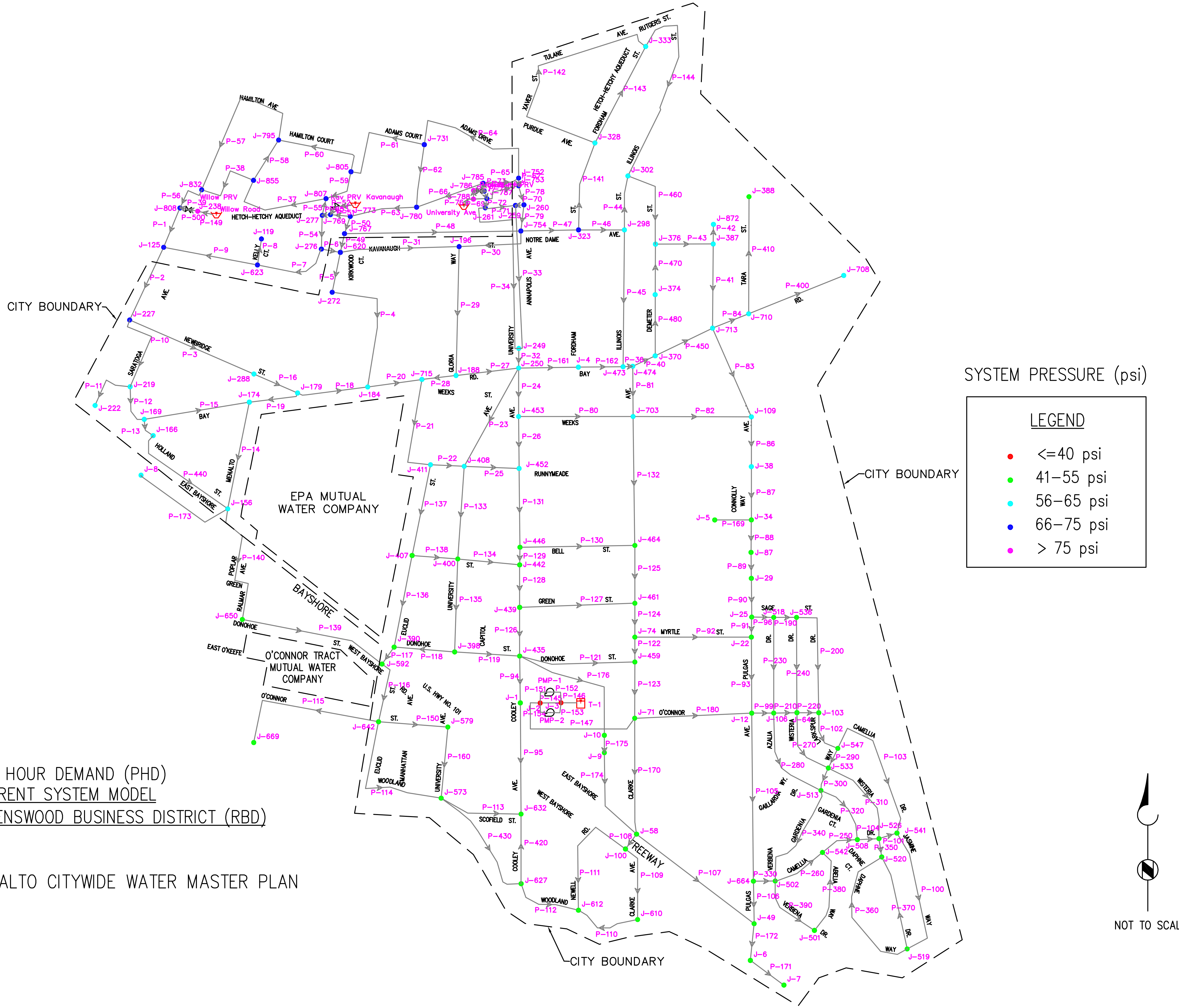
CURRENT SYSTEM MODEL

WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

13.3.2:
PHD-System Pressure



SYSTEM PRESSURE (psi)

LEGEND

- <=40 psi
- 41–55 psi
- 56–65 psi
- 66–75 psi
- > 75 psi

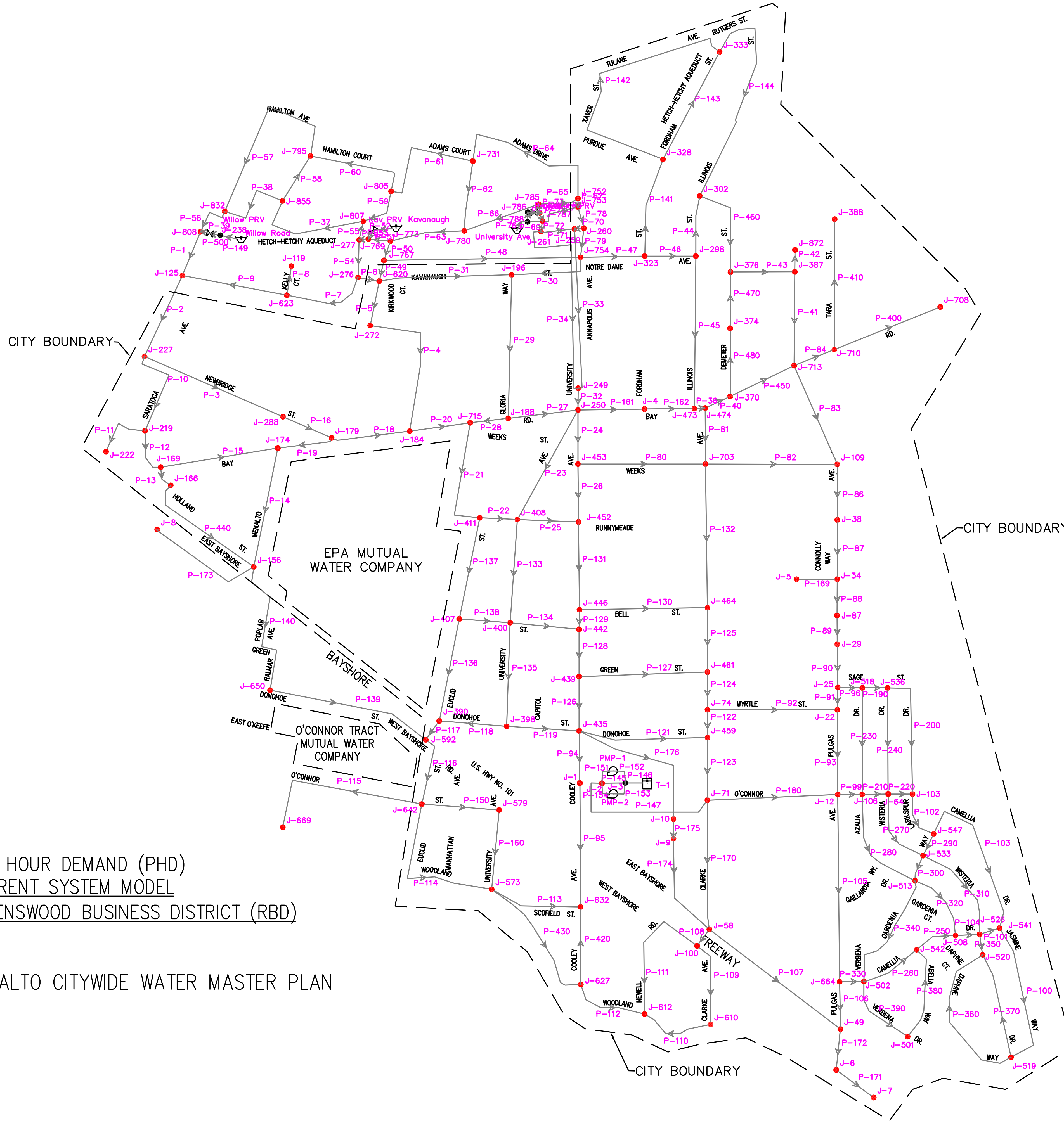
PEAK HOUR DEMAND (PHD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

13.3.3:
PHD-Available Fire Flow

AVAILABLE FIRE FLOW (gpm)



LEGEND
<=1,000 gpm
1,001–1,500 gpm
1,501–2,000 gpm
2,001–2,500 gpm
> 2,500 gpm

NOT TO SCALE

PEAK HOUR DEMAND (PHD)

CURRENT SYSTEM MODEL

WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

Appendix 14:
WaterCAD Calculations for Current System with RBD and EPA & O’Connor Mutual Water Companies Demands

14.1.1:
ADD-Fire Flow Analysis Report

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	true	1,000	1,817	1,000	1,817	20.0	35.2	20.0	20.0	J-2	5.6	J-3
J-2	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	true	1,500	3,501	1,507	3,508	20.0	66.7	20.0	20.1	J-2	5.6	J-3
J-5	true	false	1,000	734	1,000	734	20.0	20.0	20.0	21.2	J-2	5.6	J-3
J-6	true	true	1,000	1,003	1,000	1,003	20.0	20.0	20.0	20.0	J-7	5.6	J-3
J-7	true	false	1,000	968	1,008	976	20.0	20.0	20.0	20.8	J-2	5.6	J-3
J-8	true	false	1,000	769	1,000	769	20.0	20.0	20.0	21.3	J-2	5.6	J-3
J-9	true	true	1,000	1,714	1,000	1,714	20.0	66.4	20.0	20.0	J-2	5.6	J-3
J-10	true	true	1,000	1,715	1,000	1,715	20.0	66.4	20.0	20.0	J-2	5.6	J-3
J-11	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-12	true	false	2,500	1,729	2,523	1,752	20.0	65.3	20.0	20.0	J-2	5.6	J-3
J-13	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-22	true	true	1,000	1,748	1,026	1,774	20.0	64.2	20.0	20.0	J-2	5.6	J-3
J-25	true	true	1,000	1,833	1,014	1,846	20.0	63.2	20.0	20.0	J-2	5.6	J-3
J-29	true	true	1,000	1,977	1,007	1,984	20.0	58.2	20.0	20.0	J-2	5.6	J-3
J-34	true	true	1,000	2,159	1,007	2,166	20.0	53.8	20.0	20.0	J-2	5.6	J-3
J-38	true	true	1,000	2,374	1,007	2,381	20.0	52.8	20.0	20.0	J-2	5.6	J-3
J-49	true	true	1,000	1,708	1,030	1,738	20.0	47.8	20.0	20.0	J-2	5.6	J-3
J-58	true	true	1,000	1,606	1,035	1,642	20.0	66.5	20.0	20.0	J-2	5.6	J-3
J-64	true	true	1,000	1,749	1,006	1,755	20.0	59.0	20.0	20.0	J-2	5.6	J-3
J-71	true	true	1,000	1,497	1,000	1,497	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-74	true	true	1,000	1,685	1,016	1,702	20.0	68.7	20.0	20.0	J-2	5.6	J-3
J-87	true	true	1,000	2,065	1,007	2,073	20.0	55.7	20.0	20.0	J-2	5.6	J-3
J-100	true	true	1,000	1,614	1,024	1,638	20.0	63.7	20.0	20.0	J-2	5.6	J-3
J-103	true	true	1,000	1,753	1,019	1,772	20.0	53.6	20.0	20.0	J-2	5.6	J-3
J-106	true	true	1,000	1,730	1,006	1,736	20.0	65.2	20.0	20.0	J-2	5.6	J-3
J-109	true	true	1,000	2,706	1,134	2,841	20.0	57.2	20.0	20.0	J-2	5.6	J-3
J-119	true	true	1,000	3,616	1,010	3,626	20.0	20.0	20.0	21.2	J-2	5.6	J-3
J-125	true	true	1,000	5,000	1,010	5,010	20.0	58.5	20.0	21.0	J-2	5.6	J-3
J-156	true	true	1,000	1,404	1,059	1,462	20.0	20.0	20.0	20.0	J-8	5.6	J-3
J-166	true	true	1,000	1,559	1,000	1,559	20.0	20.0	20.0	21.3	J-2	5.6	J-3
J-169	true	true	1,000	2,185	1,020	2,204	20.0	20.0	20.0	20.3	J-166	5.6	J-3
J-174	true	true	1,000	1,934	1,020	1,954	20.0	20.0	20.0	21.2	J-2	5.6	J-3
J-179	true	true	3,000	3,501	3,020	3,521	20.0	48.2	20.0	21.0	J-2	5.6	J-3
J-184	true	true	1,000	5,000	1,039	5,039	20.0	35.2	20.0	20.3	J-2	5.6	J-3
J-188	true	true	1,000	4,362	1,007	4,369	20.0	49.6	20.0	20.0	J-2	5.6	J-3
J-196	true	true	1,000	5,000	1,009	5,009	20.0	55.8	20.0	20.5	J-2	5.6	J-3
J-219	true	true	1,000	2,558	1,030	2,588	20.0	20.0	20.0	20.8	J-169	5.6	J-3
J-222	true	true	1,000	1,994	1,030	2,025	20.0	20.0	20.0	21.3	J-2	5.6	J-3
J-227	true	true	1,000	5,000	1,020	5,020	20.0	46.0	20.0	20.9	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	true	1,000	3,871	1,000	3,871	20.0	60.9	20.0	20.0	J-2	5.6	J-3
J-250	true	true	1,000	3,822	1,025	3,847	20.0	61.5	20.0	20.0	J-2	5.6	J-3
J-259	true	true	1,000	5,000	1,000	5,000	20.0	70.0	20.0	20.8	J-2	5.6	J-3
J-260	true	true	1,000	5,000	1,000	5,000	20.0	72.0	20.0	20.8	J-2	5.6	J-3
J-261	true	true	1,000	5,000	1,011	5,011	20.0	67.6	20.0	21.1	J-2	5.6	J-3
J-272	true	true	1,000	5,000	1,000	5,000	20.0	23.5	20.0	20.6	J-2	5.6	J-3
J-276	true	true	1,000	5,000	1,009	5,009	20.0	62.4	20.0	20.9	J-2	5.6	J-3
J-277	true	true	1,000	5,000	1,009	5,009	20.0	68.1	20.0	21.0	J-2	5.6	J-3
J-288	true	true	1,000	5,000	1,000	5,000	20.0	28.5	20.0	20.7	J-2	5.6	J-3
J-298	true	true	1,000	4,279	1,021	4,300	20.0	62.4	20.0	20.0	J-2	5.6	J-3

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-302	true	true	1,000	4,032	1,195	4,227	20.0	47.9	20.0	20.0	J-2	5.6	J-3
J-323	true	true	1,000	4,807	1,021	4,828	20.0	62.0	20.0	20.0	J-2	5.6	J-3
J-328	true	true	1,000	1,604	1,021	1,625	20.0	20.0	20.0	21.2	J-2	5.6	J-3
J-333	true	true	1,000	1,916	1,032	1,948	20.0	20.0	20.0	21.0	J-2	5.6	J-3
J-370	true	true	3,500	3,501	3,571	3,572	20.0	61.6	20.0	20.0	J-2	5.6	J-3
J-374	true	true	1,000	2,309	1,000	2,309	20.0	20.0	20.0	20.8	J-2	5.6	J-3
J-376	true	true	1,000	3,856	1,000	3,856	20.0	41.3	20.0	20.0	J-2	5.6	J-3
J-387	true	true	1,000	3,794	1,069	3,863	20.0	38.9	20.0	20.0	J-2	5.6	J-3
J-388	true	false	1,000	460	1,071	531	20.0	20.0	20.0	21.4	J-2	5.6	J-3
J-390	true	true	1,000	2,566	1,016	2,582	20.0	59.7	20.0	20.0	J-2	5.6	J-3
J-398	true	true	1,000	2,359	1,016	2,375	20.0	61.2	20.0	20.0	J-2	5.6	J-3
J-400	true	true	2,250	2,687	2,266	2,704	20.0	64.4	20.0	20.0	J-2	5.6	J-3
J-407	true	true	1,000	3,071	1,055	3,125	20.0	60.4	20.0	20.0	J-2	5.6	J-3
J-408	true	true	1,500	3,304	1,520	3,324	20.0	61.5	20.0	20.0	J-2	5.6	J-3
J-411	true	true	1,000	3,649	1,016	3,665	20.0	55.8	20.0	20.0	J-2	5.6	J-3
J-435	true	true	1,000	1,776	1,036	1,812	20.0	66.7	20.0	20.0	J-2	5.6	J-3
J-439	true	true	1,000	2,018	1,016	2,035	20.0	65.0	20.0	20.0	J-2	5.6	J-3
J-442	true	true	1,000	2,417	1,016	2,434	20.0	65.2	20.0	20.0	J-2	5.6	J-3
J-446	true	true	1,000	2,452	1,016	2,469	20.0	64.0	20.0	20.0	J-2	5.6	J-3
J-452	true	true	1,000	2,980	1,016	2,997	20.0	60.3	20.0	20.0	J-2	5.6	J-3
J-453	true	true	1,000	3,144	1,016	3,161	20.0	59.0	20.0	20.0	J-2	5.6	J-3
J-459	true	true	1,000	1,566	1,036	1,602	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-461	true	true	1,000	1,908	1,016	1,924	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-464	true	true	1,000	2,297	1,016	2,313	20.0	63.7	20.0	20.0	J-2	5.6	J-3
J-473	true	true	1,000	3,661	1,021	3,682	20.0	61.2	20.0	20.0	J-2	5.6	J-3
J-474	true	true	1,000	3,540	1,030	3,570	20.0	61.3	20.0	20.0	J-2	5.6	J-3
J-501	true	true	1,000	1,727	1,006	1,734	20.0	22.9	20.0	20.0	J-2	5.6	J-3
J-502	true	true	1,000	1,725	1,006	1,732	20.0	47.5	20.0	20.0	J-2	5.6	J-3
J-508	true	true	1,000	1,735	1,006	1,741	20.0	50.5	20.0	20.0	J-2	5.6	J-3
J-513	true	true	1,000	1,735	1,006	1,741	20.0	54.4	20.0	20.0	J-2	5.6	J-3
J-518	true	true	1,000	1,832	1,006	1,838	20.0	63.2	20.0	20.0	J-2	5.6	J-3
J-519	true	true	1,000	1,735	1,006	1,742	20.0	39.6	20.0	20.0	J-2	5.6	J-3
J-520	true	true	1,000	1,735	1,006	1,742	20.0	42.1	20.0	20.0	J-2	5.6	J-3
J-526	true	true	1,000	1,735	1,021	1,756	20.0	50.5	20.0	20.0	J-2	5.6	J-3
J-533	true	true	1,000	1,739	1,006	1,746	20.0	54.8	20.0	20.0	J-2	5.6	J-3
J-536	true	true	1,000	1,779	1,006	1,786	20.0	55.4	20.0	20.0	J-2	5.6	J-3
J-541	true	true	1,000	1,735	1,006	1,742	20.0	45.4	20.0	20.0	J-2	5.6	J-3
J-542	true	true	1,000	1,731	1,006	1,737	20.0	43.7	20.0	20.0	J-2	5.6	J-3
J-547	true	true	1,000	1,743	1,006	1,750	20.0	51.2	20.0	20.0	J-2	5.6	J-3
J-573	true	true	1,000	2,323	1,012	2,336	20.0	33.6	20.0	20.0	J-2	5.6	J-3
J-579	true	false	2,500	2,413	2,539	2,452	20.0	22.4	20.0	20.0	J-2	5.6	J-3
J-592	true	false	3,500	2,639	3,544	2,683	20.0	59.7	20.0	20.0	J-2	5.6	J-3
J-610	true	true	1,000	1,693	1,018	1,711	20.0	49.6	20.0	20.0	J-2	5.6	J-3
J-612	true	true	1,000	1,759	1,019	1,777	20.0	49.3	20.0	20.0	J-2	5.6	J-3
J-620	true	true	1,000	5,000	1,006	5,006	20.0	63.5	20.0	20.7	J-2	5.6	J-3
J-623	true	true	1,000	5,000	1,010	5,010	20.0	48.2	20.0	21.0	J-2	5.6	J-3
J-627	true	true	1,000	1,907	1,000	1,907	20.0	43.5	20.0	20.0	J-2	5.6	J-3
J-632	true	true	1,000	1,973	1,041	2,013	20.0	41.0	20.0	20.0	J-2	5.6	J-3
J-642	true	true	1,000	2,432	1,015	2,447	20.0	41.3	20.0	20.0	J-2	5.6	J-3
J-650	true	false	1,500	1,359	1,565	1,424	20.0	20.0	20.0	21.1	J-2	5.6	J-3
J-664	true	true	1,000	1,714	1,026	1,741	20.0	50.8	20.0	20.0	J-2	5.6	J-3
J-669	true	true	1,000	2,108	1,022	2,130	20.0	20.0	20.0	20.3	J-2	5.6	J-3

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-703	true	true	1,000	2,871	1,016	2,887	20.0	64.5	20.0	20.0	J-2	5.6	J-3
J-708	true	true	1,000	3,403	1,136	3,540	20.0	38.0	20.0	20.0	J-2	5.6	J-3
J-710	true	true	1,000	3,404	1,060	3,463	20.0	52.2	20.0	20.0	J-2	5.6	J-3
J-713	true	true	1,000	3,404	1,089	3,492	20.0	60.0	20.0	20.0	J-2	5.6	J-3
J-715	true	true	1,000	4,314	1,003	4,316	20.0	51.7	20.0	20.0	J-2	5.6	J-3
J-731	true	true	1,000	5,000	1,004	5,004	20.0	66.3	20.0	21.0	J-2	5.6	J-3
J-752	true	true	1,000	5,000	1,004	5,004	20.0	73.5	20.0	21.0	J-2	5.6	J-3
J-753	true	true	1,000	5,000	1,004	5,004	20.0	72.7	20.0	21.0	J-2	5.6	J-3
J-754	true	true	1,000	5,000	1,032	5,032	20.0	68.5	20.0	20.5	J-2	5.6	J-3
J-767	true	true	1,000	5,000	1,006	5,006	20.0	65.0	20.0	20.8	J-2	5.6	J-3
J-769	true	true	1,000	5,000	1,000	5,000	20.0	68.6	20.0	21.0	J-2	5.6	J-3
J-773	true	true	1,000	5,000	1,008	5,008	20.0	67.9	20.0	20.9	J-2	5.6	J-3
J-780	true	true	1,000	5,000	1,013	5,013	20.0	68.9	20.0	21.0	J-2	5.6	J-3
J-785	true	true	1,000	5,000	1,004	5,004	20.0	74.3	20.0	21.1	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	true	1,000	5,000	1,000	5,000	20.0	73.4	20.0	21.2	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	true	1,000	5,000	1,000	5,000	20.0	73.5	20.0	21.2	J-2	5.6	J-3
J-795	true	true	1,000	5,000	1,006	5,006	20.0	51.0	20.0	21.0	J-2	5.6	J-3
J-805	true	true	1,000	5,000	1,011	5,011	20.0	32.0	20.0	21.0	J-2	5.6	J-3
J-807	true	true	1,000	5,000	1,006	5,006	20.0	65.3	20.0	21.0	J-2	5.6	J-3
J-808	true	true	1,000	5,000	1,000	5,000	20.0	59.9	20.0	21.1	J-2	5.6	J-3
J-832	true	true	1,000	5,000	1,006	5,006	20.0	58.5	20.0	21.1	J-2	5.6	J-3
J-855	true	true	1,000	5,000	1,006	5,006	20.0	54.4	20.0	21.0	J-2	5.6	J-3
J-872	true	true	1,000	3,594	1,035	3,629	20.0	20.0	20.0	20.1	J-2	5.6	J-3

14.1.2:
ADD-Junction Report

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	67.6	21.5
J-669	36.00	Zone-1	Demand	22	Pattern - 1	22	190.2	66.8
J-612	28.00	Zone-1	Demand	19	Pattern - 1	19	184.4	67.8
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	185.1	68.5
J-632	27.00	Zone-1	Demand	41	Pattern - 1	41	185.3	68.6
J-573	30.00	Zone-1	Demand	12	Pattern - 1	12	189.1	69.0
J-610	25.00	Zone-1	Demand	18	Pattern - 1	18	184.2	69.0
J-579	30.00	Zone-1	Demand	39	Pattern - 1	39	189.8	69.3
J-650	25.00	Zone-1	Demand	65	Pattern - 1	65	186.3	69.9
J-184	20.00	Zone-1	Demand	39	Pattern - 1	39	182.9	70.6
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	183.0	70.6
J-250	20.00	Zone-1	Demand	25	Pattern - 1	25	183.0	70.6
J-188	20.00	Zone-1	Demand	7	Pattern - 1	7	183.0	70.7
J-642	27.00	Zone-1	Demand	15	Pattern - 1	15	190.2	70.7
J-7	19.00	Zone-1	Demand	8	Fixed	8	182.9	71.1
J-6	19.00	Zone-1	Demand	0	Fixed	0	182.9	71.1
J-49	19.00	Zone-1	Demand	30	Pattern - 1	30	182.9	71.1
J-100	20.00	Zone-1	Demand	24	Pattern - 1	24	184.1	71.1
J-715	19.00	Zone-1	Demand	3	Pattern - 1	3	183.2	71.2
J-219	18.00	Zone-1	Demand	30	Pattern - 1	30	182.7	71.4
J-519	18.00	Zone-1	Demand	6	Pattern - 1	6	182.8	71.4
J-501	18.00	Zone-1	Demand	6	Pattern - 1	6	182.8	71.5
J-664	18.00	Zone-1	Demand	26	Pattern - 1	26	182.9	71.5
J-169	17.00	Zone-1	Demand	20	Pattern - 1	20	182.7	71.8
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	182.7	71.8
J-502	17.00	Zone-1	Demand	6	Pattern - 1	6	182.8	71.9
J-156	17.00	Zone-1	Demand	59	Pattern - 1	59	183.4	72.1
J-8	17.00	Zone-1	Demand	0	Fixed	0	183.4	72.1
J-222	16.00	Zone-1	Demand	30	Pattern - 1	30	182.7	72.3
J-1	18.00	Zone-1	Demand	0	Fixed	0	184.7	72.3
J-179	16.00	Zone-1	Demand	20	Pattern - 1	20	182.9	72.3
J-398	20.00	Zone-1	Demand	16	Pattern - 1	16	186.9	72.3
J-473	15.00	Zone-1	Demand	21	Pattern - 1	21	182.3	72.5
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	182.9	72.8
J-174	15.00	Zone-1	Demand	20	Pattern - 1	20	182.9	72.8
J-474	14.00	Zone-1	Demand	30	Pattern - 1	30	182.2	72.9
J-411	15.00	Zone-1	Demand	16	Pattern - 1	16	184.0	73.2
J-408	15.00	Zone-1	Demand	20	Pattern - 1	20	184.0	73.3
J-58	15.00	Zone-1	Demand	35	Pattern - 1	35	184.1	73.3
J-453	14.00	Zone-1	Demand	16	Pattern - 1	16	183.1	73.3
J-400	17.00	Zone-1	Demand	16	Pattern - 1	16	186.3	73.4
J-446	15.00	Zone-1	Demand	16	Pattern - 1	16	184.4	73.5
J-390	21.00	Zone-1	Demand	16	Pattern - 1	16	190.5	73.5
J-435	15.00	Zone-1	Demand	36	Pattern - 1	36	184.5	73.5
J-442	15.00	Zone-1	Demand	16	Pattern - 1	16	184.7	73.6
J-227	13.00	Zone-1	Demand	20	Pattern - 1	20	182.8	73.6
J-452	14.00	Zone-1	Demand	16	Pattern - 1	16	183.8	73.6
J-9	14.00	Zone-1	Demand	0	Fixed	0	184.3	73.8
J-10	14.00	Zone-1	Demand	0	Fixed	0	184.3	73.8
J-439	14.00	Zone-1	Demand	16	Pattern - 1	16	184.5	73.9
J-623	12.00	Zone-1	Demand	10	Pattern - 1	10	182.8	74.1
J-276	12.00	Zone-1	Demand	9	Pattern - 1	9	182.8	74.1
J-196	12.00	Zone-1	Demand	9	Pattern - 1	9	182.8	74.1

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-592	21.00	Zone-1	Demand	44	Pattern - 1	44	192.0	74.1
J-767	11.00	Zone-1	Demand	6	Pattern - 1	6	182.8	74.5
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	182.9	74.5
J-370	10.00	Zone-1	Demand	71	Pattern - 1	71	182.1	74.6
J-388	6.00	Zone-1	Demand	71	Pattern - 1	71	178.7	74.9
J-754	10.00	Zone-1	Demand	32	Pattern - 1	32	182.8	74.9
J-125	10.00	Zone-1	Demand	10	Pattern - 1	10	182.8	74.9
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	182.8	74.9
J-119	10.00	Zone-1	Demand	10	Pattern - 1	10	182.8	74.9
J-542	10.00	Zone-1	Demand	6	Pattern - 1	6	182.8	74.9
J-277	10.00	Zone-1	Demand	9	Pattern - 1	9	182.8	74.9
J-620	10.00	Zone-1	Demand	6	Pattern - 1	6	182.8	74.9
J-773	10.00	Zone-1	Demand	8	Pattern - 1	8	182.9	74.9
J-780	10.00	Zone-1	Demand	13	Pattern - 1	13	182.9	75.0
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	183.9	75.0
J-261	10.00	Zone-1	Demand	11	Pattern - 1	11	183.0	75.0
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	183.0	75.0
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	183.0	75.0
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	181.9	75.2
J-407	17.00	Zone-1	Demand	55	Pattern - 1	55	190.5	75.2
J-464	10.00	Zone-1	Demand	16	Pattern - 1	16	183.7	75.3
J-832	9.00	Zone-1	Demand	6	Pattern - 1	6	182.8	75.4
J-807	9.00	Zone-1	Demand	6	Pattern - 1	6	182.8	75.4
J-805	9.00	Zone-1	Demand	11	Pattern - 1	11	182.8	75.4
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	182.8	75.4
J-459	10.00	Zone-1	Demand	36	Pattern - 1	36	183.9	75.4
J-328	8.00	Zone-1	Demand	21	Pattern - 1	21	181.9	75.4
J-753	9.00	Zone-1	Demand	4	Pattern - 1	4	182.9	75.4
J-323	8.00	Zone-1	Demand	21	Pattern - 1	21	182.5	75.6
J-710	7.00	Zone-1	Demand	60	Pattern - 1	60	181.7	75.7
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	181.8	75.8
J-461	9.00	Zone-1	Demand	16	Pattern - 1	16	183.8	75.8
J-855	8.00	Zone-1	Demand	6	Pattern - 1	6	182.8	75.8
J-713	7.00	Zone-1	Demand	89	Pattern - 1	89	181.8	75.8
J-302	7.00	Zone-1	Demand	195	Pattern - 1	195	181.8	75.8
J-731	8.00	Zone-1	Demand	4	Pattern - 1	4	182.9	75.8
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	182.9	75.8
J-298	7.00	Zone-1	Demand	21	Pattern - 1	21	182.3	76.0
J-703	7.00	Zone-1	Demand	16	Pattern - 1	16	182.6	76.1
J-872	6.00	Zone-1	Demand	35	Pattern - 1	35	181.8	76.2
J-387	6.00	Zone-1	Demand	69	Pattern - 1	69	181.8	76.2
J-74	8.00	Zone-1	Demand	16	Pattern - 1	16	183.8	76.2
J-752	7.00	Zone-1	Demand	4	Pattern - 1	4	182.9	76.3
J-795	6.50	Zone-1	Demand	6	Pattern - 1	6	182.8	76.4
J-333	5.50	Zone-1	Demand	32	Pattern - 1	32	181.8	76.4
J-22	6.50	Zone-1	Demand	26	Pattern - 1	26	183.0	76.5
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	182.9	76.7
J-785	6.00	Zone-1	Demand	4	Pattern - 1	4	182.9	76.7
J-109	5.00	Zone-1	Demand	134	Pattern - 1	134	182.1	76.8
J-708	4.50	Zone-1	Demand	136	Pattern - 1	136	181.6	76.8
J-38	5.00	Zone-1	Demand	7	Pattern - 1	7	182.2	76.8
J-103	5.50	Zone-1	Demand	19	Pattern - 1	19	182.8	76.9
J-64	5.50	Zone-1	Demand	6	Pattern - 1	6	182.9	76.9
J-5	5.00	Zone-1	Demand	0	Fixed	0	182.4	76.9

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-34	5.00	Zone-1	Demand	7	Pattern - 1	7	182.4	76.9
J-87	5.00	Zone-1	Demand	7	Pattern - 1	7	182.5	76.9
J-29	5.00	Zone-1	Demand	7	Pattern - 1	7	182.6	77.0
J-520	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-541	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-25	5.00	Zone-1	Demand	14	Pattern - 1	14	182.8	77.1
J-518	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-526	5.00	Zone-1	Demand	21	Pattern - 1	21	182.8	77.1
J-508	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-536	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-547	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-533	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-513	5.00	Zone-1	Demand	6	Pattern - 1	6	182.8	77.1
J-106	5.00	Zone-1	Demand	6	Pattern - 1	6	183.0	77.2
J-12	5.00	Zone-1	Demand	23	Pattern - 1	23	183.0	77.2
J-4	0.00	Zone-1	Demand	7	Fixed	7	182.6	79.1
J-11	17.00	Zone-1	Demand	0	Fixed	0	203.3	80.8
J-13	21.00	Zone-1	Demand	0	Fixed	0	208.4	81.3
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	319.4	134.1
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	319.5	134.2
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

14.1.3:
ADD-Pipe Report

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-25	182.8	182.8	0.0	0.0
P-2	980	12	Ductile Iro	120	false	0.00	Open	33	182.8	182.8	0.0	0.0
P-3	1,500	12	Cast iron	78	false	0.00	Open	-52	182.8	182.9	0.0	0.0
P-4	1,440	8	Cast iron	120	false	0.00	Open	35	182.9	182.9	0.1	0.0
P-5	533	8	Ductile Iro	120	false	0.00	Open	35	182.9	182.8	0.0	0.0
P-6	290	8	Ductile Iro	120	false	0.00	Open	26	182.8	182.8	0.0	0.0
P-7	800	10	Ductile Iro	113	false	0.00	Open	-39	182.8	182.8	0.0	0.0
P-8	400	8	Ductile Iro	120	false	0.00	Open	10	182.8	182.8	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	19	182.8	182.8	0.0	0.0
P-10	930	8	Ductile Iro	120	false	0.00	Open	66	182.8	182.7	0.1	0.1
P-11	555	8	Ductile Iro	120	false	0.00	Open	30	182.7	182.7	0.0	0.0
P-12	450	8	Ductile Iro	120	false	0.00	Open	5	182.7	182.7	0.0	0.0
P-13	275	6	Ductile Iro	106	false	0.00	Open	-9	182.7	182.7	0.0	0.0
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	45	183.4	182.9	0.4	0.3
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	5	182.9	182.7	0.2	0.2
P-16	555	12	Ductile Iro	120	false	0.00	Open	-52	182.9	182.9	0.0	0.0
P-18	800	8	Ductile Iro	120	false	0.00	Open	52	182.9	182.9	0.1	0.1
P-19	620	6	Ductile Iro	106	false	0.00	Open	20	182.9	182.9	0.0	0.1
P-20	650	8	Ductile Iro	120	false	0.00	Open	-126	182.9	183.2	0.3	0.5
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	-259	183.2	184.0	0.7	0.6
P-22	400	8	Ductile Iro	120	false	0.00	Open	-30	184.0	184.0	0.0	0.0
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	165	184.0	183.0	1.0	0.8
P-24	620	8	Ductile Iro	120	false	0.00	Open	-88	183.0	183.1	0.1	0.2
P-25	650	8	Ductile Iro	120	false	0.00	Open	-80	183.8	184.0	0.1	0.2
P-26	600	8	Ductile Iro	120	false	0.00	Open	216	183.8	183.1	0.7	1.2
P-27	740	8	Ductile Iro	120	false	0.00	Open	-60	183.0	183.0	0.1	0.1
P-28	380	8	Ductile Iro	120	false	0.00	Open	131	183.2	183.0	0.2	0.5
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	64	183.0	182.8	0.2	0.1
P-30	890	10	Ductile Iro	113	false	0.00	Open	61	182.8	182.8	0.0	0.0
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-6	182.8	182.8	0.0	0.0
P-32	75	12	Ductile Iro	120	false	0.00	Open	31	183.0	183.0	0.0	0.0
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	29	183.0	182.9	0.1	0.0
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	2	183.0	183.0	0.0	0.0
P-36	100	10	Ductile Iro	120	false	0.00	Open	-281	182.2	182.3	0.1	0.7
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	30	182.8	182.8	0.0	0.0
P-38	900	8	Ductile Iro	120	false	0.00	Open	15	182.8	182.8	0.0	0.0
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	182.8	182.8	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	411	182.2	182.1	0.1	0.6
P-41	980	8	Ductile Iro	120	false	0.00	Open	38	181.8	181.8	0.0	0.0
P-42	222	8	Ductile Iro	120	false	0.00	Open	35	181.8	181.8	0.0	0.0
P-43	620	10	Ductile Iro	120	false	0.00	Open	-66	181.8	181.8	0.0	0.0
P-44	610	10	Ductile Iro	99	false	0.00	Open	-243	181.8	182.3	0.5	0.7
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	52	182.3	182.3	0.0	0.0
P-46	520	12	Ductile Iro	120	false	0.00	Open	-316	182.3	182.5	0.2	0.3
P-47	666	12	Ductile Iro	120	false	0.00	Open	-380	182.5	182.8	0.3	0.5
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-41	182.8	182.8	0.0	0.0
P-49	220	8	Ductile Iro	120	false	0.00	Open	-3	182.8	182.8	0.0	0.0
P-50	200	10	Ductile Iro	113	false	0.00	Open	-50	182.8	182.9	0.0	0.0
P-51	220	10	Ductile Iro	113	false	0.00	Open	63	182.9	182.8	0.0	0.0
P-52	20	8	Ductile Iro	50	false	0.00	Open	0	320.0	320.0	0.0	0.0
P-53	5	10	Ductile Iro	113	false	0.00	Open	63	182.8	182.8	0.0	0.0
P-54	333	10	Ductile Iro	113	false	0.00	Open	23	182.8	182.8	0.0	0.0
P-55	100	10	Ductile Iro	113	false	0.00	Open	32	182.8	182.8	0.0	0.0

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	25	182.8	182.8	0.0	0.0
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-16	182.8	182.8	0.0	0.0
P-58	555	10	Ductile Iro	120	false	0.00	Open	-9	182.8	182.8	0.0	0.0
P-59	580	10	Ductile Iro	50	false	0.00	Open	-5	182.8	182.8	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-13	182.8	182.8	0.0	0.0
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-29	182.8	182.9	0.1	0.0
P-62	730	12	Ductile Iro	120	false	0.00	Open	22	182.9	182.9	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	121	182.9	182.9	0.0	0.1
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-54	182.9	182.9	0.0	0.0
P-65	330	12	Ductile Iro	120	false	0.00	Open	111	182.9	182.9	0.0	0.0
P-66	820	12	Ductile Iro	120	false	0.00	Open	112	182.9	182.9	0.0	0.1
P-67	5	12	Ductile Iro	120	false	0.00	Open	53	182.9	182.9	0.0	0.0
P-68	225	12	Ductile Iro	120	false	0.00	Open	-202	182.9	183.0	0.0	0.2
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	183.0	319.5	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	-58	182.9	182.9	0.0	0.6
P-71	330	8	Ductile Iro	50	false	0.00	Open	-29	182.9	183.0	0.1	0.2
P-72	10	8	Ductile Iro	50	false	0.00	Open	38	183.0	183.0	0.0	0.3
P-73	100	12	Ductile Iro	120	false	0.00	Open	226	183.0	182.9	0.0	0.2
P-74	5	12	Ductile Iro	120	false	0.00	Open	240	183.0	183.0	0.0	0.2
P-75	5	10	Ductile Iro	50	false	0.00	Open	467	183.0	183.0	0.0	8.8
P-76	20	12	Ductile Iro	120	false	0.00	Open	467	319.5	319.5	0.0	0.7
P-77	15	10	Ductile Iro	50	false	0.00	Open	-467	319.4	319.5	0.1	8.8
P-78	100	12	Ductile Iro	120	false	0.00	Open	251	182.9	182.9	0.0	0.2
P-79	290	12	Ductile Iro	120	false	0.00	Open	310	182.9	182.8	0.1	0.3
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	111	183.1	182.6	0.5	0.4
P-81	600	8	Ductile Iro	120	false	0.00	Open	160	182.6	182.2	0.4	0.7
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	123	182.6	182.1	0.6	0.4
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	81	182.1	181.8	0.2	0.2
P-84	550	12	Ductile Iro	120	false	0.00	Open	267	181.8	181.7	0.1	0.3
P-85	15	6	Ductile Iro	50	false	0.00	Open	0	182.8	182.8	0.0	0.0
P-86	600	8	Ductile Iro	120	false	0.00	Open	-91	182.1	182.2	0.2	0.3
P-87	620	8	Ductile Iro	120	false	0.00	Open	-99	182.2	182.4	0.2	0.3
P-88	330	8	Ductile Iro	120	false	0.00	Open	-106	182.4	182.5	0.1	0.3
P-89	310	8	Ductile Iro	120	false	0.00	Open	-113	182.5	182.6	0.1	0.4
P-90	470	8	Ductile Iro	120	false	0.00	Open	-121	182.6	182.8	0.2	0.4
P-91	180	6	Ductile Iro	120	false	0.00	Open	-94	182.8	183.0	0.2	1.1
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	146	183.8	183.0	0.8	0.6
P-93	880	8	Ductile Iro	120	false	0.00	Open	26	183.0	183.0	0.0	0.0
P-94	512	8	Ductile Iro	50	false	0.00	Open	-53	184.5	184.7	0.2	0.5
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	-53	184.7	185.3	0.6	0.5
P-96	1	6	Ductile Iro	120	false	0.00	Open	-40	182.8	182.8	0.0	0.2
P-99	1	6	Ductile Iro	120	false	0.00	Open	130	183.0	183.0	0.0	2.0
P-100	4	6	Ductile Iro	120	false	0.00	Open	6	182.8	182.8	0.0	0.0
P-101	240	6	Ductile Iro	120	false	0.00	Open	6	182.8	182.8	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	3	182.8	182.8	0.0	0.0
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	7	182.8	182.8	0.0	0.0
P-104	1	6	Ductile Iro	120	false	0.00	Open	-23	182.8	182.8	0.0	0.1
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-32	182.9	183.0	0.1	0.0
P-106	270	8	Ductile Iro	120	false	0.00	Open	-35	182.9	182.9	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-73	182.9	184.1	1.1	0.7
P-108	240	12	Ductile Iro	120	false	0.00	Open	-77	184.1	184.1	0.0	0.0
P-109	930	10	Ductile Iro	50	false	0.00	Open	-55	184.1	184.2	0.2	0.2
P-110	670	10	Ductile Iro	50	false	0.00	Open	-73	184.2	184.4	0.2	0.3

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	46	184.4	184.1	0.3	0.4
P-112	770	10	Ductile Iro	50	false	0.00	Open	-138	184.4	185.1	0.7	0.9
P-113	900	8	Ductile Iro	50	false	0.00	Open	-173	185.3	189.1	3.8	4.2
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-158	189.1	190.2	1.1	0.7
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	22	190.2	190.2	0.0	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-322	190.2	192.0	1.8	2.6
P-117	245	8	Ductile Iro	120	false	0.00	Open	514	192.0	190.5	1.5	6.2
P-118	620	8	Ductile Iro	120	false	0.00	Open	496	190.5	186.9	3.6	5.8
P-119	840	8	Ductile Iro	120	false	0.00	Open	339	186.9	184.5	2.4	2.9
P-121	1,270	8	PVC	120	false	0.00	Open	125	184.5	183.9	0.6	0.5
P-122	290	8	Ductile Iro	120	false	0.00	Open	-114	183.8	183.9	0.1	0.4
P-123	660	12	Ductile Iro	120	false	0.00	Open	-24	183.9	183.9	0.0	0.0
P-124	380	8	Ductile Iro	120	false	0.00	Open	-49	183.8	183.8	0.0	0.1
P-125	660	8	Ductile Iro	120	false	0.00	Open	67	183.8	183.7	0.1	0.1
P-126	580	8	Ductile Iro	120	false	0.00	Open	16	184.5	184.5	0.0	0.0
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	133	184.5	183.8	0.6	0.5
P-128	530	8	Ductile Iro	120	false	0.00	Open	-133	184.5	184.7	0.3	0.5
P-129	130	8	Ductile Iro	120	false	0.00	Open	307	184.7	184.4	0.3	2.4
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	138	184.4	183.7	0.7	0.5
P-131	910	8	Ductile Iro	120	false	0.00	Open	152	184.4	183.8	0.6	0.6
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	-189	182.6	183.7	1.1	1.0
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	-295	184.0	186.3	2.3	2.2
P-134	310	8	Ductile Iro	120	false	0.00	Open	456	186.3	184.7	1.5	4.9
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	-141	186.3	186.9	0.6	0.6
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	2	190.5	190.5	0.0	0.0
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	245	190.5	184.0	6.5	6.4
P-138	470	8	Ductile Iro	120	false	0.00	Open	627	190.5	186.3	4.2	8.9
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	178	192.0	186.3	5.7	3.5
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	113	186.3	183.4	2.9	1.9
P-141	980	6	Ductile Iro	78	false	0.00	Open	43	182.5	181.9	0.6	0.6
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	9	181.9	181.8	0.1	0.0
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-13	181.8	181.9	0.1	0.1
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	-9	181.8	181.8	0.0	0.0
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	67.6	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	67.6	183.9	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	125	190.2	189.8	0.3	0.5
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	67.6	67.6	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	67.6	67.6	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	-86	189.1	189.8	0.8	0.9
P-161	686	10	Ductile Iro	120	false	0.00	Open	257	183.0	182.6	0.4	0.6
P-162	514	10	Ductile Iro	120	false	0.00	Open	250	182.6	182.3	0.3	0.5
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	182.4	182.4	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	183	184.1	183.9	0.2	0.1
P-171	362	8	PVC	120	false	0.00	Open	-8	182.9	182.9	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-8	182.9	182.9	0.0	0.0
P-173	1,035	6	PVC	99	false	0.00	Open	0	183.4	183.4	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-214	184.1	184.3	0.3	0.2
P-175	5	12	PVC	120	false	0.00	Open	-214	184.3	184.3	0.0	0.2
P-176	838	12	PVC	120	false	0.00	Open	-214	184.3	184.5	0.1	0.2

Scenario: ADD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-177	1	24	Ductile Iro	130	false	0.00	Open	925	33.0	33.0	0.0	0.1
P-178	1	24	Ductile Iro	130	false	0.00	Open	925	203.3	203.3	0.0	0.1
P-179	200	6	Ductile Iro	130	false	0.00	Open	925	203.3	190.5	12.8	64.2
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	159	183.9	183.0	0.9	0.7
P-181	1	24	Ductile Iro	130	false	0.00	Open	1,058	37.0	37.0	0.0	0.1
P-182	1	24	Ductile Iro	130	false	0.00	Open	1,058	208.4	208.4	0.0	0.1
P-183	200	6	Ductile Iro	130	false	0.00	Open	1,058	208.4	192.0	16.5	82.3
P-190	275	6	Ductile Iro	120	false	0.00	Open	-13	182.8	182.8	0.0	0.0
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	5	182.8	182.8	0.0	0.0
P-210	275	6	Ductile Iro	120	false	0.00	Open	60	183.0	182.9	0.1	0.5
P-220	275	6	Ductile Iro	120	false	0.00	Open	-27	182.8	182.9	0.0	0.1
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	-34	182.8	183.0	0.2	0.2
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	-14	182.8	182.9	0.0	0.0
P-250	440	6	Ductile Iro	120	false	0.00	Open	-14	182.8	182.8	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-15	182.8	182.8	0.0	0.0
P-270	880	6	Ductile Iro	120	false	0.00	Open	13	182.9	182.8	0.0	0.0
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	29	183.0	182.8	0.1	0.1
P-290	330	6	Ductile Iro	120	false	0.00	Open	-11	182.8	182.8	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	-14	182.8	182.8	0.0	0.0
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	10	182.8	182.8	0.0	0.0
P-320	750	6	Ductile Iro	120	false	0.00	Open	16	182.8	182.8	0.0	0.0
P-330	275	6	Ductile Iro	120	false	0.00	Open	41	182.9	182.8	0.1	0.2
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	-7	182.8	182.8	0.0	0.0
P-350	220	6	Ductile Iro	120	false	0.00	Open	6	182.8	182.8	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	0	182.8	182.8	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	0	182.8	182.8	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-6	182.8	182.8	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	12	182.8	182.8	0.0	0.0
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-136	181.6	181.7	0.1	0.1
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-71	178.7	181.7	3.0	2.0
P-420	880	8	Cast iron	120	false	0.00	Open	79	185.3	185.1	0.2	0.2
P-430	1,210	4	Cast iron	120	false	0.00	Open	59	189.1	185.1	3.9	3.3
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	9	183.4	182.7	0.7	0.5
P-450	682	12	Ductile Iro	120	false	0.00	Open	-313	181.8	182.1	0.2	0.3
P-460	990	10	Ductile Iro	99	false	0.00	Open	39	181.8	181.8	0.0	0.0
P-470	330	6	Ductile Iro	85	false	0.00	Open	-27	181.8	181.9	0.1	0.2
P-480	880	6	Ductile Iro	85	false	0.00	Open	27	182.1	181.9	0.2	0.2
P-490	1	10	Ductile Iro	50	false	0.00	Open	467	319.4	319.4	0.0	8.9
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

14.2.1:
PDD-Fire Flow Analysis Report

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	true	1,000	1,190	1,000	1,190	20.0	52.0	20.0	20.0	J-2	5.6	J-3
J-2	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	true	1,500	2,280	1,511	2,291	20.0	70.4	20.0	20.0	J-2	5.6	J-3
J-5	true	false	1,000	716	1,000	716	20.0	20.0	20.0	20.6	J-2	5.6	J-3
J-6	true	false	1,000	964	1,000	964	20.0	20.0	20.0	20.0	J-7	5.6	J-3
J-7	true	false	1,000	931	1,012	942	20.0	20.0	20.0	20.3	J-2	5.6	J-3
J-8	true	false	1,000	743	1,000	743	20.0	20.0	20.0	20.9	J-2	5.6	J-3
J-9	true	true	1,000	1,120	1,000	1,120	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-10	true	true	1,000	1,120	1,000	1,120	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-11	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-12	true	false	2,500	1,150	2,535	1,185	20.0	67.6	20.0	20.0	J-2	5.6	J-3
J-13	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-22	true	true	1,000	1,163	1,038	1,201	20.0	66.9	20.0	20.0	J-2	5.6	J-3
J-25	true	true	1,000	1,207	1,021	1,228	20.0	66.7	20.0	20.0	J-2	5.6	J-3
J-29	true	true	1,000	1,282	1,011	1,293	20.0	64.5	20.0	20.0	J-2	5.6	J-3
J-34	true	true	1,000	1,379	1,011	1,390	20.0	62.8	20.0	20.0	J-2	5.6	J-3
J-38	true	true	1,000	1,498	1,011	1,509	20.0	62.5	20.0	20.0	J-2	5.6	J-3
J-49	true	true	1,000	1,138	1,046	1,184	20.0	55.7	20.0	20.0	J-2	5.6	J-3
J-58	true	true	1,000	1,055	1,053	1,108	20.0	66.8	20.0	20.0	J-2	5.6	J-3
J-64	true	true	1,000	1,162	1,010	1,171	20.0	64.3	20.0	20.0	J-2	5.6	J-3
J-71	true	true	1,000	1,005	1,000	1,005	20.0	68.8	20.0	20.0	J-2	5.6	J-3
J-74	true	true	1,000	1,111	1,025	1,135	20.0	69.5	20.0	20.0	J-2	5.6	J-3
J-87	true	true	1,000	1,327	1,011	1,338	20.0	63.5	20.0	20.0	J-2	5.6	J-3
J-100	true	true	1,000	1,059	1,036	1,094	20.0	64.4	20.0	20.0	J-2	5.6	J-3
J-103	true	true	1,000	1,164	1,029	1,193	20.0	61.6	20.0	20.0	J-2	5.6	J-3
J-106	true	true	1,000	1,151	1,010	1,160	20.0	67.6	20.0	20.0	J-2	5.6	J-3
J-109	true	true	1,000	1,682	1,201	1,883	20.0	64.4	20.0	20.0	J-2	5.6	J-3
J-119	true	true	1,000	3,579	1,015	3,595	20.0	20.0	20.0	20.5	J-2	5.6	J-3
J-125	true	true	1,000	5,000	1,015	5,015	20.0	57.2	20.0	20.3	J-2	5.6	J-3
J-156	true	true	1,000	1,334	1,087	1,421	20.0	20.0	20.0	20.0	J-8	5.6	J-3
J-166	true	true	1,000	1,523	1,000	1,523	20.0	20.0	20.0	20.8	J-2	5.6	J-3
J-169	true	true	1,000	2,128	1,029	2,158	20.0	20.0	20.0	20.3	J-166	5.6	J-3
J-174	true	true	1,000	1,865	1,029	1,895	20.0	20.0	20.0	20.6	J-2	5.6	J-3
J-179	true	true	3,000	3,501	3,029	3,530	20.0	46.4	20.0	20.3	J-2	5.6	J-3
J-184	true	true	1,000	3,512	1,058	3,570	20.0	49.5	20.0	20.0	J-2	5.6	J-3
J-188	true	true	1,000	2,724	1,010	2,734	20.0	59.5	20.0	20.0	J-2	5.6	J-3
J-196	true	true	1,000	4,199	1,014	4,213	20.0	59.0	20.0	20.0	J-2	5.6	J-3
J-219	true	true	1,000	2,491	1,045	2,536	20.0	20.0	20.0	20.6	J-2	5.6	J-3
J-222	true	true	1,000	1,936	1,045	1,981	20.0	20.0	20.0	20.7	J-2	5.6	J-3
J-227	true	true	1,000	5,000	1,029	5,029	20.0	44.2	20.0	20.2	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	true	1,000	2,396	1,000	2,396	20.0	64.0	20.0	20.0	J-2	5.6	J-3
J-250	true	true	1,000	2,373	1,038	2,410	20.0	64.2	20.0	20.0	J-2	5.6	J-3
J-259	true	true	1,000	5,000	1,000	5,000	20.0	68.8	20.0	20.1	J-2	5.6	J-3
J-260	true	true	1,000	5,000	1,000	5,000	20.0	70.7	20.0	20.1	J-2	5.6	J-3
J-261	true	true	1,000	5,000	1,016	5,016	20.0	66.9	20.0	20.5	J-2	5.6	J-3
J-272	true	true	1,000	4,452	1,000	4,452	20.0	31.7	20.0	20.0	J-2	5.6	J-3
J-276	true	true	1,000	5,000	1,013	5,013	20.0	61.4	20.0	20.2	J-2	5.6	J-3
J-277	true	true	1,000	5,000	1,013	5,013	20.0	67.3	20.0	20.3	J-2	5.6	J-3
J-288	true	true	1,000	4,542	1,000	4,542	20.0	33.2	20.0	20.0	J-2	5.6	J-3
J-298	true	true	1,000	2,562	1,031	2,594	20.0	67.3	20.0	20.0	J-2	5.6	J-3

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-302	true	true	1,000	2,414	1,292	2,706	20.0	60.3	20.0	20.0	J-2	5.6	J-3
J-323	true	true	1,000	2,927	1,031	2,959	20.0	67.2	20.0	20.0	J-2	5.6	J-3
J-328	true	true	1,000	1,552	1,031	1,584	20.0	20.0	20.0	20.5	J-2	5.6	J-3
J-333	true	true	1,000	1,846	1,047	1,894	20.0	20.0	20.0	20.4	J-2	5.6	J-3
J-370	true	false	3,500	2,111	3,606	2,217	20.0	65.5	20.0	20.0	J-2	5.6	J-3
J-374	true	true	1,000	2,231	1,000	2,231	20.0	20.0	20.0	20.0	J-2	5.6	J-3
J-376	true	true	1,000	2,309	1,000	2,309	20.0	57.7	20.0	20.0	J-2	5.6	J-3
J-387	true	true	1,000	2,265	1,103	2,369	20.0	56.9	20.0	20.0	J-2	5.6	J-3
J-388	true	false	1,000	415	1,106	521	20.0	20.0	20.0	20.9	J-2	5.6	J-3
J-390	true	true	1,000	1,716	1,025	1,740	20.0	63.1	20.0	20.0	J-2	5.6	J-3
J-398	true	true	1,000	1,528	1,025	1,553	20.0	64.2	20.0	20.0	J-2	5.6	J-3
J-400	true	false	2,250	1,780	2,275	1,804	20.0	66.1	20.0	20.0	J-2	5.6	J-3
J-407	true	true	1,000	2,033	1,083	2,116	20.0	65.2	20.0	20.0	J-2	5.6	J-3
J-408	true	true	1,500	2,147	1,530	2,176	20.0	65.2	20.0	20.0	J-2	5.6	J-3
J-411	true	true	1,000	2,356	1,025	2,381	20.0	62.9	20.0	20.0	J-2	5.6	J-3
J-435	true	true	1,000	1,167	1,054	1,221	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-439	true	true	1,000	1,318	1,025	1,343	20.0	66.7	20.0	20.0	J-2	5.6	J-3
J-442	true	true	1,000	1,572	1,025	1,597	20.0	66.8	20.0	20.0	J-2	5.6	J-3
J-446	true	true	1,000	1,596	1,025	1,621	20.0	66.2	20.0	20.0	J-2	5.6	J-3
J-452	true	true	1,000	1,901	1,025	1,926	20.0	65.0	20.0	20.0	J-2	5.6	J-3
J-453	true	true	1,000	1,979	1,025	2,003	20.0	64.4	20.0	20.0	J-2	5.6	J-3
J-459	true	true	1,000	1,036	1,054	1,091	20.0	69.1	20.0	20.0	J-2	5.6	J-3
J-461	true	true	1,000	1,236	1,025	1,260	20.0	68.7	20.0	20.0	J-2	5.6	J-3
J-464	true	true	1,000	1,458	1,025	1,483	20.0	67.1	20.0	20.0	J-2	5.6	J-3
J-473	true	true	1,000	2,228	1,031	2,259	20.0	64.4	20.0	20.0	J-2	5.6	J-3
J-474	true	true	1,000	2,143	1,045	2,187	20.0	64.6	20.0	20.0	J-2	5.6	J-3
J-501	true	true	1,000	1,150	1,010	1,159	20.0	44.0	20.0	20.0	J-2	5.6	J-3
J-502	true	true	1,000	1,148	1,010	1,158	20.0	55.9	20.0	20.0	J-2	5.6	J-3
J-508	true	true	1,000	1,154	1,010	1,164	20.0	59.9	20.0	20.0	J-2	5.6	J-3
J-513	true	true	1,000	1,154	1,010	1,164	20.0	62.0	20.0	20.0	J-2	5.6	J-3
J-518	true	true	1,000	1,207	1,010	1,216	20.0	66.7	20.0	20.0	J-2	5.6	J-3
J-519	true	true	1,000	1,154	1,010	1,164	20.0	51.8	20.0	20.0	J-2	5.6	J-3
J-520	true	true	1,000	1,154	1,010	1,164	20.0	55.9	20.0	20.0	J-2	5.6	J-3
J-526	true	true	1,000	1,154	1,031	1,185	20.0	59.9	20.0	20.0	J-2	5.6	J-3
J-533	true	true	1,000	1,156	1,010	1,166	20.0	62.2	20.0	20.0	J-2	5.6	J-3
J-536	true	true	1,000	1,178	1,010	1,188	20.0	62.9	20.0	20.0	J-2	5.6	J-3
J-541	true	true	1,000	1,154	1,010	1,164	20.0	57.5	20.0	20.0	J-2	5.6	J-3
J-542	true	true	1,000	1,151	1,010	1,161	20.0	55.6	20.0	20.0	J-2	5.6	J-3
J-547	true	true	1,000	1,159	1,010	1,168	20.0	60.5	20.0	20.0	J-2	5.6	J-3
J-573	true	true	1,000	1,488	1,018	1,507	20.0	49.0	20.0	20.0	J-2	5.6	J-3
J-579	true	false	2,500	1,558	2,559	1,617	20.0	43.6	20.0	20.0	J-2	5.6	J-3
J-592	true	false	3,500	1,750	3,567	1,817	20.0	63.6	20.0	20.0	J-2	5.6	J-3
J-610	true	true	1,000	1,097	1,027	1,125	20.0	56.8	20.0	20.0	J-2	5.6	J-3
J-612	true	true	1,000	1,131	1,028	1,159	20.0	56.1	20.0	20.0	J-2	5.6	J-3
J-620	true	true	1,000	5,000	1,009	5,009	20.0	62.4	20.0	20.0	J-2	5.6	J-3
J-623	true	true	1,000	5,000	1,015	5,015	20.0	47.1	20.0	20.3	J-2	5.6	J-3
J-627	true	true	1,000	1,215	1,000	1,215	20.0	54.1	20.0	20.0	J-2	5.6	J-3
J-632	true	true	1,000	1,254	1,061	1,315	20.0	53.0	20.0	20.0	J-2	5.6	J-3
J-642	true	true	1,000	1,572	1,023	1,595	20.0	53.1	20.0	20.0	J-2	5.6	J-3
J-650	true	false	1,500	1,285	1,598	1,383	20.0	20.0	20.0	20.6	J-2	5.6	J-3
J-664	true	true	1,000	1,142	1,040	1,181	20.0	57.4	20.0	20.0	J-2	5.6	J-3
J-669	true	true	1,000	1,572	1,034	1,605	20.0	35.1	20.0	20.0	J-2	5.6	J-3

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-703	true	true	1,000	1,791	1,025	1,816	20.0	68.0	20.0	20.0	J-2	5.6	J-3
J-708	true	true	1,000	2,040	1,205	2,244	20.0	56.1	20.0	20.0	J-2	5.6	J-3
J-710	true	true	1,000	2,040	1,090	2,130	20.0	61.6	20.0	20.0	J-2	5.6	J-3
J-713	true	true	1,000	2,040	1,133	2,173	20.0	65.2	20.0	20.0	J-2	5.6	J-3
J-715	true	true	1,000	2,711	1,004	2,715	20.0	60.5	20.0	20.0	J-2	5.6	J-3
J-731	true	true	1,000	5,000	1,006	5,006	20.0	65.3	20.0	20.4	J-2	5.6	J-3
J-752	true	true	1,000	5,000	1,006	5,006	20.0	72.6	20.0	20.4	J-2	5.6	J-3
J-753	true	true	1,000	5,000	1,005	5,005	20.0	71.7	20.0	20.4	J-2	5.6	J-3
J-754	true	true	1,000	4,341	1,049	4,390	20.0	68.1	20.0	20.0	J-2	5.6	J-3
J-767	true	true	1,000	5,000	1,009	5,009	20.0	64.0	20.0	20.2	J-2	5.6	J-3
J-769	true	true	1,000	5,000	1,000	5,000	20.0	67.8	20.0	20.3	J-2	5.6	J-3
J-773	true	true	1,000	5,000	1,011	5,011	20.0	67.2	20.0	20.3	J-2	5.6	J-3
J-780	true	true	1,000	5,000	1,019	5,019	20.0	67.9	20.0	20.4	J-2	5.6	J-3
J-785	true	true	1,000	5,000	1,005	5,005	20.0	73.5	20.0	20.5	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	true	1,000	5,000	1,000	5,000	20.0	72.8	20.0	20.7	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	true	1,000	5,000	1,000	5,000	20.0	73.0	20.0	20.7	J-2	5.6	J-3
J-795	true	true	1,000	5,000	1,009	5,009	20.0	50.0	20.0	20.4	J-2	5.6	J-3
J-805	true	true	1,000	5,000	1,016	5,016	20.0	31.1	20.0	20.4	J-2	5.6	J-3
J-807	true	true	1,000	5,000	1,009	5,009	20.0	64.4	20.0	20.3	J-2	5.6	J-3
J-808	true	true	1,000	5,000	1,000	5,000	20.0	58.9	20.0	20.4	J-2	5.6	J-3
J-832	true	true	1,000	5,000	1,009	5,009	20.0	57.4	20.0	20.4	J-2	5.6	J-3
J-855	true	true	1,000	5,000	1,009	5,009	20.0	53.4	20.0	20.4	J-2	5.6	J-3
J-872	true	true	1,000	2,266	1,053	2,319	20.0	47.2	20.0	20.0	J-2	5.6	J-3

14.2.2:
PDD-Junction Report

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	66.6	21.1
J-669	36.00	Zone-1	Demand	34	Pattern - 1	34	186.2	65.1
J-612	28.00	Zone-1	Demand	28	Pattern - 1	28	180.4	66.1
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	181.0	66.8
J-632	27.00	Zone-1	Demand	61	Pattern - 1	61	181.2	66.8
J-573	30.00	Zone-1	Demand	18	Pattern - 1	18	185.0	67.2
J-610	25.00	Zone-1	Demand	27	Pattern - 1	27	180.2	67.3
J-579	30.00	Zone-1	Demand	59	Pattern - 1	59	185.8	67.5
J-650	25.00	Zone-1	Demand	98	Pattern - 1	98	182.8	68.4
J-642	27.00	Zone-1	Demand	23	Pattern - 1	23	186.2	69.0
J-7	19.00	Zone-1	Demand	12	Fixed	12	178.5	69.1
J-6	19.00	Zone-1	Demand	0	Fixed	0	178.5	69.1
J-49	19.00	Zone-1	Demand	46	Pattern - 1	46	178.5	69.2
J-100	20.00	Zone-1	Demand	36	Pattern - 1	36	180.1	69.4
J-519	18.00	Zone-1	Demand	10	Pattern - 1	10	178.4	69.5
J-501	18.00	Zone-1	Demand	10	Pattern - 1	10	178.4	69.5
J-664	18.00	Zone-1	Demand	40	Pattern - 1	40	178.5	69.6
J-250	20.00	Zone-1	Demand	38	Pattern - 1	38	181.2	69.9
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	181.2	69.9
J-502	17.00	Zone-1	Demand	10	Pattern - 1	10	178.5	70.0
J-188	20.00	Zone-1	Demand	10	Pattern - 1	10	181.5	70.0
J-184	20.00	Zone-1	Demand	58	Pattern - 1	58	181.6	70.0
J-715	19.00	Zone-1	Demand	4	Pattern - 1	4	181.6	70.5
J-1	18.00	Zone-1	Demand	0	Fixed	0	180.9	70.6
J-219	18.00	Zone-1	Demand	45	Pattern - 1	45	181.2	70.7
J-398	20.00	Zone-1	Demand	25	Pattern - 1	25	183.5	70.9
J-169	17.00	Zone-1	Demand	29	Pattern - 1	29	181.2	71.2
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	181.2	71.2
J-156	17.00	Zone-1	Demand	87	Pattern - 1	87	181.3	71.2
J-8	17.00	Zone-1	Demand	0	Fixed	0	181.3	71.2
J-473	15.00	Zone-1	Demand	31	Pattern - 1	31	179.6	71.3
J-58	15.00	Zone-1	Demand	53	Pattern - 1	53	180.1	71.6
J-222	16.00	Zone-1	Demand	45	Pattern - 1	45	181.1	71.6
J-474	14.00	Zone-1	Demand	45	Pattern - 1	45	179.3	71.7
J-179	16.00	Zone-1	Demand	29	Pattern - 1	29	181.5	71.7
J-388	6.00	Zone-1	Demand	106	Pattern - 1	106	171.6	71.8
J-435	15.00	Zone-1	Demand	54	Pattern - 1	54	180.8	71.9
J-390	21.00	Zone-1	Demand	25	Pattern - 1	25	187.1	72.0
J-400	17.00	Zone-1	Demand	25	Pattern - 1	25	183.2	72.0
J-174	15.00	Zone-1	Demand	29	Pattern - 1	29	181.3	72.1
J-446	15.00	Zone-1	Demand	25	Pattern - 1	25	181.4	72.1
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	181.5	72.2
J-442	15.00	Zone-1	Demand	25	Pattern - 1	25	181.5	72.2
J-9	14.00	Zone-1	Demand	0	Fixed	0	180.5	72.2
J-10	14.00	Zone-1	Demand	0	Fixed	0	180.5	72.2
J-408	15.00	Zone-1	Demand	30	Pattern - 1	30	181.7	72.3
J-411	15.00	Zone-1	Demand	25	Pattern - 1	25	181.8	72.3
J-439	14.00	Zone-1	Demand	25	Pattern - 1	25	180.8	72.3
J-453	14.00	Zone-1	Demand	25	Pattern - 1	25	181.0	72.4
J-452	14.00	Zone-1	Demand	25	Pattern - 1	25	181.3	72.5
J-592	21.00	Zone-1	Demand	67	Pattern - 1	67	188.5	72.6
J-542	10.00	Zone-1	Demand	10	Pattern - 1	10	178.4	73.0
J-227	13.00	Zone-1	Demand	29	Pattern - 1	29	181.5	73.1

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-370	10.00	Zone-1	Demand	106	Pattern - 1	106	178.9	73.2
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	180.0	73.3
J-623	12.00	Zone-1	Demand	15	Pattern - 1	15	181.7	73.6
J-196	12.00	Zone-1	Demand	14	Pattern - 1	14	181.7	73.6
J-276	12.00	Zone-1	Demand	13	Pattern - 1	13	181.8	73.6
J-459	10.00	Zone-1	Demand	54	Pattern - 1	54	180.0	73.7
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	178.6	73.7
J-464	10.00	Zone-1	Demand	25	Pattern - 1	25	180.2	73.8
J-407	17.00	Zone-1	Demand	83	Pattern - 1	83	187.3	73.8
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	181.7	74.0
J-767	11.00	Zone-1	Demand	9	Pattern - 1	9	181.8	74.1
J-328	8.00	Zone-1	Demand	31	Pattern - 1	31	178.9	74.1
J-710	7.00	Zone-1	Demand	90	Pattern - 1	90	178.0	74.1
J-461	9.00	Zone-1	Demand	25	Pattern - 1	25	180.1	74.2
J-713	7.00	Zone-1	Demand	133	Pattern - 1	133	178.3	74.3
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	178.5	74.3
J-125	10.00	Zone-1	Demand	15	Pattern - 1	15	181.6	74.4
J-302	7.00	Zone-1	Demand	292	Pattern - 1	292	178.6	74.4
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	181.6	74.4
J-119	10.00	Zone-1	Demand	15	Pattern - 1	15	181.7	74.4
J-754	10.00	Zone-1	Demand	49	Pattern - 1	49	181.7	74.4
J-620	10.00	Zone-1	Demand	9	Pattern - 1	9	181.8	74.5
J-277	10.00	Zone-1	Demand	13	Pattern - 1	13	181.9	74.5
J-773	10.00	Zone-1	Demand	11	Pattern - 1	11	181.9	74.5
J-74	8.00	Zone-1	Demand	25	Pattern - 1	25	179.9	74.5
J-780	10.00	Zone-1	Demand	19	Pattern - 1	19	182.2	74.7
J-22	6.50	Zone-1	Demand	38	Pattern - 1	38	178.8	74.7
J-872	6.00	Zone-1	Demand	53	Pattern - 1	53	178.3	74.7
J-387	6.00	Zone-1	Demand	103	Pattern - 1	103	178.3	74.7
J-323	8.00	Zone-1	Demand	31	Pattern - 1	31	180.5	74.8
J-261	10.00	Zone-1	Demand	16	Pattern - 1	16	182.5	74.8
J-703	7.00	Zone-1	Demand	25	Pattern - 1	25	179.6	74.8
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	182.6	74.8
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	182.6	74.8
J-832	9.00	Zone-1	Demand	9	Pattern - 1	9	181.7	74.9
J-298	7.00	Zone-1	Demand	31	Pattern - 1	31	179.8	74.9
J-807	9.00	Zone-1	Demand	9	Pattern - 1	9	181.9	74.9
J-805	9.00	Zone-1	Demand	16	Pattern - 1	16	181.9	74.9
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	181.9	74.9
J-103	5.50	Zone-1	Demand	29	Pattern - 1	29	178.5	75.0
J-64	5.50	Zone-1	Demand	10	Pattern - 1	10	178.5	75.0
J-333	5.50	Zone-1	Demand	47	Pattern - 1	47	178.6	75.1
J-109	5.00	Zone-1	Demand	201	Pattern - 1	201	178.3	75.1
J-753	9.00	Zone-1	Demand	5	Pattern - 1	5	182.4	75.2
J-708	4.50	Zone-1	Demand	205	Pattern - 1	205	177.9	75.2
J-38	5.00	Zone-1	Demand	11	Pattern - 1	11	178.4	75.2
J-520	5.00	Zone-1	Demand	10	Pattern - 1	10	178.4	75.2
J-541	5.00	Zone-1	Demand	10	Pattern - 1	10	178.4	75.2
J-526	5.00	Zone-1	Demand	31	Pattern - 1	31	178.4	75.2
J-508	5.00	Zone-1	Demand	10	Pattern - 1	10	178.4	75.2
J-5	5.00	Zone-1	Demand	0	Fixed	0	178.4	75.2
J-34	5.00	Zone-1	Demand	11	Pattern - 1	11	178.4	75.2
J-87	5.00	Zone-1	Demand	11	Pattern - 1	11	178.4	75.2
J-547	5.00	Zone-1	Demand	10	Pattern - 1	10	178.4	75.2

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-533	5.00	Zone-1	Demand	10	Pattern - 1	10	178.4	75.2
J-513	5.00	Zone-1	Demand	10	Pattern - 1	10	178.5	75.2
J-29	5.00	Zone-1	Demand	11	Pattern - 1	11	178.5	75.2
J-536	5.00	Zone-1	Demand	10	Pattern - 1	10	178.5	75.2
J-25	5.00	Zone-1	Demand	21	Pattern - 1	21	178.5	75.2
J-518	5.00	Zone-1	Demand	10	Pattern - 1	10	178.5	75.2
J-106	5.00	Zone-1	Demand	10	Pattern - 1	10	178.7	75.3
J-12	5.00	Zone-1	Demand	35	Pattern - 1	35	178.7	75.3
J-855	8.00	Zone-1	Demand	9	Pattern - 1	9	181.7	75.3
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	182.2	75.5
J-731	8.00	Zone-1	Demand	6	Pattern - 1	6	182.2	75.5
J-795	6.50	Zone-1	Demand	9	Pattern - 1	9	181.7	76.0
J-752	7.00	Zone-1	Demand	6	Pattern - 1	6	182.4	76.0
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	182.2	76.4
J-785	6.00	Zone-1	Demand	5	Pattern - 1	5	182.5	76.5
J-4	0.00	Zone-1	Demand	11	Fixed	11	180.2	78.1
J-11	17.00	Zone-1	Demand	0	Fixed	0	201.0	79.8
J-13	21.00	Zone-1	Demand	0	Fixed	0	206.2	80.3
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	318.3	133.6
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	319.4	134.1
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

14.2.3:
PDD-Pipe Report

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-111	181.6	181.6	0.0	0.1
P-2	980	12	Ductile Iro	120	false	0.00	Open	169	181.6	181.5	0.1	0.1
P-3	1,500	12	Cast iron	78	false	0.00	Open	27	181.5	181.5	0.0	0.0
P-4	1,440	8	Cast iron	120	false	0.00	Open	-58	181.6	181.7	0.2	0.1
P-5	533	8	Ductile Iro	120	false	0.00	Open	-58	181.7	181.8	0.1	0.1
P-6	290	8	Ductile Iro	120	false	0.00	Open	-37	181.8	181.8	0.0	0.0
P-7	800	10	Ductile Iro	113	false	0.00	Open	-105	181.7	181.8	0.1	0.1
P-8	400	8	Ductile Iro	120	false	0.00	Open	15	181.7	181.7	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	74	181.7	181.6	0.1	0.1
P-10	930	8	Ductile Iro	120	false	0.00	Open	113	181.5	181.2	0.3	0.4
P-11	555	8	Ductile Iro	120	false	0.00	Open	45	181.2	181.1	0.0	0.1
P-12	450	8	Ductile Iro	120	false	0.00	Open	22	181.2	181.2	0.0	0.0
P-13	275	6	Ductile Iro	106	false	0.00	Open	-3	181.2	181.2	0.0	0.0
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-10	181.3	181.3	0.0	0.0
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	4	181.3	181.2	0.1	0.1
P-16	555	12	Ductile Iro	120	false	0.00	Open	27	181.5	181.5	0.0	0.0
P-18	800	8	Ductile Iro	120	false	0.00	Open	46	181.6	181.5	0.1	0.1
P-19	620	6	Ductile Iro	106	false	0.00	Open	-44	181.3	181.5	0.2	0.3
P-20	650	8	Ductile Iro	120	false	0.00	Open	-46	181.6	181.6	0.0	0.1
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	-130	181.6	181.8	0.2	0.2
P-22	400	8	Ductile Iro	120	false	0.00	Open	69	181.8	181.7	0.1	0.2
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	120	181.7	181.2	0.6	0.4
P-24	620	8	Ductile Iro	120	false	0.00	Open	91	181.2	181.0	0.2	0.3
P-25	650	8	Ductile Iro	120	false	0.00	Open	-147	181.3	181.7	0.4	0.6
P-26	600	8	Ductile Iro	120	false	0.00	Open	138	181.3	181.0	0.3	0.5
P-27	740	8	Ductile Iro	120	false	0.00	Open	-128	181.2	181.5	0.3	0.5
P-28	380	8	Ductile Iro	120	false	0.00	Open	79	181.6	181.5	0.1	0.2
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-59	181.5	181.7	0.2	0.1
P-30	890	10	Ductile Iro	113	false	0.00	Open	-1	181.7	181.7	0.0	0.0
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-72	181.7	181.8	0.1	0.1
P-32	75	12	Ductile Iro	120	false	0.00	Open	-293	181.2	181.2	0.0	0.3
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-140	181.2	182.2	1.0	0.6
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-153	181.2	182.5	1.3	0.7
P-36	100	10	Ductile Iro	120	false	0.00	Open	-585	179.3	179.6	0.3	2.7
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	96	181.9	181.7	0.1	0.1
P-38	900	8	Ductile Iro	120	false	0.00	Open	56	181.7	181.7	0.1	0.1
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	181.6	181.6	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	671	179.3	178.9	0.3	1.4
P-41	980	8	Ductile Iro	120	false	0.00	Open	6	178.3	178.3	0.0	0.0
P-42	222	8	Ductile Iro	120	false	0.00	Open	53	178.3	178.3	0.0	0.1
P-43	620	10	Ductile Iro	120	false	0.00	Open	-150	178.3	178.5	0.1	0.2
P-44	610	10	Ductile Iro	99	false	0.00	Open	-407	178.6	179.8	1.2	1.9
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	216	179.8	179.6	0.3	0.2
P-46	520	12	Ductile Iro	120	false	0.00	Open	-654	179.8	180.5	0.7	1.3
P-47	666	12	Ductile Iro	120	false	0.00	Open	-761	180.5	181.7	1.2	1.8
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-80	181.7	181.8	0.1	0.1
P-49	220	8	Ductile Iro	120	false	0.00	Open	-102	181.8	181.8	0.1	0.3
P-50	200	10	Ductile Iro	113	false	0.00	Open	-191	181.8	181.9	0.1	0.4
P-51	220	10	Ductile Iro	113	false	0.00	Open	134	181.9	181.9	0.0	0.2
P-52	20	8	Ductile Iro	50	false	0.00	Open	122	320.0	320.0	0.0	2.2
P-53	5	10	Ductile Iro	113	false	0.00	Open	256	181.9	181.9	0.0	0.6
P-54	333	10	Ductile Iro	113	false	0.00	Open	154	181.9	181.8	0.1	0.3
P-55	100	10	Ductile Iro	113	false	0.00	Open	88	181.9	181.9	0.0	0.1

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	111	181.7	181.6	0.0	0.1
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-64	181.7	181.7	0.1	0.0
P-58	555	10	Ductile Iro	120	false	0.00	Open	-31	181.7	181.7	0.0	0.0
P-59	580	10	Ductile Iro	50	false	0.00	Open	-17	181.9	181.9	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-42	181.7	181.9	0.1	0.1
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-76	181.9	182.2	0.4	0.3
P-62	730	12	Ductile Iro	120	false	0.00	Open	52	182.2	182.2	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	337	182.2	181.9	0.3	0.4
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-134	182.2	182.4	0.1	0.1
P-65	330	12	Ductile Iro	120	false	0.00	Open	338	182.5	182.4	0.1	0.4
P-66	820	12	Ductile Iro	120	false	0.00	Open	304	182.5	182.2	0.3	0.3
P-67	5	12	Ductile Iro	120	false	0.00	Open	198	182.4	182.4	0.0	0.1
P-68	225	12	Ductile Iro	120	false	0.00	Open	-594	182.4	182.6	0.3	1.1
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	182.6	319.4	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	56	182.2	182.2	0.0	0.5
P-71	330	8	Ductile Iro	50	false	0.00	Open	-84	182.2	182.5	0.4	1.1
P-72	10	8	Ductile Iro	50	false	0.00	Open	253	182.6	182.5	0.1	8.4
P-73	100	12	Ductile Iro	120	false	0.00	Open	648	182.6	182.5	0.1	1.3
P-74	5	12	Ductile Iro	120	false	0.00	Open	846	182.6	182.6	0.0	2.2
P-75	5	10	Ductile Iro	50	false	0.00	Open	1,494	183.0	182.6	0.4	76.0
P-76	20	12	Ductile Iro	120	false	0.00	Open	1,494	319.5	319.4	0.1	6.2
P-77	15	10	Ductile Iro	50	false	0.00	Open	-1,494	318.3	319.4	1.1	76.0
P-78	100	12	Ductile Iro	120	false	0.00	Open	786	182.4	182.2	0.2	1.9
P-79	290	12	Ductile Iro	120	false	0.00	Open	730	182.2	181.7	0.5	1.6
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	205	181.0	179.6	1.4	1.1
P-81	600	8	Ductile Iro	120	false	0.00	Open	130	179.6	179.3	0.3	0.5
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	185	179.6	178.3	1.2	0.9
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	13	178.3	178.3	0.0	0.0
P-84	550	12	Ductile Iro	120	false	0.00	Open	400	178.3	178.0	0.3	0.5
P-85	15	6	Ductile Iro	50	false	0.00	Open	122	182.0	181.9	0.1	8.9
P-86	600	8	Ductile Iro	120	false	0.00	Open	-30	178.3	178.4	0.0	0.0
P-87	620	8	Ductile Iro	120	false	0.00	Open	-41	178.4	178.4	0.0	0.1
P-88	330	8	Ductile Iro	120	false	0.00	Open	-52	178.4	178.4	0.0	0.1
P-89	310	8	Ductile Iro	120	false	0.00	Open	-63	178.4	178.5	0.0	0.1
P-90	470	8	Ductile Iro	120	false	0.00	Open	-74	178.5	178.5	0.1	0.2
P-91	180	6	Ductile Iro	120	false	0.00	Open	-98	178.5	178.8	0.2	1.2
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	182	179.9	178.8	1.2	0.9
P-93	880	8	Ductile Iro	120	false	0.00	Open	46	178.8	178.7	0.1	0.1
P-94	512	8	Ductile Iro	50	false	0.00	Open	-38	180.8	180.9	0.1	0.3
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	-38	180.9	181.2	0.3	0.3
P-96	1	6	Ductile Iro	120	false	0.00	Open	3	178.5	178.5	0.0	0.0
P-99	1	6	Ductile Iro	120	false	0.00	Open	149	178.7	178.7	0.0	2.5
P-100	4	6	Ductile Iro	120	false	0.00	Open	11	178.4	178.4	0.0	0.0
P-101	240	6	Ductile Iro	120	false	0.00	Open	7	178.4	178.4	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	21	178.5	178.4	0.0	0.1
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	14	178.4	178.4	0.1	0.0
P-104	1	6	Ductile Iro	120	false	0.00	Open	-28	178.4	178.4	0.0	0.1
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-53	178.5	178.7	0.2	0.1
P-106	270	8	Ductile Iro	120	false	0.00	Open	-31	178.5	178.5	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-88	178.5	180.1	1.6	1.0
P-108	240	12	Ductile Iro	120	false	0.00	Open	-42	180.1	180.1	0.0	0.0
P-109	930	10	Ductile Iro	50	false	0.00	Open	-40	180.1	180.2	0.1	0.1
P-110	670	10	Ductile Iro	50	false	0.00	Open	-67	180.2	180.4	0.2	0.2

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	38	180.4	180.1	0.2	0.3
P-112	770	10	Ductile Iro	50	false	0.00	Open	-134	180.4	181.0	0.7	0.9
P-113	900	8	Ductile Iro	50	false	0.00	Open	-174	181.2	185.0	3.8	4.2
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-166	185.0	186.2	1.2	0.8
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	34	186.2	186.2	0.0	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-367	186.2	188.5	2.3	3.3
P-117	245	8	Ductile Iro	120	false	0.00	Open	488	188.5	187.1	1.4	5.6
P-118	620	8	Ductile Iro	120	false	0.00	Open	497	187.1	183.5	3.6	5.8
P-119	840	8	Ductile Iro	120	false	0.00	Open	366	183.5	180.8	2.8	3.3
P-121	1,270	8	PVC	120	false	0.00	Open	146	180.8	180.0	0.8	0.6
P-122	290	8	Ductile Iro	120	false	0.00	Open	-70	179.9	180.0	0.0	0.2
P-123	660	12	Ductile Iro	120	false	0.00	Open	21	180.0	180.0	0.0	0.0
P-124	380	8	Ductile Iro	120	false	0.00	Open	-137	179.9	180.1	0.2	0.5
P-125	660	8	Ductile Iro	120	false	0.00	Open	-25	180.1	180.2	0.0	0.0
P-126	580	8	Ductile Iro	120	false	0.00	Open	-63	180.8	180.8	0.1	0.1
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	136	180.8	180.1	0.7	0.5
P-128	530	8	Ductile Iro	120	false	0.00	Open	-224	180.8	181.5	0.7	1.3
P-129	130	8	Ductile Iro	120	false	0.00	Open	224	181.5	181.4	0.2	1.3
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	184	181.4	180.2	1.2	0.9
P-131	910	8	Ductile Iro	120	false	0.00	Open	15	181.4	181.3	0.0	0.0
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	-135	179.6	180.2	0.6	0.5
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	-228	181.7	183.2	1.4	1.4
P-134	310	8	Ductile Iro	120	false	0.00	Open	473	183.2	181.5	1.6	5.3
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	-106	183.2	183.5	0.4	0.3
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-33	187.1	187.3	0.2	0.2
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	224	187.3	181.8	5.5	5.4
P-138	470	8	Ductile Iro	120	false	0.00	Open	620	187.3	183.2	4.1	8.7
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	177	188.5	182.8	5.7	3.5
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	80	182.8	181.3	1.6	1.0
P-141	980	6	Ductile Iro	78	false	0.00	Open	76	180.5	178.9	1.6	1.6
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	18	178.9	178.6	0.3	0.1
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-27	178.6	178.9	0.3	0.2
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	-3	178.6	178.6	0.0	0.0
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	66.6	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	66.6	180.0	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	144	186.2	185.8	0.5	0.6
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	66.6	66.6	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	66.6	66.6	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	-85	185.0	185.8	0.8	0.9
P-161	686	10	Ductile Iro	120	false	0.00	Open	412	181.2	180.2	0.9	1.4
P-162	514	10	Ductile Iro	120	false	0.00	Open	401	180.2	179.6	0.7	1.3
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	178.4	178.4	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	169	180.1	180.0	0.1	0.1
P-171	362	8	PVC	120	false	0.00	Open	-12	178.5	178.5	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-12	178.5	178.5	0.0	0.0
P-173	1,035	6	PVC	99	false	0.00	Open	0	181.3	181.3	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-267	180.1	180.5	0.4	0.3
P-175	5	12	PVC	120	false	0.00	Open	-267	180.5	180.5	0.0	0.3
P-176	838	12	PVC	120	false	0.00	Open	-267	180.5	180.8	0.2	0.3

Scenario: PDD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-177	1	24	Ductile Iro	130	false	0.00	Open	960	33.0	33.0	0.0	0.1
P-178	1	24	Ductile Iro	130	false	0.00	Open	960	201.0	201.0	0.0	0.1
P-179	200	6	Ductile Iro	130	false	0.00	Open	960	201.0	187.3	13.7	68.7
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	190	180.0	178.7	1.3	1.0
P-181	1	24	Ductile Iro	130	false	0.00	Open	1,099	37.0	37.0	0.0	0.1
P-182	1	24	Ductile Iro	130	false	0.00	Open	1,099	206.2	206.2	0.0	0.1
P-183	200	6	Ductile Iro	130	false	0.00	Open	1,099	206.2	188.5	17.7	88.4
P-190	275	6	Ductile Iro	120	false	0.00	Open	24	178.5	178.5	0.0	0.1
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-15	178.5	178.5	0.0	0.0
P-210	275	6	Ductile Iro	120	false	0.00	Open	69	178.7	178.5	0.2	0.6
P-220	275	6	Ductile Iro	120	false	0.00	Open	-35	178.5	178.5	0.0	0.2
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	-31	178.5	178.7	0.1	0.1
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	-0	178.5	178.5	0.0	0.0
P-250	440	6	Ductile Iro	120	false	0.00	Open	-15	178.4	178.4	0.0	0.0
P-260	770	6	Ductile Iro	120	false	0.00	Open	-18	178.4	178.5	0.0	0.1
P-270	880	6	Ductile Iro	120	false	0.00	Open	24	178.5	178.4	0.1	0.1
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	39	178.7	178.5	0.2	0.2
P-290	330	6	Ductile Iro	120	false	0.00	Open	-3	178.4	178.4	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	-6	178.4	178.5	0.0	0.0
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	18	178.4	178.4	0.1	0.0
P-320	750	6	Ductile Iro	120	false	0.00	Open	22	178.5	178.4	0.1	0.1
P-330	275	6	Ductile Iro	120	false	0.00	Open	44	178.5	178.5	0.1	0.3
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	1	178.5	178.5	0.0	0.0
P-350	220	6	Ductile Iro	120	false	0.00	Open	8	178.4	178.4	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-1	178.4	178.4	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-1	178.4	178.4	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-7	178.4	178.4	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	16	178.5	178.4	0.0	0.0
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-205	177.9	178.0	0.2	0.2
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-106	171.6	178.0	6.4	4.3
P-420	880	8	Cast iron	120	false	0.00	Open	75	181.2	181.0	0.2	0.2
P-430	1,210	4	Cast iron	120	false	0.00	Open	59	185.0	181.0	3.9	3.3
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	3	181.3	181.2	0.1	0.1
P-450	682	12	Ductile Iro	120	false	0.00	Open	-526	178.3	178.9	0.6	0.9
P-460	990	10	Ductile Iro	99	false	0.00	Open	112	178.6	178.5	0.2	0.2
P-470	330	6	Ductile Iro	85	false	0.00	Open	-39	178.5	178.6	0.1	0.4
P-480	880	6	Ductile Iro	85	false	0.00	Open	39	178.9	178.6	0.3	0.4
P-490	1	10	Ductile Iro	50	false	0.00	Open	1,494	318.3	318.2	0.1	76.0
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

14.3.1:
PHD-Fire Flow Analysis Report

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	true	false	1,000	0	1,000	0	20.0	61.3	20.0	18.7	J-2	5.6	J-3
J-2	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-3	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-4	true	false	1,500	0	1,522	22	20.0	70.9	20.0	18.7	J-2	5.6	J-3
J-5	true	false	1,000	0	1,000	0	20.0	65.0	20.0	18.7	J-2	5.6	J-3
J-6	true	false	1,000	0	1,000	0	20.0	58.5	20.0	18.7	J-2	5.6	J-3
J-7	true	false	1,000	0	1,023	23	20.0	58.5	20.0	18.7	J-2	5.6	J-3
J-8	true	false	1,000	0	1,000	0	20.0	63.7	20.0	18.7	J-2	5.6	J-3
J-9	true	false	1,000	0	1,000	0	20.0	62.8	20.0	18.7	J-2	5.6	J-3
J-10	true	false	1,000	0	1,000	0	20.0	62.9	20.0	18.7	J-2	5.6	J-3
J-11	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-12	true	false	2,500	0	2,570	70	20.0	64.9	20.0	18.7	J-2	5.6	J-3
J-13	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-22	true	false	1,000	0	1,077	77	20.0	64.4	20.0	18.7	J-2	5.6	J-3
J-25	true	false	1,000	0	1,041	41	20.0	64.9	20.0	18.7	J-2	5.6	J-3
J-29	true	false	1,000	0	1,022	22	20.0	64.9	20.0	18.7	J-2	5.6	J-3
J-34	true	false	1,000	0	1,022	22	20.0	65.0	20.0	18.7	J-2	5.6	J-3
J-38	true	false	1,000	0	1,022	22	20.0	65.0	20.0	18.7	J-2	5.6	J-3
J-49	true	false	1,000	0	1,091	91	20.0	58.5	20.0	18.7	J-2	5.6	J-3
J-58	true	false	1,000	0	1,106	106	20.0	62.0	20.0	18.7	J-2	5.6	J-3
J-64	true	false	1,000	0	1,019	19	20.0	64.5	20.0	18.7	J-2	5.6	J-3
J-71	true	false	1,000	0	1,000	0	20.0	63.6	20.0	18.7	J-2	5.6	J-3
J-74	true	false	1,000	0	1,049	49	20.0	65.0	20.0	18.7	J-2	5.6	J-3
J-87	true	false	1,000	0	1,022	22	20.0	64.9	20.0	18.7	J-2	5.6	J-3
J-100	true	false	1,000	0	1,071	71	20.0	59.8	20.0	18.7	J-2	5.6	J-3
J-103	true	false	1,000	0	1,058	58	20.0	64.4	20.0	18.7	J-2	5.6	J-3
J-106	true	false	1,000	0	1,019	19	20.0	64.9	20.0	18.7	J-2	5.6	J-3
J-109	true	false	1,000	0	1,403	403	20.0	65.1	20.0	18.7	J-2	5.6	J-3
J-119	true	false	1,000	0	1,031	31	20.0	71.4	20.0	18.7	J-2	5.6	J-3
J-125	true	false	1,000	0	1,031	31	20.0	71.1	20.0	18.7	J-2	5.6	J-3
J-156	true	false	1,000	0	1,175	175	20.0	63.7	20.0	18.7	J-2	5.6	J-3
J-166	true	false	1,000	0	1,000	0	20.0	66.5	20.0	18.7	J-2	5.6	J-3
J-169	true	false	1,000	0	1,059	59	20.0	66.5	20.0	18.7	J-2	5.6	J-3
J-174	true	false	1,000	0	1,059	59	20.0	66.3	20.0	18.7	J-2	5.6	J-3
J-179	true	false	3,000	0	3,059	59	20.0	67.1	20.0	18.7	J-2	5.6	J-3
J-184	true	false	1,000	0	1,116	116	20.0	65.3	20.0	18.7	J-2	5.6	J-3
J-188	true	false	1,000	0	1,020	20	20.0	64.6	20.0	18.7	J-2	5.6	J-3
J-196	true	false	1,000	0	1,028	28	20.0	70.5	20.0	18.7	J-2	5.6	J-3
J-219	true	false	1,000	0	1,091	91	20.0	66.1	20.0	18.7	J-2	5.6	J-3
J-222	true	false	1,000	0	1,091	91	20.0	66.9	20.0	18.7	J-2	5.6	J-3
J-227	true	false	1,000	0	1,059	59	20.0	69.1	20.0	18.7	J-2	5.6	J-3
J-238	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-249	true	false	1,000	0	1,000	0	20.0	63.8	20.0	18.7	J-2	5.6	J-3
J-250	true	false	1,000	0	1,075	75	20.0	63.7	20.0	18.7	J-2	5.6	J-3
J-259	true	false	1,000	0	1,000	0	20.0	74.4	20.0	18.7	J-2	5.6	J-3
J-260	true	false	1,000	0	1,000	0	20.0	73.6	20.0	18.7	J-2	5.6	J-3
J-261	true	false	1,000	0	1,032	32	20.0	73.6	20.0	18.7	J-2	5.6	J-3
J-272	true	false	1,000	0	1,000	0	20.0	70.7	20.0	18.7	J-2	5.6	J-3
J-276	true	false	1,000	0	1,027	27	20.0	71.0	20.0	18.7	J-2	5.6	J-3
J-277	true	false	1,000	0	1,027	27	20.0	72.3	20.0	18.7	J-2	5.6	J-3
J-288	true	false	1,000	0	1,000	0	20.0	67.7	20.0	18.7	J-2	5.6	J-3
J-298	true	false	1,000	0	1,063	63	20.0	68.0	20.0	18.7	J-2	5.6	J-3

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-302	true	false	1,000	0	1,585	585	20.0	65.7	20.0	18.7	J-2	5.6	J-3
J-323	true	false	1,000	0	1,063	63	20.0	69.4	20.0	18.7	J-2	5.6	J-3
J-328	true	false	1,000	0	1,063	63	20.0	66.0	20.0	18.7	J-2	5.6	J-3
J-333	true	false	1,000	0	1,095	95	20.0	66.4	20.0	18.7	J-2	5.6	J-3
J-370	true	false	3,500	0	3,712	212	20.0	64.3	20.0	18.7	J-2	5.6	J-3
J-374	true	false	1,000	0	1,000	0	20.0	64.6	20.0	18.7	J-2	5.6	J-3
J-376	true	false	1,000	0	1,000	0	20.0	65.1	20.0	18.7	J-2	5.6	J-3
J-387	true	false	1,000	0	1,207	207	20.0	65.1	20.0	18.7	J-2	5.6	J-3
J-388	true	false	1,000	0	1,212	212	20.0	54.5	20.0	18.7	J-2	5.6	J-3
J-390	true	false	1,000	0	1,049	49	20.0	64.3	20.0	18.7	J-2	5.6	J-3
J-398	true	false	1,000	0	1,049	49	20.0	63.1	20.0	18.7	J-2	5.6	J-3
J-400	true	false	2,250	0	2,299	49	20.0	64.6	20.0	18.7	J-2	5.6	J-3
J-407	true	false	1,000	0	1,165	165	20.0	66.7	20.0	18.7	J-2	5.6	J-3
J-408	true	false	1,500	0	1,560	60	20.0	65.6	20.0	18.7	J-2	5.6	J-3
J-411	true	false	1,000	0	1,049	49	20.0	66.4	20.0	18.7	J-2	5.6	J-3
J-435	true	false	1,000	0	1,109	109	20.0	62.6	20.0	18.7	J-2	5.6	J-3
J-439	true	false	1,000	0	1,049	49	20.0	63.4	20.0	18.7	J-2	5.6	J-3
J-442	true	false	1,000	0	1,049	49	20.0	64.2	20.0	18.7	J-2	5.6	J-3
J-446	true	false	1,000	0	1,049	49	20.0	64.2	20.0	18.7	J-2	5.6	J-3
J-452	true	false	1,000	0	1,049	49	20.0	65.3	20.0	18.7	J-2	5.6	J-3
J-453	true	false	1,000	0	1,049	49	20.0	65.2	20.0	18.7	J-2	5.6	J-3
J-459	true	false	1,000	0	1,109	109	20.0	64.1	20.0	18.7	J-2	5.6	J-3
J-461	true	false	1,000	0	1,049	49	20.0	65.0	20.0	18.7	J-2	5.6	J-3
J-464	true	false	1,000	0	1,049	49	20.0	65.0	20.0	18.7	J-2	5.6	J-3
J-473	true	false	1,000	0	1,063	63	20.0	63.4	20.0	18.7	J-2	5.6	J-3
J-474	true	false	1,000	0	1,089	89	20.0	63.2	20.0	18.7	J-2	5.6	J-3
J-501	true	false	1,000	0	1,019	19	20.0	58.8	20.0	18.7	J-2	5.6	J-3
J-502	true	false	1,000	0	1,019	19	20.0	59.3	20.0	18.7	J-2	5.6	J-3
J-508	true	false	1,000	0	1,019	19	20.0	64.5	20.0	18.7	J-2	5.6	J-3
J-513	true	false	1,000	0	1,019	19	20.0	64.5	20.0	18.7	J-2	5.6	J-3
J-518	true	false	1,000	0	1,019	19	20.0	64.9	20.0	18.7	J-2	5.6	J-3
J-519	true	false	1,000	0	1,019	19	20.0	58.8	20.0	18.7	J-2	5.6	J-3
J-520	true	false	1,000	0	1,019	19	20.0	64.4	20.0	18.7	J-2	5.6	J-3
J-526	true	false	1,000	0	1,062	62	20.0	64.5	20.0	18.7	J-2	5.6	J-3
J-533	true	false	1,000	0	1,019	19	20.0	64.5	20.0	18.7	J-2	5.6	J-3
J-536	true	false	1,000	0	1,019	19	20.0	64.8	20.0	18.7	J-2	5.6	J-3
J-541	true	false	1,000	0	1,019	19	20.0	64.4	20.0	18.7	J-2	5.6	J-3
J-542	true	false	1,000	0	1,019	19	20.0	62.3	20.0	18.7	J-2	5.6	J-3
J-547	true	false	1,000	0	1,019	19	20.0	64.5	20.0	18.7	J-2	5.6	J-3
J-573	true	false	1,000	0	1,037	37	20.0	58.1	20.0	18.7	J-2	5.6	J-3
J-579	true	false	2,500	0	2,618	118	20.0	58.5	20.0	18.7	J-2	5.6	J-3
J-592	true	false	3,500	0	3,632	132	20.0	64.8	20.0	18.7	J-2	5.6	J-3
J-610	true	false	1,000	0	1,054	54	20.0	57.6	20.0	18.7	J-2	5.6	J-3
J-612	true	false	1,000	0	1,057	57	20.0	56.4	20.0	18.7	J-2	5.6	J-3
J-620	true	false	1,000	0	1,018	18	20.0	71.7	20.0	18.7	J-2	5.6	J-3
J-623	true	false	1,000	0	1,031	31	20.0	70.6	20.0	18.7	J-2	5.6	J-3
J-627	true	false	1,000	0	1,000	0	20.0	57.3	20.0	18.7	J-2	5.6	J-3
J-632	true	false	1,000	0	1,122	122	20.0	57.4	20.0	18.7	J-2	5.6	J-3
J-642	true	false	1,000	0	1,046	46	20.0	60.2	20.0	18.7	J-2	5.6	J-3
J-650	true	false	1,500	0	1,695	195	20.0	60.2	20.0	18.7	J-2	5.6	J-3
J-664	true	false	1,000	0	1,079	79	20.0	58.9	20.0	18.7	J-2	5.6	J-3
J-669	true	false	1,000	0	1,067	67	20.0	56.3	20.0	18.7	J-2	5.6	J-3

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-703	true	false	1,000	0	1,049	49	20.0	66.2	20.0	18.7	J-2	5.6	J-3
J-708	true	false	1,000	0	1,409	409	20.0	64.9	20.0	18.7	J-2	5.6	J-3
J-710	true	false	1,000	0	1,179	179	20.0	64.1	20.0	18.7	J-2	5.6	J-3
J-713	true	false	1,000	0	1,267	267	20.0	64.6	20.0	18.7	J-2	5.6	J-3
J-715	true	false	1,000	0	1,008	8	20.0	65.1	20.0	18.7	J-2	5.6	J-3
J-731	true	false	1,000	0	1,012	12	20.0	73.9	20.0	18.7	J-2	5.6	J-3
J-752	true	false	1,000	0	1,012	12	20.0	74.5	20.0	18.7	J-2	5.6	J-3
J-753	true	false	1,000	0	1,011	11	20.0	73.7	20.0	18.7	J-2	5.6	J-3
J-754	true	false	1,000	0	1,097	97	20.0	71.4	20.0	18.7	J-2	5.6	J-3
J-767	true	false	1,000	0	1,018	18	20.0	71.6	20.0	18.7	J-2	5.6	J-3
J-769	true	false	1,000	0	1,000	0	20.0	72.8	20.0	18.7	J-2	5.6	J-3
J-773	true	false	1,000	0	1,023	23	20.0	72.3	20.0	18.7	J-2	5.6	J-3
J-780	true	false	1,000	0	1,039	39	20.0	73.0	20.0	18.7	J-2	5.6	J-3
J-785	true	false	1,000	0	1,011	11	20.0	75.4	20.0	18.7	J-2	5.6	J-3
J-786	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-787	true	false	1,000	0	1,000	0	20.0	73.9	20.0	18.7	J-2	5.6	J-3
J-788	false	false	1,000	N/A	N/A	N/A	20.0	N/A	20.0	N/A	N/A	N/A	N/A
J-789	true	false	1,000	0	1,000	0	20.0	74.0	20.0	18.7	J-2	5.6	J-3
J-795	true	false	1,000	0	1,018	18	20.0	73.2	20.0	18.7	J-2	5.6	J-3
J-805	true	false	1,000	0	1,033	33	20.0	72.7	20.0	18.7	J-2	5.6	J-3
J-807	true	false	1,000	0	1,018	18	20.0	72.7	20.0	18.7	J-2	5.6	J-3
J-808	true	false	1,000	0	1,000	0	20.0	71.2	20.0	18.7	J-2	5.6	J-3
J-832	true	false	1,000	0	1,018	18	20.0	71.7	20.0	18.7	J-2	5.6	J-3
J-855	true	false	1,000	0	1,018	18	20.0	72.6	20.0	18.7	J-2	5.6	J-3
J-872	true	false	1,000	0	1,106	106	20.0	65.1	20.0	18.7	J-2	5.6	J-3

14.3.2:
PHD-Junction Report

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-3	18.00	FF Dur	Demand	0	Fixed	0	31.0	5.6
J-2	18.00	Zone-1	Demand	0	Fixed	0	61.2	18.7
J-388	6.00	Zone-1	Demand	212	Pattern - 1	212	131.8	54.5
J-669	36.00	Zone-1	Demand	67	Pattern - 1	67	165.8	56.3
J-612	28.00	Zone-1	Demand	57	Pattern - 1	57	158.1	56.4
J-627	27.00	Zone-1	Demand	0	Pattern - 1	0	159.1	57.3
J-632	27.00	Zone-1	Demand	122	Pattern - 1	122	159.3	57.4
J-610	25.00	Zone-1	Demand	54	Pattern - 1	54	157.9	57.6
J-573	30.00	Zone-1	Demand	37	Pattern - 1	37	164.1	58.1
J-7	19.00	Zone-1	Demand	23	Fixed	23	153.9	58.5
J-6	19.00	Zone-1	Demand	0	Fixed	0	153.9	58.5
J-49	19.00	Zone-1	Demand	91	Pattern - 1	91	154.0	58.5
J-579	30.00	Zone-1	Demand	118	Pattern - 1	118	165.0	58.5
J-519	18.00	Zone-1	Demand	19	Pattern - 1	19	153.7	58.8
J-501	18.00	Zone-1	Demand	19	Pattern - 1	19	153.7	58.8
J-664	18.00	Zone-1	Demand	79	Pattern - 1	79	154.0	58.9
J-502	17.00	Zone-1	Demand	19	Pattern - 1	19	153.8	59.3
J-100	20.00	Zone-1	Demand	71	Pattern - 1	71	157.9	59.8
J-650	25.00	Zone-1	Demand	195	Pattern - 1	195	163.8	60.2
J-642	27.00	Zone-1	Demand	46	Pattern - 1	46	165.9	60.2
J-1	18.00	Zone-1	Demand	0	Fixed	0	159.5	61.3
J-58	15.00	Zone-1	Demand	106	Pattern - 1	106	157.9	62.0
J-542	10.00	Zone-1	Demand	19	Pattern - 1	19	153.7	62.3
J-435	15.00	Zone-1	Demand	109	Pattern - 1	109	159.5	62.6
J-9	14.00	Zone-1	Demand	0	Fixed	0	159.0	62.8
J-10	14.00	Zone-1	Demand	0	Fixed	0	159.0	62.9
J-398	20.00	Zone-1	Demand	49	Pattern - 1	49	165.6	63.1
J-474	14.00	Zone-1	Demand	89	Pattern - 1	89	159.7	63.2
J-473	15.00	Zone-1	Demand	63	Pattern - 1	63	161.2	63.4
J-439	14.00	Zone-1	Demand	49	Pattern - 1	49	160.3	63.4
J-71	11.00	Zone-1	Demand	0	Pattern - 1	0	157.8	63.6
J-250	20.00	Zone-1	Demand	75	Pattern - 1	75	166.8	63.7
J-156	17.00	Zone-1	Demand	175	Pattern - 1	175	163.8	63.7
J-8	17.00	Zone-1	Demand	0	Fixed	0	163.8	63.7
J-249	20.00	Zone-1	Demand	0	Pattern - 1	0	167.1	63.8
J-459	10.00	Zone-1	Demand	109	Pattern - 1	109	157.8	64.1
J-710	7.00	Zone-1	Demand	179	Pattern - 1	179	154.9	64.1
J-446	15.00	Zone-1	Demand	49	Pattern - 1	49	163.1	64.2
J-442	15.00	Zone-1	Demand	49	Pattern - 1	49	163.1	64.2
J-390	21.00	Zone-1	Demand	49	Pattern - 1	49	169.3	64.3
J-370	10.00	Zone-1	Demand	212	Pattern - 1	212	158.4	64.3
J-22	6.50	Zone-1	Demand	77	Pattern - 1	77	155.0	64.4
J-103	5.50	Zone-1	Demand	58	Pattern - 1	58	154.1	64.4
J-520	5.00	Zone-1	Demand	19	Pattern - 1	19	153.7	64.4
J-541	5.00	Zone-1	Demand	19	Pattern - 1	19	153.7	64.4
J-526	5.00	Zone-1	Demand	62	Pattern - 1	62	153.7	64.5
J-508	5.00	Zone-1	Demand	19	Pattern - 1	19	153.7	64.5
J-64	5.50	Zone-1	Demand	19	Pattern - 1	19	154.3	64.5
J-513	5.00	Zone-1	Demand	19	Pattern - 1	19	153.9	64.5
J-533	5.00	Zone-1	Demand	19	Pattern - 1	19	153.9	64.5
J-547	5.00	Zone-1	Demand	19	Pattern - 1	19	153.9	64.5
J-713	7.00	Zone-1	Demand	267	Pattern - 1	267	156.0	64.6
J-374	8.50	Zone-1	Demand	0	Pattern - 1	0	157.5	64.6
J-400	17.00	Zone-1	Demand	49	Pattern - 1	49	166.0	64.6

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-188	20.00	Zone-1	Demand	20	Pattern - 1	20	169.1	64.6
J-536	5.00	Zone-1	Demand	19	Pattern - 1	19	154.4	64.8
J-592	21.00	Zone-1	Demand	132	Pattern - 1	132	170.4	64.8
J-518	5.00	Zone-1	Demand	19	Pattern - 1	19	154.7	64.9
J-25	5.00	Zone-1	Demand	41	Pattern - 1	41	154.7	64.9
J-106	5.00	Zone-1	Demand	19	Pattern - 1	19	154.7	64.9
J-12	5.00	Zone-1	Demand	70	Pattern - 1	70	154.7	64.9
J-29	5.00	Zone-1	Demand	22	Pattern - 1	22	154.7	64.9
J-708	4.50	Zone-1	Demand	409	Pattern - 1	409	154.2	64.9
J-87	5.00	Zone-1	Demand	22	Pattern - 1	22	154.8	64.9
J-5	5.00	Zone-1	Demand	0	Fixed	0	154.8	65.0
J-34	5.00	Zone-1	Demand	22	Pattern - 1	22	154.8	65.0
J-74	8.00	Zone-1	Demand	49	Pattern - 1	49	157.8	65.0
J-464	10.00	Zone-1	Demand	49	Pattern - 1	49	159.9	65.0
J-38	5.00	Zone-1	Demand	22	Pattern - 1	22	155.0	65.0
J-461	9.00	Zone-1	Demand	49	Pattern - 1	49	159.0	65.0
J-715	19.00	Zone-1	Demand	8	Pattern - 1	8	169.1	65.1
J-376	7.00	Zone-1	Demand	0	Pattern - 1	0	157.1	65.1
J-872	6.00	Zone-1	Demand	106	Pattern - 1	106	156.2	65.1
J-109	5.00	Zone-1	Demand	403	Pattern - 1	403	155.3	65.1
J-387	6.00	Zone-1	Demand	207	Pattern - 1	207	156.3	65.1
J-453	14.00	Zone-1	Demand	49	Pattern - 1	49	164.5	65.2
J-452	14.00	Zone-1	Demand	49	Pattern - 1	49	164.5	65.3
J-184	20.00	Zone-1	Demand	116	Pattern - 1	116	170.6	65.3
J-408	15.00	Zone-1	Demand	60	Pattern - 1	60	166.4	65.6
J-302	7.00	Zone-1	Demand	585	Pattern - 1	585	158.6	65.7
J-328	8.00	Zone-1	Demand	63	Pattern - 1	63	160.3	66.0
J-219	18.00	Zone-1	Demand	91	Pattern - 1	91	170.5	66.1
J-703	7.00	Zone-1	Demand	49	Pattern - 1	49	159.8	66.2
J-174	15.00	Zone-1	Demand	59	Pattern - 1	59	167.8	66.3
J-411	15.00	Zone-1	Demand	49	Pattern - 1	49	168.1	66.4
J-333	5.50	Zone-1	Demand	95	Pattern - 1	95	158.6	66.4
J-166	17.00	Zone-1	Demand	0	Pattern - 1	0	170.3	66.5
J-169	17.00	Zone-1	Demand	59	Pattern - 1	59	170.3	66.5
J-407	17.00	Zone-1	Demand	165	Pattern - 1	165	171.0	66.7
J-222	16.00	Zone-1	Demand	91	Pattern - 1	91	170.4	66.9
J-179	16.00	Zone-1	Demand	59	Pattern - 1	59	170.8	67.1
J-288	15.00	Zone-1	Demand	0	Pattern - 1	0	171.1	67.7
J-298	7.00	Zone-1	Demand	63	Pattern - 1	63	163.8	68.0
J-227	13.00	Zone-1	Demand	59	Pattern - 1	59	172.5	69.1
J-323	8.00	Zone-1	Demand	63	Pattern - 1	63	168.0	69.4
J-196	12.00	Zone-1	Demand	28	Pattern - 1	28	174.6	70.5
J-623	12.00	Zone-1	Demand	31	Pattern - 1	31	174.8	70.6
J-272	11.00	Zone-1	Demand	0	Pattern - 1	0	174.1	70.7
J-4	0.00	Zone-1	Demand	22	Fixed	22	163.5	70.9
J-276	12.00	Zone-1	Demand	27	Pattern - 1	27	175.8	71.0
J-125	10.00	Zone-1	Demand	31	Pattern - 1	31	174.0	71.1
J-808	10.00	Zone-1	Demand	0	Pattern - 1	0	174.3	71.2
J-754	10.00	Zone-1	Demand	97	Pattern - 1	97	174.8	71.4
J-119	10.00	Zone-1	Demand	31	Pattern - 1	31	174.8	71.4
J-767	11.00	Zone-1	Demand	18	Pattern - 1	18	176.1	71.6
J-620	10.00	Zone-1	Demand	18	Pattern - 1	18	175.4	71.7
J-832	9.00	Zone-1	Demand	18	Pattern - 1	18	174.4	71.7
J-277	10.00	Zone-1	Demand	27	Pattern - 1	27	176.8	72.3

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-773	10.00	Zone-1	Demand	23	Pattern - 1	23	176.9	72.3
J-855	8.00	Zone-1	Demand	18	Pattern - 1	18	175.5	72.6
J-805	9.00	Zone-1	Demand	33	Pattern - 1	33	176.7	72.7
J-807	9.00	Zone-1	Demand	18	Pattern - 1	18	176.7	72.7
J-769	9.00	Zone-1	Demand	0	Pattern - 1	0	176.8	72.8
J-780	10.00	Zone-1	Demand	39	Pattern - 1	39	178.4	73.0
J-795	6.50	Zone-1	Demand	18	Pattern - 1	18	175.5	73.2
J-260	8.00	Zone-1	Demand	0	Pattern - 1	0	177.7	73.6
J-261	10.00	Zone-1	Demand	32	Pattern - 1	32	179.8	73.6
J-753	9.00	Zone-1	Demand	11	Pattern - 1	11	179.0	73.7
J-731	8.00	Zone-1	Demand	12	Pattern - 1	12	178.5	73.9
J-787	10.00	Zone-1	Demand	0	Pattern - 1	0	180.5	73.9
J-789	10.00	Zone-1	Demand	0	Pattern - 1	0	180.6	74.0
J-259	6.00	Zone-1	Demand	0	Pattern - 1	0	177.6	74.4
J-752	7.00	Zone-1	Demand	12	Pattern - 1	12	179.0	74.5
J-11	17.00	Zone-1	Demand	0	Fixed	0	189.3	74.7
J-13	21.00	Zone-1	Demand	0	Fixed	0	194.3	75.1
J-785	6.00	Zone-1	Demand	11	Pattern - 1	11	179.8	75.4
J-786	10.00	FF Dur	Demand	0	Pattern - 1	0	311.5	130.7
J-788	10.00	FF Dur	Demand	0	Pattern - 1	0	318.8	133.9
J-238	10.00	FF Dur	Demand	0	Pattern - 1	0	320.5	134.6

14.3.3:
PHD-Pipe Report

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	450	12	Ductile Iro	120	false	0.00	Open	-436	174.0	174.3	0.3	0.6
P-2	980	12	Ductile Iro	120	false	0.00	Open	699	174.0	172.5	1.5	1.5
P-3	1,500	12	Cast iron	78	false	0.00	Open	351	172.5	171.1	1.4	0.9
P-4	1,440	8	Cast iron	120	false	0.00	Open	-311	170.6	174.1	3.5	2.4
P-5	533	8	Ductile Iro	120	false	0.00	Open	-311	174.1	175.4	1.3	2.4
P-6	290	8	Ductile Iro	120	false	0.00	Open	-221	175.4	175.8	0.4	1.3
P-7	800	10	Ductile Iro	113	false	0.00	Open	-356	174.8	175.8	0.9	1.2
P-8	400	8	Ductile Iro	120	false	0.00	Open	31	174.8	174.8	0.0	0.0
P-9	1,150	10	Ductile Iro	120	false	0.00	Open	294	174.8	174.0	0.9	0.7
P-10	930	8	Ductile Iro	120	false	0.00	Open	290	172.5	170.5	2.0	2.1
P-11	555	8	Ductile Iro	120	false	0.00	Open	91	170.5	170.4	0.1	0.2
P-12	450	8	Ductile Iro	120	false	0.00	Open	108	170.5	170.3	0.2	0.3
P-13	275	6	Ductile Iro	106	false	0.00	Open	30	170.3	170.3	0.0	0.2
P-14	1,290	6	Ductile Iro	106	false	0.00	Open	-147	163.8	167.8	4.0	3.1
P-15	1,210	4	Ductile Iro	50	false	0.00	Open	-19	167.8	170.3	2.5	2.1
P-16	555	12	Ductile Iro	120	false	0.00	Open	351	171.1	170.8	0.2	0.4
P-18	800	8	Ductile Iro	120	false	0.00	Open	-105	170.6	170.8	0.3	0.3
P-19	620	6	Ductile Iro	106	false	0.00	Open	-187	167.8	170.8	3.0	4.8
P-20	650	8	Ductile Iro	120	false	0.00	Open	300	170.6	169.1	1.5	2.3
P-21	1,250	10	Ductile Iro	120	false	0.00	Open	307	169.1	168.1	1.0	0.8
P-22	400	8	Ductile Iro	120	false	0.00	Open	415	168.1	166.4	1.7	4.2
P-23	1,350	8	Ductile Iro	120	false	0.00	Open	-101	166.4	166.8	0.4	0.3
P-24	620	8	Ductile Iro	120	false	0.00	Open	394	166.8	164.5	2.3	3.8
P-25	650	8	Ductile Iro	120	false	0.00	Open	-342	164.5	166.4	1.9	2.9
P-26	600	8	Ductile Iro	120	false	0.00	Open	45	164.5	164.5	0.0	0.1
P-27	740	8	Ductile Iro	120	false	0.00	Open	-351	166.8	169.1	2.3	3.1
P-28	380	8	Ductile Iro	120	false	0.00	Open	-15	169.1	169.1	0.0	0.0
P-29	1,500	8	Ductile Iro	120	false	0.00	Open	-386	169.1	174.6	5.5	3.6
P-30	890	10	Ductile Iro	113	false	0.00	Open	-150	174.6	174.8	0.2	0.2
P-31	1,220	10	Ductile Iro	113	false	0.00	Open	-263	174.6	175.4	0.8	0.7
P-32	75	12	Ductile Iro	120	false	0.00	Open	-1,026	166.8	167.1	0.2	3.1
P-33	1,750	8	Ductile Iro	120	false	0.00	Open	-507	167.1	177.6	10.5	6.0
P-34	2,030	8	Ductile Iro	120	false	0.00	Open	-519	167.1	179.8	12.8	6.3
P-36	100	10	Ductile Iro	120	false	0.00	Open	-1,465	159.7	161.2	1.4	14.5
P-37	1,150	10	Ductile Iro	120	false	0.00	Open	347	176.7	175.5	1.2	1.0
P-38	900	8	Ductile Iro	120	false	0.00	Open	213	175.5	174.4	1.1	1.2
P-39	120	8	Ductile Iro	50	false	0.00	Open	0	174.3	174.3	0.0	0.0
P-40	242	12	Ductile Iro	120	false	0.00	Open	1,396	159.7	158.4	1.3	5.5
P-41	980	8	Ductile Iro	120	false	0.00	Open	-102	156.0	156.3	0.3	0.3
P-42	222	8	Ductile Iro	120	false	0.00	Open	106	156.3	156.2	0.1	0.3
P-43	620	10	Ductile Iro	120	false	0.00	Open	-415	156.3	157.1	0.9	1.4
P-44	610	10	Ductile Iro	99	false	0.00	Open	-913	158.6	163.8	5.3	8.6
P-45	1,550	12	Ductile Iro	120	false	0.00	Open	742	163.8	161.2	2.6	1.7
P-46	520	12	Ductile Iro	120	false	0.00	Open	-1,718	163.8	168.0	4.2	8.0
P-47	666	12	Ductile Iro	120	false	0.00	Open	-1,958	168.0	174.8	6.8	10.2
P-48	1,900	10	Ductile Iro	113	false	0.00	Open	-272	174.8	176.1	1.4	0.7
P-49	220	8	Ductile Iro	120	false	0.00	Open	-372	175.4	176.1	0.7	3.4
P-50	200	10	Ductile Iro	113	false	0.00	Open	-661	176.1	176.9	0.7	3.7
P-51	220	10	Ductile Iro	113	false	0.00	Open	114	176.9	176.8	0.0	0.1
P-52	20	8	Ductile Iro	50	false	0.00	Open	881	320.0	318.3	1.7	84.7
P-53	5	10	Ductile Iro	113	false	0.00	Open	995	176.8	176.8	0.0	7.9
P-54	333	10	Ductile Iro	113	false	0.00	Open	603	176.8	175.8	1.0	3.1
P-55	100	10	Ductile Iro	113	false	0.00	Open	365	176.8	176.7	0.1	1.2

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-56	290	12	Ductile Iro	120	false	0.00	Open	436	174.4	174.3	0.2	0.6
P-57	1,980	10	Ductile Iro	120	false	0.00	Open	-241	174.4	175.5	1.0	0.5
P-58	555	10	Ductile Iro	120	false	0.00	Open	-115	175.5	175.5	0.1	0.1
P-59	580	10	Ductile Iro	50	false	0.00	Open	-0	176.7	176.7	0.0	0.0
P-60	1,220	10	Ductile Iro	50	false	0.00	Open	-145	175.5	176.7	1.2	1.0
P-61	1,200	10	Ductile Iro	50	false	0.00	Open	-178	176.7	178.5	1.8	1.5
P-62	730	12	Ductile Iro	120	false	0.00	Open	94	178.5	178.4	0.0	0.0
P-63	800	12	Ductile Iro	120	false	0.00	Open	798	178.4	176.9	1.5	1.9
P-64	1,780	12	Ductile Iro	120	false	0.00	Open	-284	178.5	179.0	0.5	0.3
P-65	330	12	Ductile Iro	120	false	0.00	Open	933	179.8	179.0	0.9	2.6
P-66	820	12	Ductile Iro	120	false	0.00	Open	743	179.8	178.4	1.4	1.7
P-67	5	12	Ductile Iro	120	false	0.00	Open	637	179.0	179.0	0.0	1.3
P-68	225	12	Ductile Iro	120	false	0.00	Open	-1,590	179.0	180.5	1.6	6.9
P-69	5	12	Ductile Iro	120	false	0.00	Closed	0	180.5	318.8	0.0	0.0
P-70	5	8	Ductile Iro	50	false	0.00	Open	282	177.7	177.6	0.1	10.3
P-71	330	8	Ductile Iro	50	false	0.00	Open	-225	177.6	179.8	2.2	6.8
P-72	10	8	Ductile Iro	50	false	0.00	Open	776	180.5	179.8	0.7	67.0
P-73	100	12	Ductile Iro	120	false	0.00	Open	1,687	180.6	179.8	0.8	7.7
P-74	5	12	Ductile Iro	120	false	0.00	Open	2,366	180.6	180.5	0.1	14.5
P-75	5	10	Ductile Iro	50	false	0.00	Open	4,053	183.0	180.6	2.4	482.7
P-76	20	12	Ductile Iro	120	false	0.00	Open	4,053	319.5	318.8	0.8	39.3
P-77	15	10	Ductile Iro	50	false	0.00	Open	-4,053	311.5	318.8	7.2	482.8
P-78	100	12	Ductile Iro	120	false	0.00	Open	2,217	179.0	177.7	1.3	12.8
P-79	290	12	Ductile Iro	120	false	0.00	Open	1,934	177.7	174.8	2.9	10.0
P-80	1,290	8	Ductile Iro	120	false	0.00	Open	389	164.5	159.8	4.8	3.7
P-81	600	8	Ductile Iro	120	false	0.00	Open	20	159.8	159.7	0.0	0.0
P-82	1,330	8	Ductile Iro	120	false	0.00	Open	371	159.8	155.3	4.5	3.4
P-83	1,065	8	Ductile Iro	120	false	0.00	Open	-153	155.3	156.0	0.7	0.7
P-84	550	12	Ductile Iro	120	false	0.00	Open	800	156.0	154.9	1.1	1.9
P-85	15	6	Ductile Iro	50	false	0.00	Open	881	182.0	176.8	5.2	343.9
P-86	600	8	Ductile Iro	120	false	0.00	Open	122	155.3	155.0	0.3	0.4
P-87	620	8	Ductile Iro	120	false	0.00	Open	99	155.0	154.8	0.2	0.3
P-88	330	8	Ductile Iro	120	false	0.00	Open	77	154.8	154.8	0.1	0.2
P-89	310	8	Ductile Iro	120	false	0.00	Open	55	154.8	154.7	0.0	0.1
P-90	470	8	Ductile Iro	120	false	0.00	Open	33	154.7	154.7	0.0	0.0
P-91	180	6	Ductile Iro	120	false	0.00	Open	-114	154.7	155.0	0.3	1.6
P-92	1,310	8	Ductile Iro	120	false	0.00	Open	292	157.8	155.0	2.8	2.2
P-93	880	8	Ductile Iro	120	false	0.00	Open	101	155.0	154.7	0.3	0.3
P-94	512	8	Ductile Iro	50	false	0.00	Open	23	159.5	159.5	0.0	0.1
P-95	1,218	8	Ductile Iro	50	false	0.00	Open	23	159.5	159.3	0.1	0.1
P-96	1	6	Ductile Iro	120	false	0.00	Open	106	154.7	154.7	0.0	1.3
P-99	1	6	Ductile Iro	120	false	0.00	Open	219	154.7	154.7	0.0	5.2
P-100	4	6	Ductile Iro	120	false	0.00	Open	24	153.7	153.7	0.0	0.1
P-101	240	6	Ductile Iro	120	false	0.00	Open	12	153.7	153.7	0.0	0.0
P-102	480	6	Ductile Iro	120	false	0.00	Open	56	154.1	153.9	0.2	0.4
P-103	1,700	6	Ductile Iro	120	false	0.00	Open	31	153.9	153.7	0.2	0.1
P-104	1	6	Ductile Iro	120	false	0.00	Open	-51	153.7	153.7	0.0	0.4
P-105	1,910	8	Ductile Iro	120	false	0.00	Open	-116	154.0	154.7	0.7	0.4
P-106	270	8	Ductile Iro	120	false	0.00	Open	-29	154.0	154.0	0.0	0.0
P-107	1,670	6	Ductile Iro	120	false	0.00	Open	-143	154.0	157.9	3.9	2.4
P-108	240	12	Ductile Iro	120	false	0.00	Open	19	157.9	157.9	0.0	0.0
P-109	930	10	Ductile Iro	50	false	0.00	Open	-18	157.9	157.9	0.0	0.0
P-110	670	10	Ductile Iro	50	false	0.00	Open	-72	157.9	158.1	0.2	0.3

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

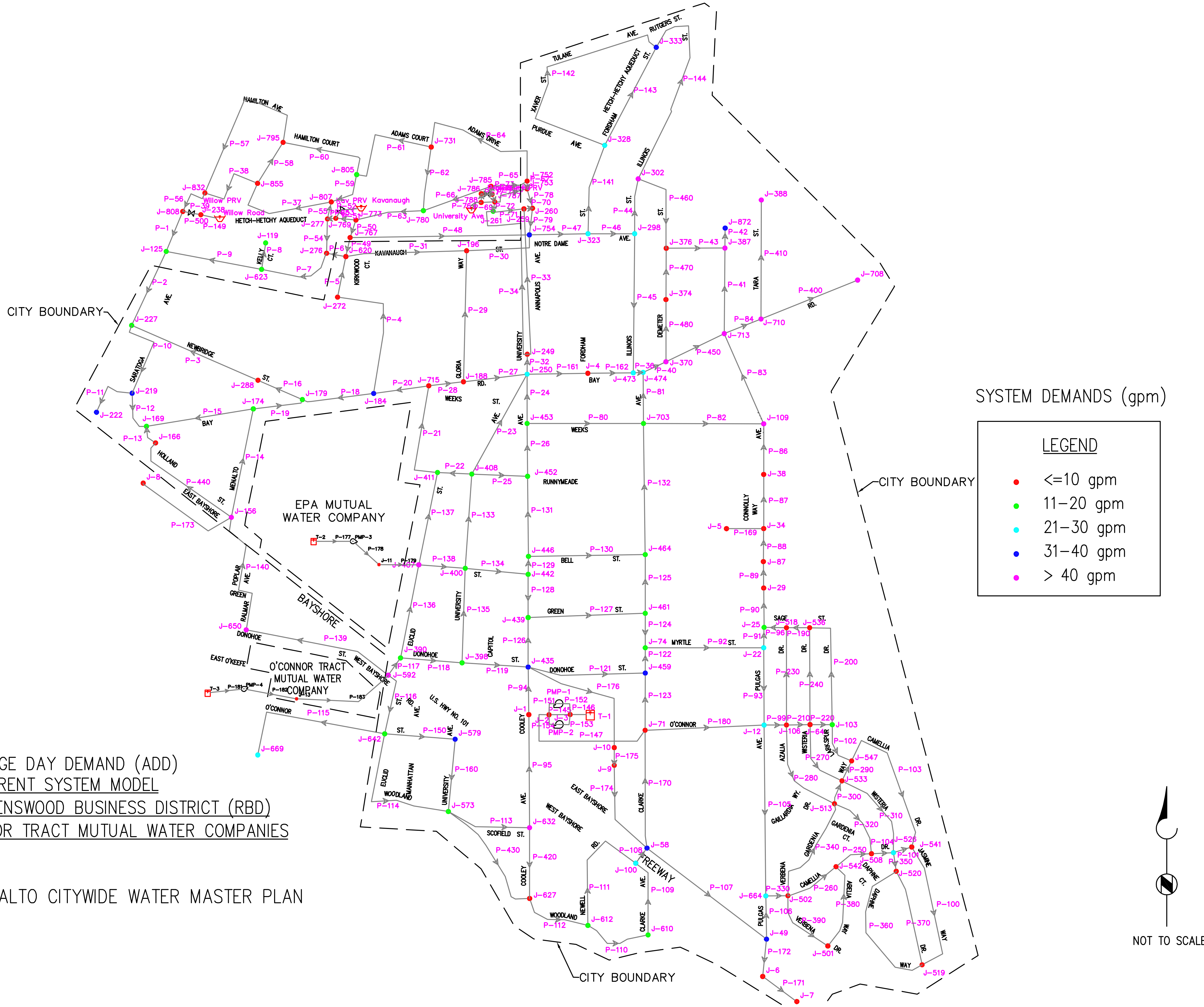
Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-111	980	8	Ductile Iro	50	false	0.00	Open	34	158.1	157.9	0.2	0.2
P-112	770	10	Ductile Iro	50	false	0.00	Open	-163	158.1	159.1	1.0	1.3
P-113	900	8	Ductile Iro	50	false	0.00	Open	-196	159.3	164.1	4.7	5.2
P-114	1,620	8	Ductile Iro	120	false	0.00	Open	-206	164.1	165.9	1.8	1.1
P-115	1,890	10	Ductile Iro	120	false	0.00	Open	67	165.9	165.8	0.1	0.0
P-116	690	8	Ductile Iro	120	false	0.00	Open	-531	165.9	170.4	4.5	6.6
P-117	245	8	Ductile Iro	120	false	0.00	Open	438	170.4	169.3	1.1	4.6
P-118	620	8	Ductile Iro	120	false	0.00	Open	502	169.3	165.6	3.7	5.9
P-119	840	8	Ductile Iro	120	false	0.00	Open	563	165.6	159.5	6.1	7.3
P-121	1,270	8	PVC	120	false	0.00	Open	224	159.5	157.8	1.7	1.3
P-122	290	8	Ductile Iro	120	false	0.00	Open	17	157.8	157.8	0.0	0.0
P-123	660	12	Ductile Iro	120	false	0.00	Open	132	157.8	157.8	0.0	0.1
P-124	380	8	Ductile Iro	120	false	0.00	Open	-359	157.8	159.0	1.2	3.2
P-125	660	8	Ductile Iro	120	false	0.00	Open	-215	159.0	159.9	0.8	1.2
P-126	580	8	Ductile Iro	120	false	0.00	Open	-232	159.5	160.3	0.8	1.4
P-127	1,290	8	Ductile Iro	120	false	0.00	Open	193	160.3	159.0	1.3	1.0
P-128	530	8	Ductile Iro	120	false	0.00	Open	-474	160.3	163.1	2.8	5.3
P-129	130	8	Ductile Iro	120	false	0.00	Open	118	163.1	163.1	0.1	0.4
P-130	1,290	8	Ductile Iro	120	false	0.00	Open	316	163.1	159.9	3.2	2.5
P-131	910	8	Ductile Iro	120	false	0.00	Open	-248	163.1	164.5	1.5	1.6
P-132	1,130	8	Ductile Iro	120	false	0.00	Open	-52	159.8	159.9	0.1	0.1
P-133	1,040	8	Ductile Iro	120	false	0.00	Open	115	166.4	166.0	0.4	0.4
P-134	310	8	Ductile Iro	120	false	0.00	Open	641	166.0	163.1	2.9	9.3
P-135	1,070	8	Ductile Iro	120	false	0.00	Open	110	166.0	165.6	0.4	0.4
P-136	1,080	6	Ductile Iro	120	false	0.00	Open	-114	169.3	171.0	1.7	1.5
P-137	1,020	6	Ductile Iro	120	false	0.00	Open	158	171.0	168.1	2.9	2.8
P-138	470	8	Ductile Iro	120	false	0.00	Open	685	171.0	166.0	4.9	10.5
P-139	1,620	6	Ductile Iro	120	false	0.00	Open	193	170.4	163.8	6.6	4.1
P-140	1,550	6	Ductile Iro	106	false	0.00	Open	-3	163.8	163.8	0.0	0.0
P-141	980	6	Ductile Iro	78	false	0.00	Open	178	168.0	160.3	7.6	7.8
P-142	2,675	6	Ductile Iro	78	false	0.00	Open	46	160.3	158.6	1.7	0.6
P-143	1,280	6	Ductile Iro	78	false	0.00	Open	-69	158.6	160.3	1.7	1.3
P-144	2,300	8	Ductile Iro	99	false	0.00	Open	20	158.6	158.6	0.1	0.0
P-145	50	12	Ductile Iro	120	false	0.00	Closed	0	61.2	31.0	0.0	0.0
P-146	200	12	Ductile Iro	120	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-147	500	12	Ductile Iro	120	false	0.00	Closed	0	61.2	157.8	0.0	0.0
P-149	5	8	Ductile Iro	120	false	0.00	Open	0	320.5	320.5	0.0	0.0
P-150	770	8	Ductile Iro	120	false	0.00	Open	212	165.9	165.0	0.9	1.2
P-151	25	10	Ductile Iro	130	false	0.00	Open	0	61.2	61.2	0.0	0.0
P-152	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-153	25	12	Ductile Iro	130	false	0.00	Open	0	31.0	31.0	0.0	0.0
P-154	25	10	Ductile Iro	130	false	0.00	Open	0	61.2	61.2	0.0	0.0
P-160	858	6	Ductile Iro	120	false	0.00	Open	-94	164.1	165.0	0.9	1.1
P-161	686	10	Ductile Iro	120	false	0.00	Open	808	166.8	163.5	3.3	4.8
P-162	514	10	Ductile Iro	120	false	0.00	Open	786	163.5	161.2	2.4	4.6
P-169	350	4	Ductile Iro	120	false	0.00	Open	0	154.8	154.8	0.0	0.0
P-170	1,210	12	Ductile Iro	120	false	0.00	Open	171	157.9	157.8	0.1	0.1
P-171	362	8	PVC	120	false	0.00	Open	-23	153.9	153.9	0.0	0.0
P-172	575	6	Cast iron	85	false	0.00	Open	-23	153.9	154.0	0.1	0.2
P-173	1,035	6	PVC	99	false	0.00	Open	0	163.8	163.8	0.0	0.0
P-174	1,644	12	PVC	120	false	0.00	Open	-439	157.9	159.0	1.1	0.6
P-175	5	12	PVC	120	false	0.00	Open	-439	159.0	159.0	0.0	0.6
P-176	838	12	PVC	120	false	0.00	Open	-439	159.0	159.5	0.5	0.6

Scenario: PHD-Calibrated-Calculated FF w/ future RBD & Mutuals
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-177	1	24	Ductile Iro	130	false	0.00	Open	1,122	33.0	33.0	0.0	0.1
P-178	1	24	Ductile Iro	130	false	0.00	Open	1,122	189.3	189.3	0.0	0.1
P-179	200	6	Ductile Iro	130	false	0.00	Open	1,122	189.3	171.0	18.3	91.7
P-180	1,320	8	Ductile Iro	120	false	0.00	Open	303	157.8	154.7	3.1	2.3
P-181	1	24	Ductile Iro	130	false	0.00	Open	1,293	37.0	37.0	0.0	0.1
P-182	1	24	Ductile Iro	130	false	0.00	Open	1,293	194.3	194.3	0.0	0.1
P-183	200	6	Ductile Iro	130	false	0.00	Open	1,293	194.3	170.4	23.9	119.4
P-190	275	6	Ductile Iro	120	false	0.00	Open	93	154.7	154.4	0.3	1.1
P-200	1,320	6	Ductile Iro	120	false	0.00	Open	-43	154.1	154.4	0.3	0.2
P-210	275	6	Ductile Iro	120	false	0.00	Open	117	154.7	154.3	0.4	1.6
P-220	275	6	Ductile Iro	120	false	0.00	Open	-72	154.1	154.3	0.2	0.7
P-230	1,045	6	Ductile Iro	120	false	0.00	Open	-6	154.7	154.7	0.0	0.0
P-240	1,045	6	Ductile Iro	120	false	0.00	Open	31	154.4	154.3	0.1	0.1
P-250	440	6	Ductile Iro	120	false	0.00	Open	-25	153.7	153.7	0.0	0.1
P-260	770	6	Ductile Iro	120	false	0.00	Open	-33	153.7	153.8	0.1	0.2
P-270	880	6	Ductile Iro	120	false	0.00	Open	58	154.3	153.9	0.4	0.4
P-280	1,155	6	Ductile Iro	120	false	0.00	Open	76	154.7	153.9	0.8	0.7
P-290	330	6	Ductile Iro	120	false	0.00	Open	6	153.9	153.9	0.0	0.0
P-300	330	6	Ductile Iro	120	false	0.00	Open	7	153.9	153.9	0.0	0.0
P-310	1,100	6	Ductile Iro	120	false	0.00	Open	38	153.9	153.7	0.2	0.2
P-320	750	6	Ductile Iro	120	false	0.00	Open	46	153.9	153.7	0.2	0.3
P-330	275	6	Ductile Iro	120	false	0.00	Open	65	154.0	153.8	0.2	0.5
P-340	1,280	6	Ductile Iro	120	false	0.00	Open	17	153.9	153.8	0.1	0.0
P-350	220	6	Ductile Iro	120	false	0.00	Open	15	153.7	153.7	0.0	0.0
P-360	1,650	6	Ductile Iro	120	false	0.00	Open	-2	153.7	153.7	0.0	0.0
P-370	1,100	6	Ductile Iro	120	false	0.00	Open	-2	153.7	153.7	0.0	0.0
P-380	990	6	Ductile Iro	120	false	0.00	Open	-11	153.7	153.7	0.0	0.0
P-390	770	6	Ductile Iro	120	false	0.00	Open	30	153.8	153.7	0.1	0.1
P-400	1,155	12	Ductile Iro	120	false	0.00	Open	-409	154.2	154.9	0.6	0.6
P-410	1,485	6	Ductile Iro	64	false	0.00	Open	-212	131.8	154.9	23.1	15.5
P-420	880	8	Cast iron	120	false	0.00	Open	97	159.3	159.1	0.2	0.3
P-430	1,210	4	Cast iron	120	false	0.00	Open	67	164.1	159.1	5.0	4.1
P-440	1,320	4	Ductile Iro	50	false	0.00	Open	-30	163.8	170.3	6.5	4.9
P-450	682	12	Ductile Iro	120	false	0.00	Open	-1,118	156.0	158.4	2.5	3.6
P-460	990	10	Ductile Iro	99	false	0.00	Open	348	158.6	157.1	1.4	1.4
P-470	330	6	Ductile Iro	85	false	0.00	Open	-66	157.1	157.5	0.4	1.1
P-480	880	6	Ductile Iro	85	false	0.00	Open	66	158.4	157.5	0.9	1.1
P-490	1	10	Ductile Iro	50	false	0.00	Open	4,053	311.5	311.0	0.5	482.7
P-500	5	8	Asbestos (	50	false	0.00	Open	0	320.5	320.5	0.0	0.0

Appendix 15:
WaterCAD Exhibits for Current System with RBD and EPA & O'Connor Mutual Water Companies Demands

15.1.1:
ADD-System Demands



AVERAGE DAY DEMAND (ADD)

CURRENT SYSTEM MODEL

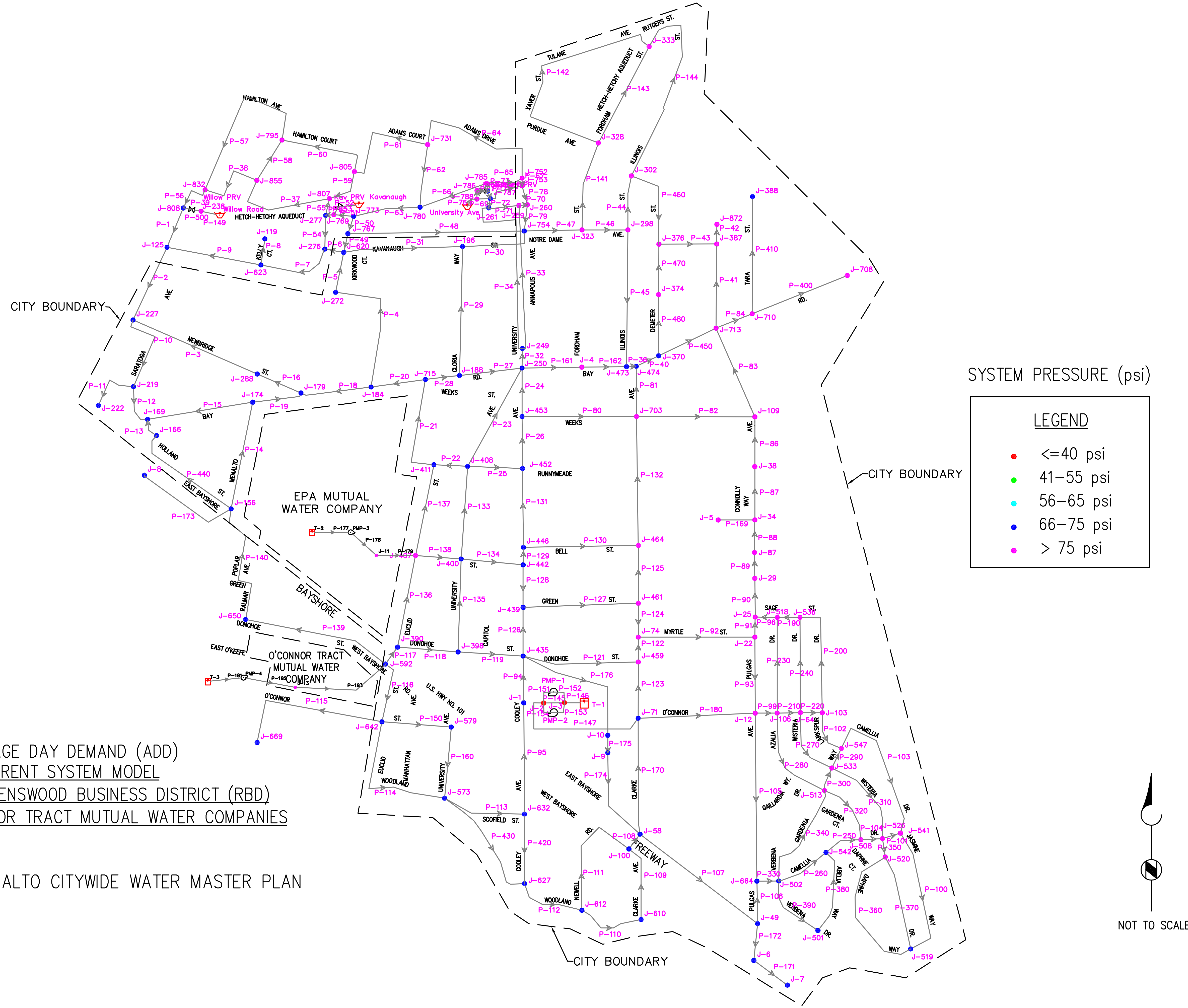
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

15.1.2:
ADD-System Pressure

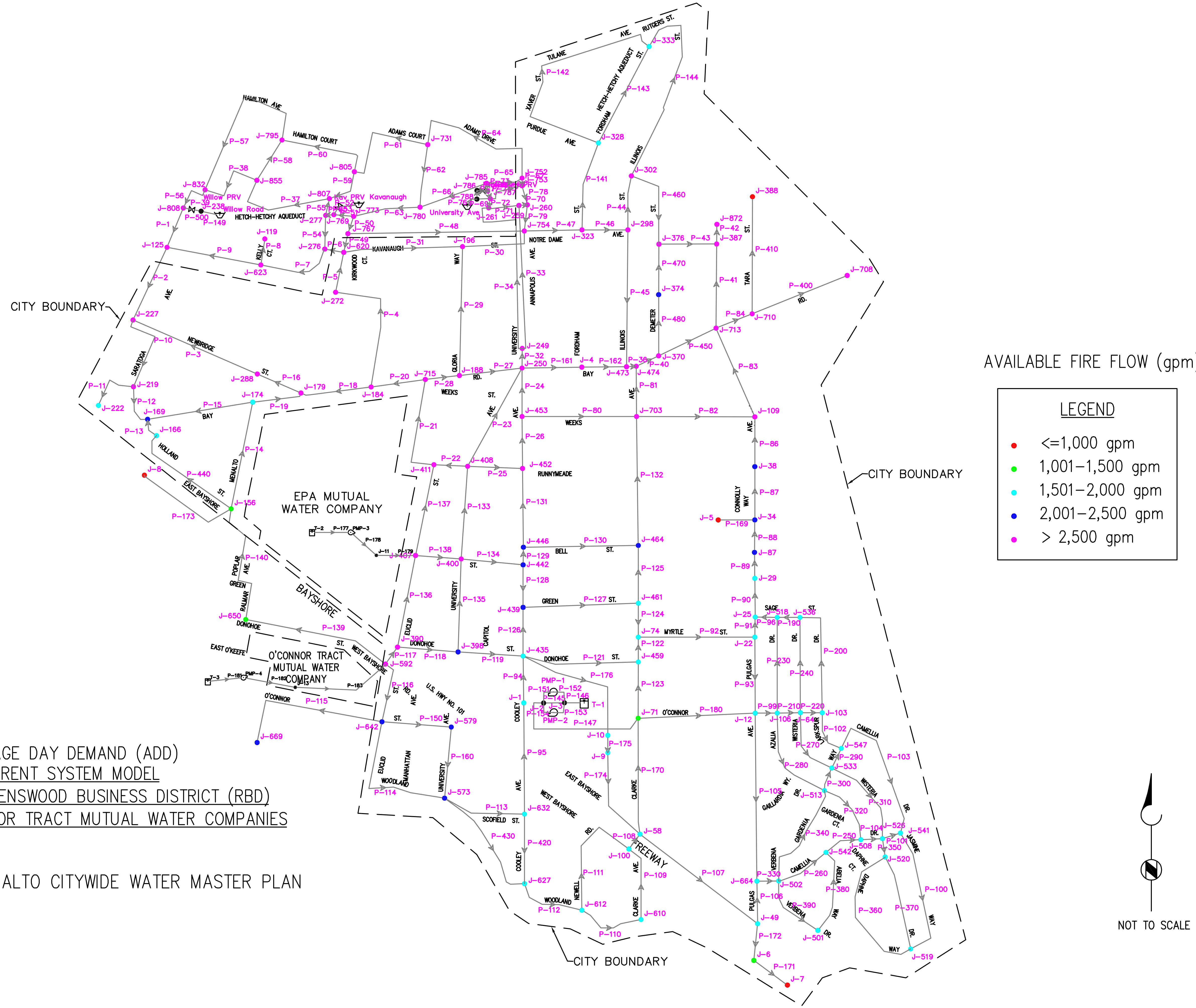


AVERAGE DAY DEMAND (ADD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)
AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

15.1.3:
ADD-Available Fire Flow



AVAILABLE FIRE FLOW (gpm)

LEGEND

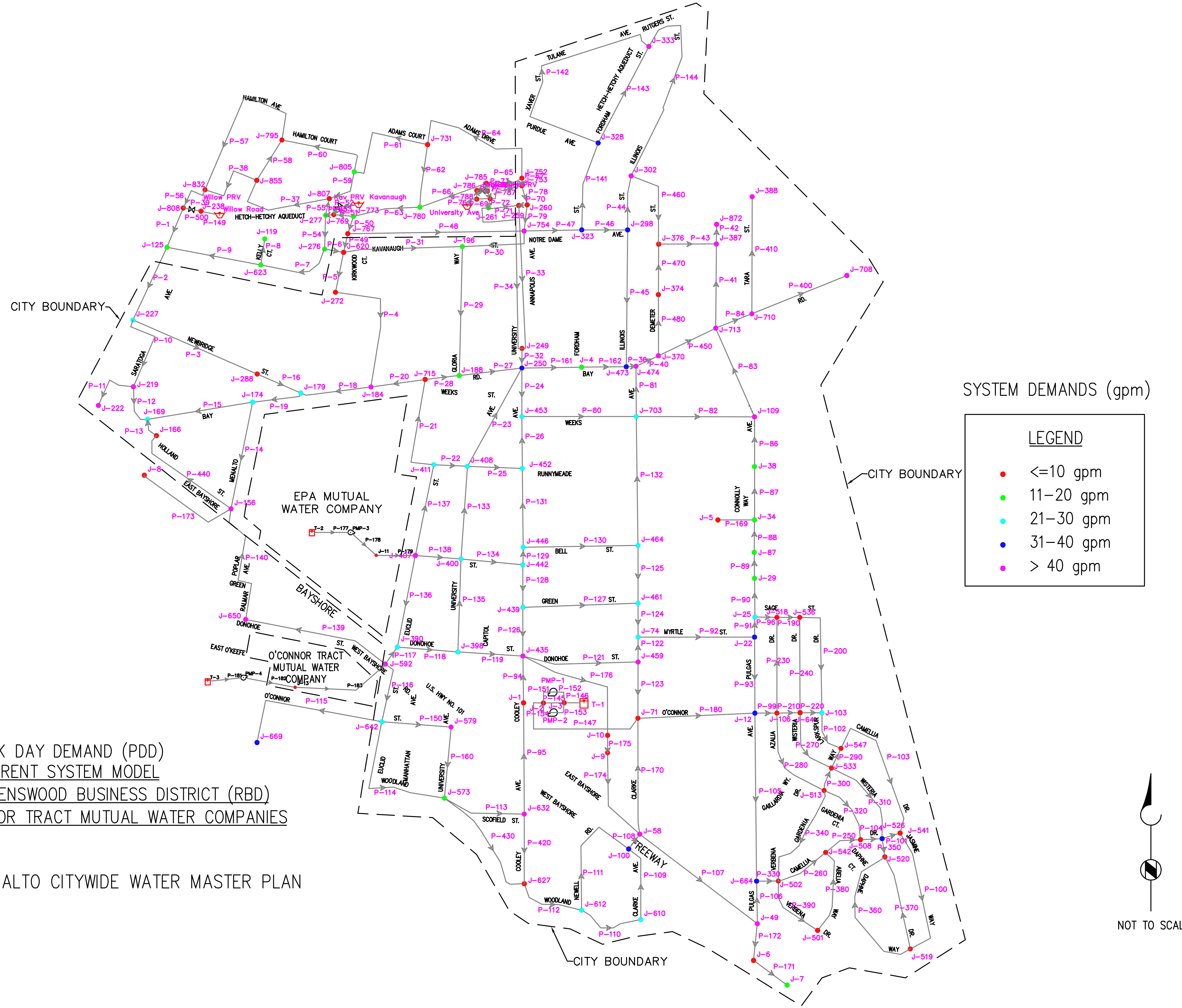
- <=1,000 gpm
- 1,001–1,500 gpm
- 1,501–2,000 gpm
- 2,001–2,500 gpm
- > 2,500 gpm

AVERAGE DAY DEMAND (ADD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)
AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

15.2.1:
PDD-System Demands

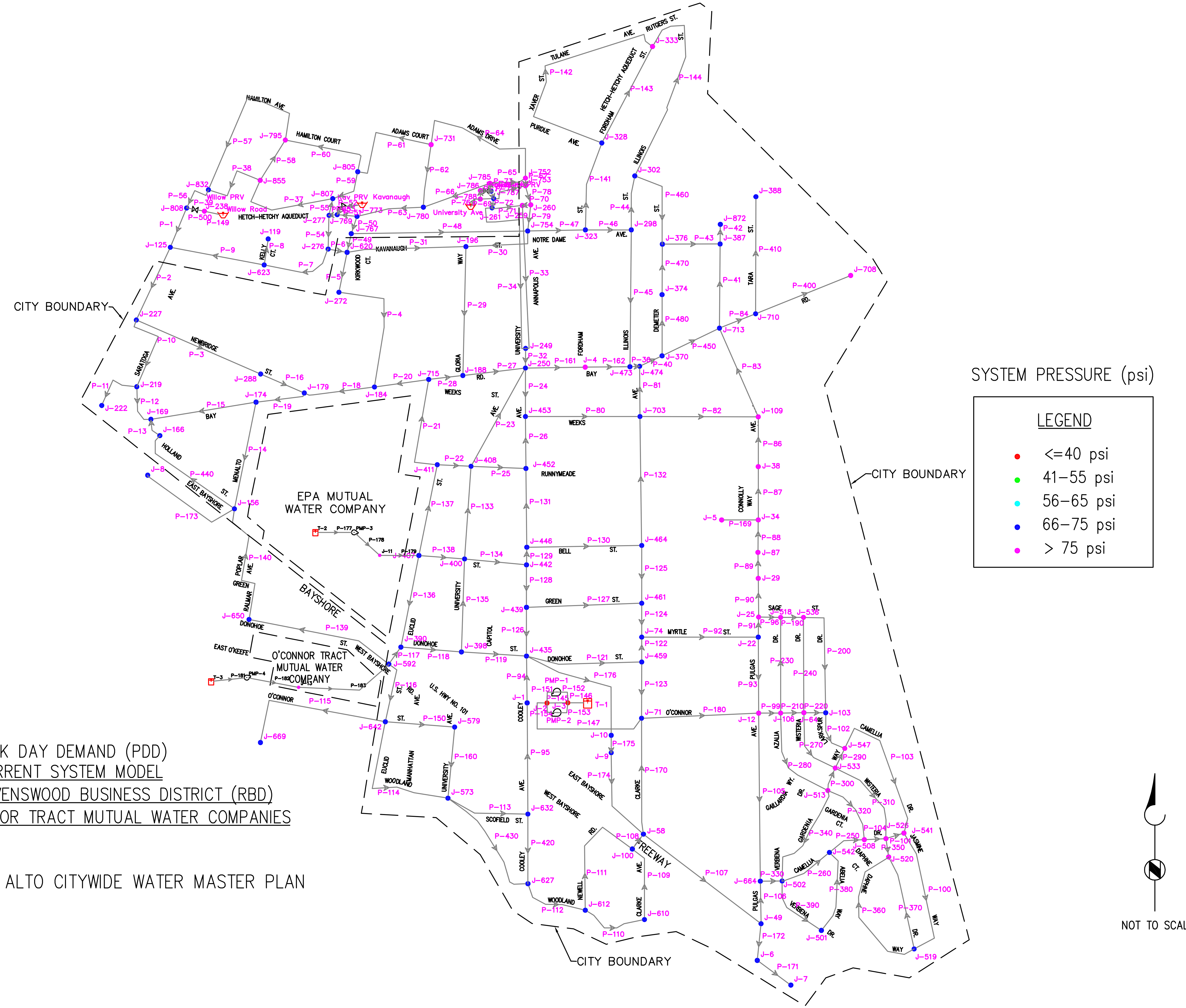


PEAK DAY DEMAND (PDD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)
AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

15.2.2:
PDD-System Pressure



PEAK DAY DEMAND (PDD)

CURRENT SYSTEM MODEL

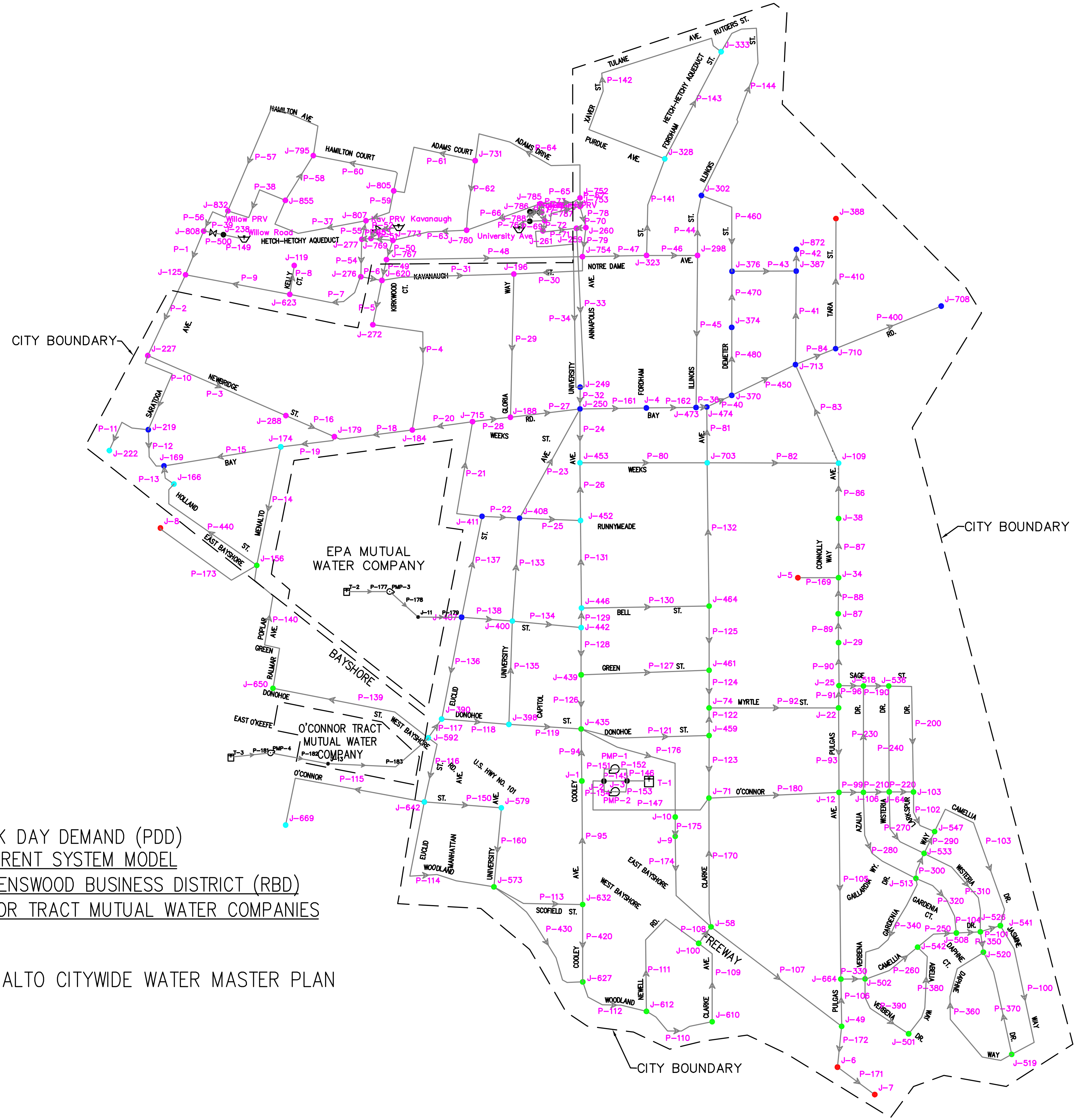
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

15.2.3:
PDD-Available Fire Flow



AVAILABLE FIRE FLOW (gpm)

LEGEND

- <=1,000 gpm
- 1,001–1,500 gpm
- 1,501–2,000 gpm
- 2,001–2,500 gpm
- > 2,500 gpm

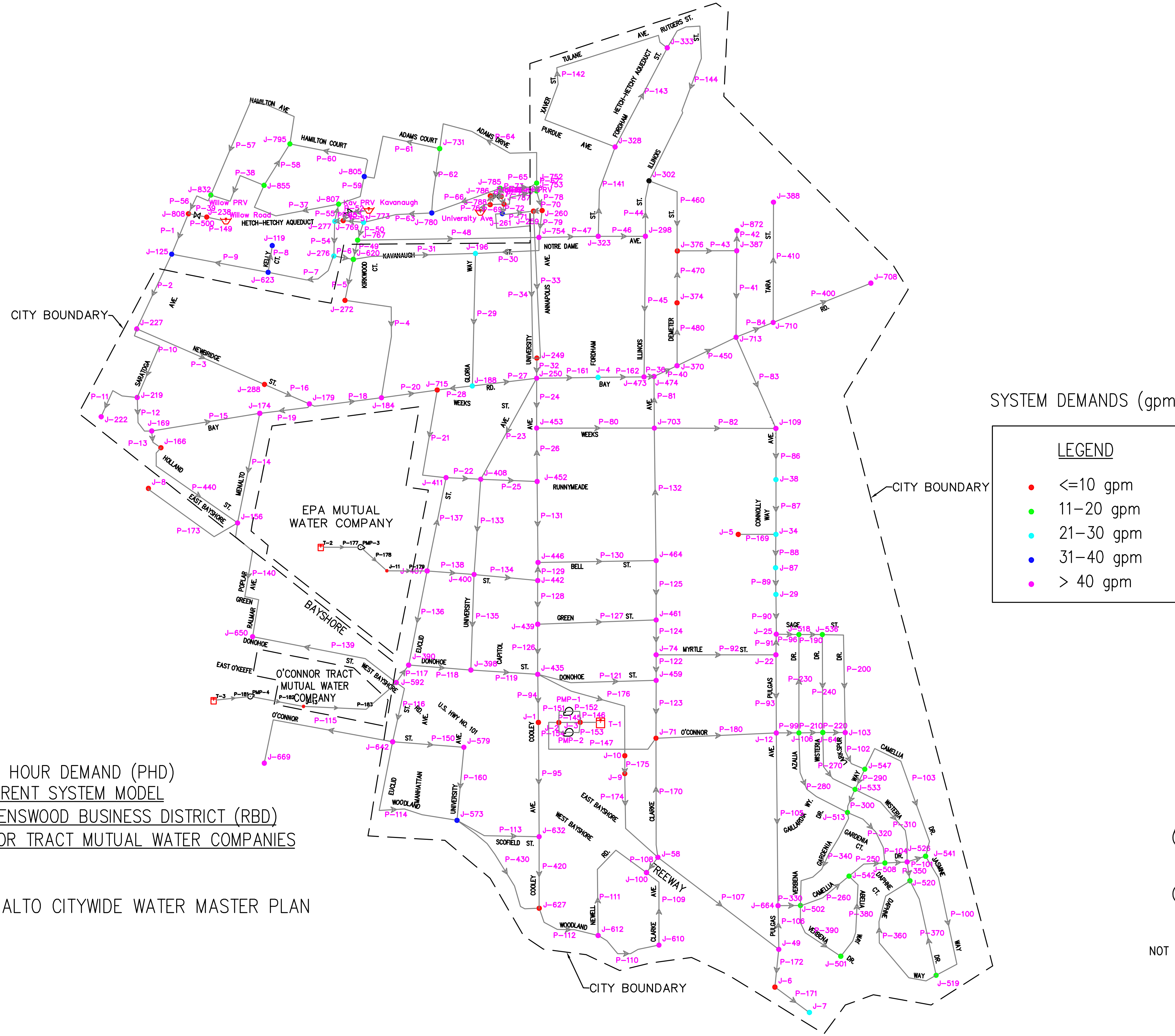
NOT TO SCALE

PEAK DAY DEMAND (PDD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)
AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

15.3.1:
PHD-System Demands



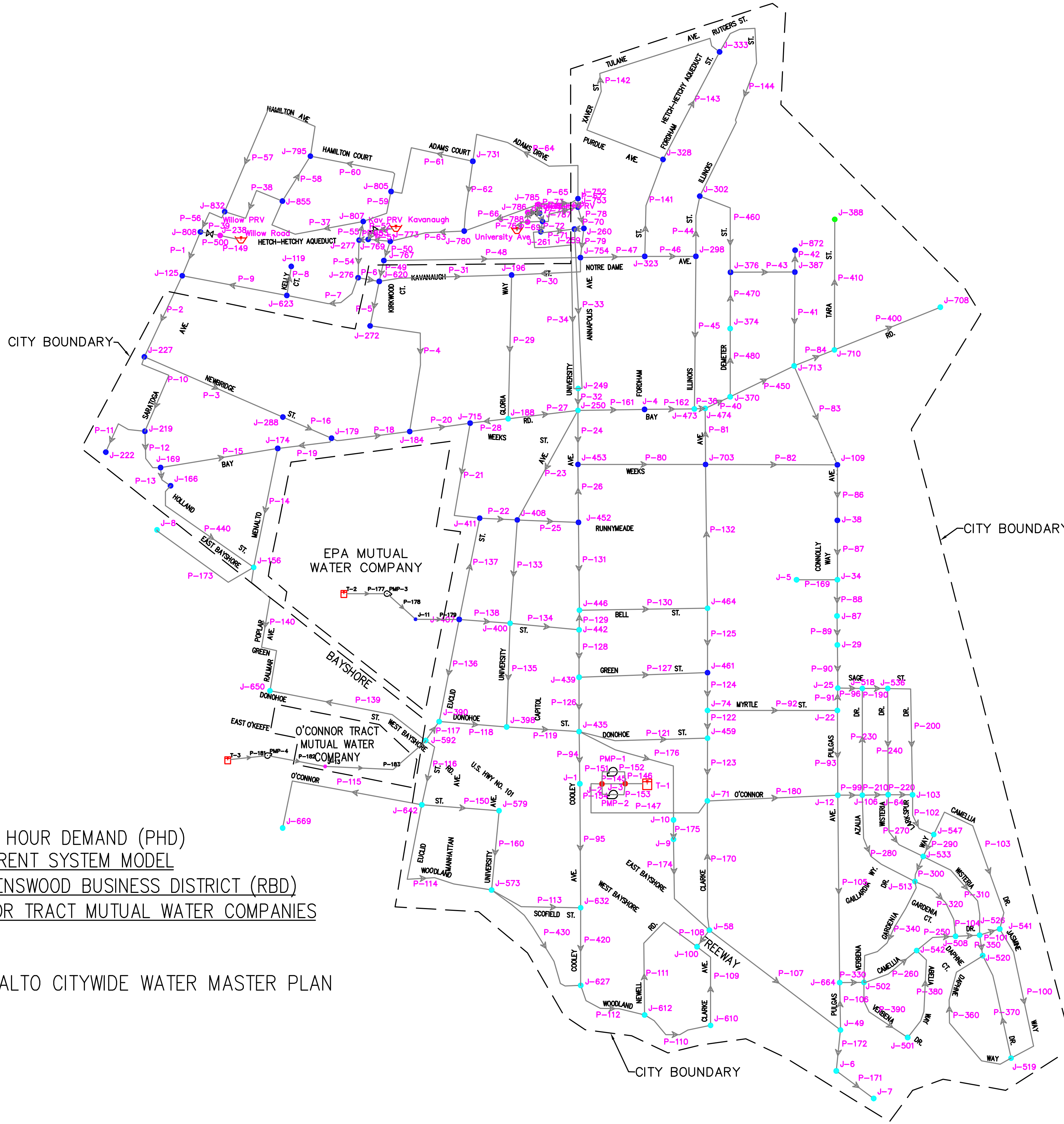
PEAK HOUR DEMAND (PHD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)
AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

NOT TO SCALE

EXHIBIT XX

15.3.2:
PHD-System Pressure



PEAK HOUR DEMAND (PHD)
CURRENT SYSTEM MODEL
WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)
AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

SYSTEM PRESSURE (psi)

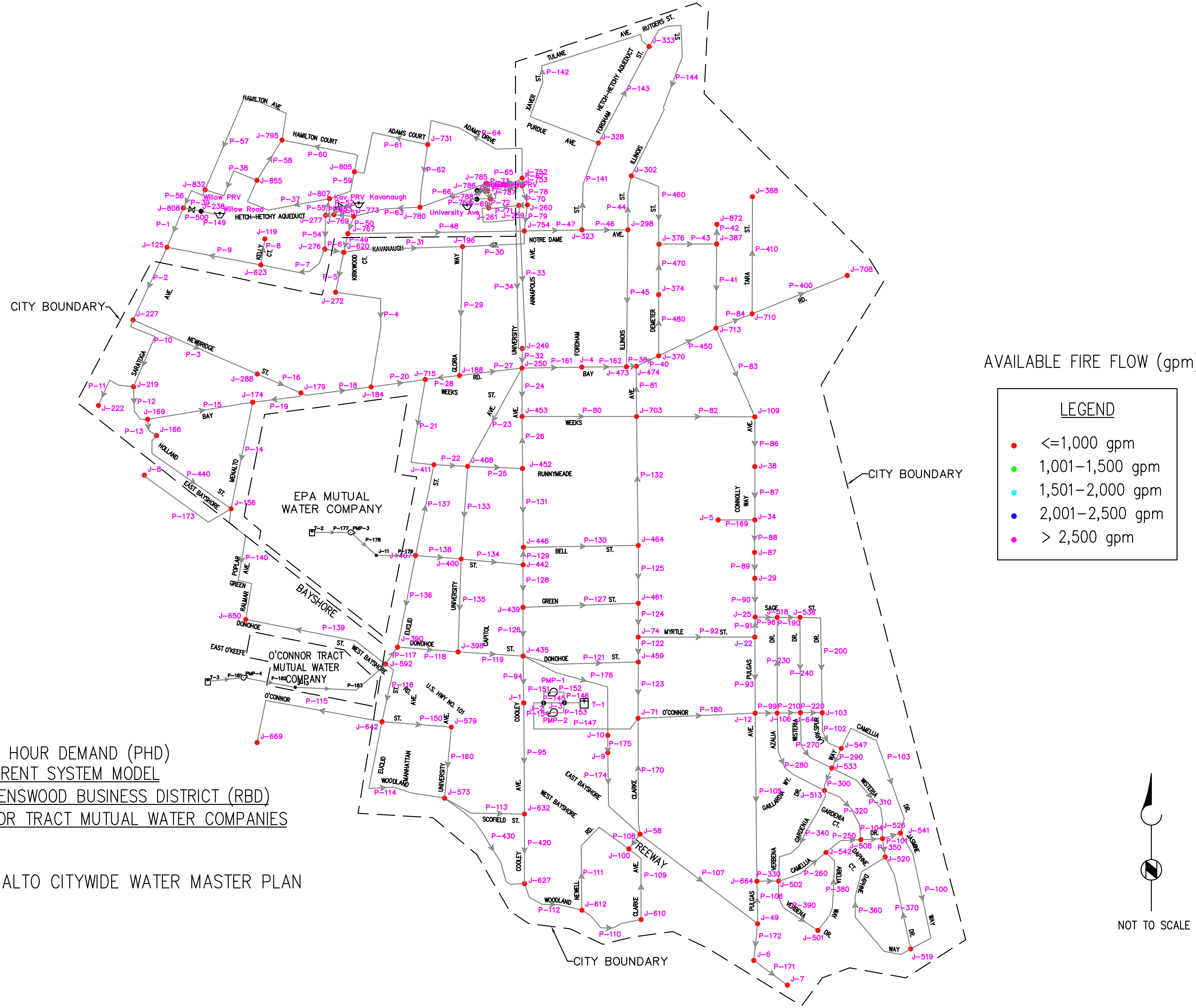
LEGEND

- <=40 psi
- 41–55 psi
- 56–65 psi
- 66–75 psi
- > 75 psi

NOT TO SCALE

EXHIBIT XX

15.3.3:
PHD-Available Fire Flow



PEAK HOUR DEMAND (PHD)

CURRENT SYSTEM MODEL

WITH FUTURE RAVENSWOOD BUSINESS DISTRICT (RBD)

AND EPA & O'CONNOR TRACT MUTUAL WATER COMPANIES

CITY OF EAST PALO ALTO CITYWIDE WATER MASTER PLAN

EXHIBIT XX

Appendix 16:
Comments

#	Organization	Comment	Response
1	City of East Palo Alto, Economic Development & Redevelopment	Their analysis indicates the need to have 45psi (p43), but the Appendix 12.1.2: has the lower threshold as 40psi.	**Adjusted minimum pressure to 40 psi based on comment from the City and the Brown and Caldwell 1998 Water System Master Plan. The text was updated to reflect the change.**
2	City of East Palo Alto, Economic Development & Redevelopment	In addition to Sean's notes, some appendices are erroneously labeled and/or numbered.	**Appendix numbering has been updated.**
3	City of East Palo Alto, Economic Development & Redevelopment	The WH report assumed an 1.8 million gallon emergency storage tank in the RBD. I did not see it in the Master Plan.	**See response to comment 10.**
4	City of East Palo Alto, Economic Development & Redevelopment	It planned for 600,000 sqft of commercial growth in the RBD. The Wilsey Ham (WH) report assumed 5 million sqft. See attachment.	**The 2010 Water System Master Plan has been updated appropriately. The report references a 2025 outlook for infrastructure improvements. Underground utilities are to be sized for ultimate build out which is the 5,000,000 sqft.**
5	City of East Palo Alto, Economic Development & Redevelopment	Appendix 12.1.3, the symbol table does use different colors for <1,000 gpm and >2,500 gpm. However, I did not see any >2,500 color in the map. I am not sure if it is a reflection that there is no >2,500.	**Exhibits have been updated. Previous Appendix 12.1.3 is now 15.1.3 and it now depicts nodes with an available fire flow above 2,500 gpm as reflected in the calculations in Appendix 14 and in the text in the report.**
6	City of East Palo Alto, Economic Development & Redevelopment	See p.43, I guess the references to Appendix 9.1.2 really refers to 8.1.2 Appendix 9.1.1 should be 8.1.1., etc. I just could not match the narrative to the appendices.	**See response to comment 2.**
7	City of East Palo Alto, Economic Development & Redevelopment	The model refers to node/Junction 669, as the lowest pressure in the system. However, that node seems to be outside of the City of East Palo Alto boundaries.	**Although the node does appear to be outside of the City of East Palo Alto boundary, it is part of the water service area supplied by the water distribution system being analyzed. This portion of the distribution system is within the City of Menlo Park.**
8	City of East Palo Alto, Economic Development & Redevelopment	p.44 refers to Appendix 11.1.2 showing node J669 with a pressure of 68.8. However, the table shows a pressure of 60.6.	**Numbers in report have been updated to match calculations.**
9	City of East Palo Alto, Economic Development & Redevelopment	I missed the narrative for Appendix 9, or maybe I got confused by the wrong references in p.43.	**Unclear which reference is being used; however, there was confusion on the numbering of the Appendices which should be cleared up now. See response to comment 2.**

#	Organization	Comment	Response
10	City of East Palo Alto, Economic Development & Redevelopment	There are too many water storage tank sizes out there, one in the Engineer's Report (1.8MG), another one in the WMP (3.8MG, p.39), and yet another one in the CIP (2.6MG, CIP p.58). We need to get all these water storage tank numbers straight. I do not see a 2.6MG reference. I do not see a 2.6MG reference. For the Ravenswood Engineer Report water tank size go to: http://www.ci.east-palo-alto.ca.us/economicdev/planandinfrast.html#ravenswood, See: Draft RBD Engineering Plan Part 1 (2.05MB PDF), p.26 of .pdf) The report calls for a 1.8 MG tank.	**The 2010 Water System Master Plan has been updated to specify a 4.2 MG tank to meet current storage and fire flow requirements. Originally, a 3.8 MG tank was described as independent of a 1.8 MG tank required for future RBD demands. A total of 6.0 MG will ultimately be required. Reference to a 2.6 MG tank could not be found.**
11	City of East Palo Alto, Economic Development & Redevelopment	Typo: Appendix 11.1.2. Calibrated not Calibrated	**Appendix 11.1.2 corrections made.**
12	City of East Palo Alto, Economic Development & Redevelopment	Typo? Is it Gloria Bay or Gloria Way? p.1. and other pages.	**The well's designated name is Gloria Bay Well. There is reference to a Gloria Way Well Report by HDR, because we are referencing a report we reference the actual report name. The name "Gloria Bay" is a combination of "Gloria Way" and "Bay Road."**
13	City of East Palo Alto, Economic Development & Redevelopment	P.26 states: "The number of district customers and the size of the sewer main within EPA currently are not known." Why? Hasn't the consultant talk to the Sanitary Dist./Rich? This may not be of importance, but if it is not, why is it mentioned? In the line before this statement there is a typo: We Weather Flow.	**Updated the 2010 Water System Master Plan to reflect the number customers and the sewer main size. Found no reference to "We Weather Flow"**
14	City of East Palo Alto, Economic Development & Redevelopment	P.26 bottom, Both plants deliver …in certain sections of their service area…Where? Is it close to East Palo Alto, how feasible is it to extend a pipe to EPA? A map would help.	**Included complete service area map in report appendix. Provided a map of the closest pipes to the EPA municipal water system in the report.**
15	City of East Palo Alto, Economic Development & Redevelopment	Satellite wastewater treatment plants, (p.27) have a small footprint…how small? Once the water is filtered, don't we would need a pump and pipes to distribute it? If so, what would be the resulting size and cost? Is this a feasible alternative, when we don't have a golf course to irrigate?	**Changes have been made in the 2010 Water System Master Plan to reflect the comment.**
16	City of East Palo Alto, Economic Development & Redevelopment	Does the proposal of using recycled water (p.27) for irrigation makes sense? It says that it has the potential of creating up to 50K Gall per day, reducing supply by 2.5%. Do we really use that much water to irrigate our parks?	**Yes, using non-potable water for irrigation makes sense and is required by law in California if available. The non-potable water system would service parks, landscaped medians and other non-potable uses, i.e. street sweeping and construction water.**

#	Organization	Comment	Response
17	City of East Palo Alto, Economic Development & Redevelopment	P.28 talks about potential water capture basins…where? It seems to suggest that near freeway or railway. Do we really think it is feasible to create a water capture basin in the wetlands? The environmental costs and considerations would be prohibitive…I think. Shouldn't we be realistic?	**This section of the 2010 Water System Master Plan has been revised. Feasibility is considered on a project-by-project basis; but this project is likely infeasible for a city-wide system.**
18	City of East Palo Alto, Economic Development & Redevelopment	P.33 talks about a groundwater well, and states that… It is uncertain whether the groundwater well was properly destroyed. This should be fully researched.	**A CIP has been added to investigate destruction of the well.**
19	City of East Palo Alto, Economic Development & Redevelopment	P.32 Can we mix Gloria Well water in the Palo Alto Park Mutual facilities? What it would take to do this?	**Yes, it will take mutual agreement of the parties and approval of the California Department of Public Health.**
20	City of East Palo Alto, Economic Development & Redevelopment	P.34: Says: To accurately analyze the water distribution system…A hydraulic network simulation model must be created. Didn't this study create one? Do we get to keep the model?	**Text was modified to clarify a previous water model was updated and calibrated. The model will be submitted to the City of East Palo Alto upon completion.**
21	City of East Palo Alto, Economic Development & Redevelopment	P.36 bottom of first paragraph: largely because an environmental business that was the City's largest water consumer has since closed. What was ROMIC's consumption? Please add.	**ROMIC's average usage has been included.**
22	City of East Palo Alto, Economic Development & Redevelopment	In addition: The Ravenswood Engineer Report recommends 12" water mains in the Ravenswood. See: http://www.ci.east-palo-alto.ca.us/economicdev/planandinfrast.html#ravenswood) See: Draft RBD Engineering Plan Part 1 (2.05MB PDF) p.2 of Memorandum, p.13 of .pdf file: …"As a result, the water main size needed for RBD to provide sufficient fire flows for the area is 12 inch."	**Addressed in paragraph 7.1. This will be further addressed in the design of the RBD Development.**
23	Menlo Park Fire Protection District	Sec 1.2 the regional Hatch Hetchy system is adequate to meet existing and future demands. If demands are already above the supplied, how is it able to meet future growth demands?	**This has been modified to state that they need additional production to meet the future demands. 1,000 gpm**
24	Menlo Park Fire Protection District	Sec 1.3The pressure regulating valves are set to the following pressures: 70 psi at Willow Road, 75 psi at O'Brien Drive, and 75 psi at University Ave. Is there a possibility of increasing the pressures to improve the fire supply demands for building sprinkler designs. This will actually reduce construction costs.	**It is possible, but not advised. Running increased pressures in the distribution system will lead to greater water loss and impact private property plumbing systems. The Uniformed Plumbing Code mandates a maximum system pressure at 80 psi before pressure regulators are required to be installed.**

#	Organization	Comment	Response
25	Menlo Park Fire Protection District	The minimum standard pipeline diameter for the water distribution system network should be 8 inches. This falls into alignment with Menlo Park Fire District Standards.	**No Response Required**
26	Menlo Park Fire Protection District	Sec 1.4 it is estimated the city would need 3.8 MG to meet demands for system equalization, fire flow, and emergency storage. Based upon provided water demands. CA Fire Code required higher water demands and the demand may actually be higher than stated in this report.	**The 2010 Water System Master Plan has been updated to reflect a 4,000 gpm/ four-hour duration fire flow demand.**
27	Menlo Park Fire Protection District	Sec 2.1 This Water Master Plan has been developed with the input and cooperation of both the City of East Palo Alto and American Water Services Company. As a user and having impact of demand of this system, Menlo Park Fire would appreciate having involvement with development of this system for the next 50 plus years.	**No Response Required**
28	Menlo Park Fire Protection District	Sec 3.1 Menlo Park Fire would prefer that the connections to Palo Alto Park Mutual Water Co. and O'Connor Tract Mutual Water Company be bi-directional to provide improved emergency supplies for the City of East Palo Alto.	**Bi-directional service was the intention of the emergency service. Currently service is only from the City of East Palo Alto to the mutual companies. Report has been updated to help clarify.**
29	Menlo Park Fire Protection District	Sec 3.1.1.1 The City of East Palo Alto has a supply assurance of 1.963 MGD. What is the demand for EPA build out in 2030 and how will this impact the required fire flow and demand.	**Section 3.2.5 has been added to show what the build out demand will be for EPA. The demand for RBD is 1.270,100 gpd or 1,698 ccf/d. At build out, the City of East Palo Alto will exceed its water supply assurance. This only impacts supply and has no bearing on the system hydraulics or fire flow requirements.**
30	Menlo Park Fire Protection District	Sec 3.1.2 Gloria Bay Well. The MPFPD would like to see an emergency supply be available from this well.	**The Gloria Bay Well is currently usable and is used for construction and street sweeping. The only connection point for the well is the hydrant located next to the well property. Discussion between MPFPD and the City of East Palo Alto should be had to discuss the use of the well.**
31	Menlo Park Fire Protection District	Sec 3.2.1 Historical Water Use Commercial/Industrial Use has almost doubled from 99-00 to 08-09. With very little commercial/industrial growth to make an almost double impact, what will be the impact of 2030 growth of the RBD?	**At build out, 2025, the expected average day use is 1,270,100 gpd or 1,698 ccf/d. This amounts to a 63% increase over the 2008/09 water year. Section 3.2.5 has been added to show future demand.**
32	Menlo Park Fire Protection District	Sec 3.2.3 Population Forecasts. …no population growth was used other than what is included as part of the RBD. This will be the largest impact for future water demand for fire service supplies.	**No Response Needed**

#	Organization	Comment	Response
33	Menlo Park Fire Protection District	Sec 4.1.2 Bioterrorism ACT - Emergency Response Plan. Menlo Park Fire District respectfully requests a copy of the Emergency Response Plan and would also like to be involved in all future modifications of the plan to ensure we will be able to work within the scope of the ERP and that our needs will be met to provide the best service we can to East Palo Alto.	**No Response Required**
34	Menlo Park Fire Protection District	Sec 5.1 Future Water Supply. The City of East Palo Alto has a supply assurance from SFPUC of 1.96 MGD. In 2007-2008, the City used 2.04 MGD. How will future needs be met if it has already been demonstrated that demand is over provided. MPFD needs to be part of all discussions for the other sources to make sure it is compatible and accessible for MPFD needs.	**No Response Required**
35	Menlo Park Fire Protection District	Sec 5.2 Groundwater. With less than a 4 hour supply of water in storage, it is a major priority to establish an dependable independent emergency water supply with more than a 4 hour supply. The recommendation of a treatment facility for the Gloria Bay well is a viable option worth pursuing.	**No Response Required**
36	Menlo Park Fire Protection District	Sec 5.2 Recycled Water Programs. The City could also reuse treated wastewater for... MPFD would recommend a dual purpose of connecting a fire hydrant system to this as this could be a redundant backup system, especially for the RBD area.	**No Response Required**
37	Menlo Park Fire Protection District	Sec 5.7 O'Connor Tract Mutual Water Company. MPFD recommends upgrading the intertie to 8 inches or larger with bidirectional capabilities. This will allow an immediate 100,000 gallon storage tank to be part of an emergency supply.	**The analysis used the existing 6" intertie. The results indicate that the existing 6" is sufficient for emergency use purposes if the one-way valves were to be replaced. May be upsized to 8" if desired.**
38	Menlo Park Fire Protection District	Sec 5.8 Palo Alto Park Mutual Water Company. MPFD recommends upgrading the intertie to 8 inches or larger with bidirectional capabilities. This will allow an immediate 361,500 gallon storage tank to be part of an emergency supply.	**The analysis used the existing 6" intertie. The results indicate that the existing 6" is sufficient for emergency use purposes if the one-way valves were to be replaced. May be upsized to 8" if desired.**
39	Menlo Park Fire Protection District	Sec 6.1 Existing Distribution System There is currently no storage within the City of East Palo Alto's water system. This is a deficiency that can be corrected quickly with interties to the adjoining water companies and development of the Gloria Bay well.	**No Response Required**

#	Organization	Comment	Response
40	Menlo Park Fire Protection District	Sec 6.3 Design Criteria. Fire flow demands show the deficiencies of the system under any load due to age and lack of adequate infrastructure. It was noted that for fire flow a 2,500 gpm requirement was given for commercial structures such as the Four Seasons. Modeling should be corrected as the CA Fire Code requires flow up to 8,000 gpm based upon design. MPFPD may reduce specific projects fire flows up to 50%. Therefore we would recommend a minimum design showing 4,000 gpm. MPFPD also recommends increasing the pressure of the system so that construction costs would be lowered as the sprinkler system costs for the RBD build out would be reduced. The reason would be less onsite water storage requirements and smaller pipe size for fire sprinkler systems. An example of required on-site water storage is IKEA.	**The 2010 Water System Master Plan has been updated to reflect a 4,000 gpm/ four-hour duration fire flow demand.**
41	Menlo Park Fire Protection District	Sec 6.3.3 Storage requirements. The maximum fire flow requirement is between 4,000 gpm to 8,000 gpm and therefore, the minimum 4-hour fire storage would be between 960,000 gallons and 1,920,000 gallons.	**The 2010 Water System Master Plan has been updated to reflect a 4,000 gpm/ four-hour duration fire flow demand.**
42	Menlo Park Fire Protection District	Sec 6.3.4 Minimum pipe sizes. Fire hydrants must be supplied from a minimum of 8 inch supply lines. 6 inch lines are acceptable for strictly residential areas as long as the 6 inch is tied and fed by 8 inch lines.	**All new water distribution lines will be a minimum of 8".**
43	Menlo Park Fire Protection District	Sec 7.1 Pipeline Replacement projects MPFPD recommends that all major lines and supplies be upgraded to 16 inch or larger. A discussion as to which lines should be upgraded to larger than 8 inch should be agreed upon for all future supplies and build outs. We also recommend the use of plastic pipe and non-corrosive fittings or a minimum of epoxy coated due to hot soil conditions. This will maintain long term integrity of the system. We also recommend that all residential taps be a minimum of one inch taps with one inch meters to accommodate the new fire sprinkler requirement on single family residences.	**These details should be addressed in the City of East Palo Water System Standards and Specifications.**
44	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 46 of Report: Report calls for the removal & replacement of an existing 6" CI to 8" on Ralmar between East Bayshore & Donohoe. This should be revised to say: East Bayshore (from Ralmar to Donohoe)	**Table 7-1 has been updated per comment**

#	Organization	Comment	Response
45	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 46 of Report: Report calls for the removal & replacement of an existing 6" CI to 8" on Demeter between Bay & Illinois. This should be revised to say: Demeter St (from Bay to Purdue)	**Table 7-1 has been updated per comment**
46	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 47 of Report: Report calls for the removal & replacement of an existing 8" to 10" on Euclid between West Bayshore to University. This is unclear. Euclid does not run between West Bayshore & University. Please re-specify.	**Refers to pipe along Woodland and Euclid from University to West Bayshore and is to be 12". Added Woodland to Table 7-1.**
47	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 47 of Report: Report calls for the removal & replacement of 755 ft of existing 6" to 8" on Pulgas between West Bayshore and north end of street. This appears to be incorrect because the current "Water Atlas Book" prepared by California-American Water Company for EPA only indicates the existence of approximately 350 ft of 4" CI on Pulgas between West & East Bayshore. There're no 6" on Pulgas! Furthermore, the report goes on to call for the removal & replacement of only 96 ft of existing 8" CI to 10" on Pulgas between West Bayshore & north end of street. This, again, seems incorrect as the "Water Atlas Book" shows approximately 6800 lf of existing 8" CI instead. Need further clarification.	**From the Water Atlas Maps, there is a 6" CI pipe that runs across the Bayshore Freeway which is modeled in the system (575'). The additional 180' on N. Pulgas should be 8". This has been changed in Table 7-1 to read: Pulgas Ave. (West Bayshore – East Bayshore) 575 ft of 6" to 8".** **Error in summation, Table 7-1 has been updated to read 8,019 lf of 8" to 10"**
48	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 47 of Report: Report calls for the upgrade of the existing 8" CI to 10" on Clarke between West Bayshore & Bay and the existing 4" CI to 8" on Garden between Terra Villa & Pulgas. The remaining 4" CI on Garden between Clarke & Terra Villa seems to remain in place. Recommend upgrading this stretch to 8" as well to finish the loop.	**That section of pipe was not modeled but is recommended to be upgraded to an 8" pipe per improvement criterion 2 and is reflected in Group IV and Table 7-5.**
49	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 47 of Report: Report calls for the removal & replacement of an existing 6" CI on Jasmine Way between Camellia & Wisteria. This should be revised to say: Jasmine Way (from Camellia to Daphne). In addition, only 4 ft of the existing 6" is recommended for replacement. This appears to be an error! The existing 6" CI on Jasmine Way (Camellia to Daphne) is approximately 1200 ft in length. Please clarify.	**Table 7-1 has been updated per comment**

#	Organization	Comment	Response
50	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 47 of Report: The existing 6” CI on Verbena between Abelia & Camellia is recommended for replacement leaving the remaining stretch between Camellia & Azalia seemingly untouched. Since both Azalia & Camellia will be upgraded, it’s only logical to recommend Verbena (between Azalia & Camellia) for replacement/upgrade to complete the loop.	**That section of pipe was not modeled but is recommended to be upgraded to an 8” pipe per improvement criterion 3 and is reflected in Group V and Table 7-6.**
51	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 47 of Report: Report calls for the removal & replacement of 2487 ft of existing 12” to 16” on East Bayshore between Donohoe & Pulgas. This appears to be an error since the current “Water Atlas Book” from California-American Water Company only describes the existence of a 6”CI on this stretch. Please clarify.	**This is shown on the Water Atlas maps as the 12” PVC from East Bayshore running parallel to Cooley Ave to the east and connecting to Cooley at Donohoe on sheet 12.**
52	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 48 of Report: Report calls for the removal & replacement of 1210 ft of existing 4” to 8” on Bay Rd between Westminster & Newbridge. This appears to be an error since the current “Water Atlas Book” from California-American Water Company only describes the existence of a 6”CI on this stretch. Please clarify. The report goes on to further recommend 620 ft of the existing 6” to be upgraded to 8”. Again, this seems incorrect since the existing 6” on this stretch of Bay Rd is measured approximately 1700 ft in length. Need further clarification.	**Updated report to read 6” to 8”.** **According to the Water Atlas maps, starting at Newbridge and going east, the size of the line is 8”. The 1,830 lf west of Newbridge is all 6” which is accounted for in Table 7-1 (see changes made from first part of comment). All other recommended upgrades along Bay Rd are accounted for in Table 7-1 under the Bay Rd (Dumbarton – End of street east) section.**
53	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 48 of Report: Report calls for the removal & replacement of existing pipes (varying in sizes) on Bay Rd between Westminster & Newbridge and between Dumbarton & east end of street leaving approximately 675 ft of existing 8” CI on Bay between Newbridge & Dumbarton seemingly untouched. Recommend upgrading this stretch to 10” to complete the loop.	**Based on results of model runs in WaterCAD and other criteria, this section of pipe did not meet the criteria that required it to be upgraded.**
54	City of East Palo Alto, Engineering	Section 7.1 Pipeline Replacement Projects – Page 48 of Report: Report calls for the removal & replacement of 1290 ft of existing 6” to 8” on Menalto between Bay & East Bayshore. This appears to be an error! The current “Water Atlas Map” from California-American Water only shows an existing 4” CI on this stretch. Need clarification.	**The street name was identified incorrectly, it should be 1290 lf of existing 6” to 8” on Holland and Bradley from Bay – Menalto. This is reflected on Table 7-1.**

#	Organization	Comment	Response
55	City of East Palo Alto, Planning Department	The RBD Engineering Report recommends upgrading to 12" mains throughout the RBD, while the draft Master Plan recommends 8" mains on Demeter Street, Pulgas Avenue and Tara Road.	**The lines were upsized to 12"**
56	City of East Palo Alto, Planning Department	The RBD Engineering Report recommends the construction of a 1.8 MG storage tank, while the draft Master Plan recommends the construction of a 3.8 MG storage tank.	**See Comment 10**
57	City of East Palo Alto, Planning Department	The RBD Engineering Report states that East Palo Alto's SFPUC allocation is 2.18 MGD, while the draft Master Plan states that East Palo Alto's SFPUC allocation is 1.963 MGD.	**Upon dissolution of the East Palo Alto County Water District and transfer of the system to City of East Palo and Menlo Park for respective areas within city boundaries the City of Menlo Park acquired a portion of allocation, 0.217 MGD, to serve Menlo Park.**
58	City of East Palo Alto, Planning Department	The draft Master Plan points out that East Palo Alto has low per capita water use. Could you provide some explanations why that is the case? Why is there low per capita water use and what conditions could increase the City's per capita water use. What measures can be taken to prevent those conditions from occurring?	**The major use of water in a system is irrigation. Due to the small lot sizes and the limited up keep of yards by customer, the per capita use is low. If customers were to maintain yards more regularly, the per capita use could go up.**
59	City of East Palo Alto, Planning Department	The draft Master Plan recommends that the City supplement its SFPUC water supply through installation of a groundwater well, satellite waste water reuse, treatment of Gloria Well and storm water reuse to achieve a water supply of 3.8 MG. It is unclear whether all of those projects are required to meet the 3.8 MG system equalization number. Could the report clarify if all of these projects are necessary to achieve this goal? Are certain projects more valuable or cost effective than others?	**The 3.8 MG (which is now 4.2 MG see comment 10 above) is a storage calculation. All projects are not needed to meet the demand. The most reliable source would be the construction of treatment for the Gloria Bay Well and the construction of a new well for future development.**

#	Organization	Comment	Response
60	City of East Palo Alto, Planning Department	Chapter 3.2.3 states that "In the analysis as part of Section 7, no population growth was used other than what is included as part of the RBD… Any population growth outside of the RBD is small, as the majority of the residential zones of the city are built out. Therefore, the impact of the water system and the model are insignificant compared to the future demands of larger developments expected as part of the redevelopment effort within the RBD." I disagree with the statement that the majority of the residential zones of the city are built out. According to the population projections from BAWSCA, the City will add 6,000 new residents by 2030. The City's draft Housing Element also adds that the City will attempt to build 630 new housing units by 2014. A substantial amount of this residential development will occur outside of the RBD. There are also opportunities for large non-residential development along the University Avenue corridor (outside of the RBD). Could the report explain/justify why this growth outside of the RBD was not considered in the analysis?	**Growth projections outside the RBD was assumed to be redevelopment. Therefore the property would already have a demand associated with it.**
61	City of East Palo Alto, Planning Department	It is important to distinguish between the "City of East Palo Alto" and the "City of East Palo Alto Water System Service Area". It is unclear in some parts of the report whether population projections and water use statistics pertain to the City as a whole or just the water service area.	**The 2010 Water System Master Plan has been updated for clarification**
62	City of East Palo Alto, Planning Department	The draft report recommends the construction of a new 1,000 gpm ground water well. What are the site requirements for such a facility? How many square feet does the site have to be? Does it have to be sited in a particular location?	**Due to the topography of the city, the well can be located in virtually any area of the city. Site size and location will be analyzed during the design phase.**
63	City of East Palo Alto, Planning Department	Chapter 5.4 indicates that constructing a storm water recapture facility would be difficult because of physical barriers. Could the report clarify if installation of such a facility is still feasible? Under what conditions could such a facility be built? Where?	**See Comment 16**
64	City of East Palo Alto, Planning Department	The draft Master Plan groups hydrant replacement and valve replacement in the same CIP project. The City's adopted CIP differs, in that it lists hydrant replacement as a standalone project (no valves). Is there a reason why valve and hydrant replacement should be listed together? If there is a good reason, we will revise out CIP to match.	**There is no fire hydrant or valve replacement project. There is a maintenance project for fire hydrants and valves. This can be coordinated together or separately. Logistically, it would be wise to maintain all facilities in the same area and not have to go back.**
65	City of East Palo Alto, Planning Department	Could the draft Master Plan incorporate the City's meter replacement program as a CIP project in Chapter 7?	**Meter replacement is part of the regular operations and maintenance budget.**

#	Organization	Comment	Response
66	City of East Palo Alto, Planning Department	Chapter 6.3.5 states that the minimum main size should be 6” because it would be cost prohibitive to upgrade all 90,000 lf of existing 6” lines. Could the report specify how many lf of 6” pipe is being proposed to remain? Could you provide greater detail about the budgetary considerations used to arrive at that recommendation? Also, this seems to contradict Section 1.3, which states that minimum pipeline diameter should be 8”.	**Minimum pipe size for a distribution system can be six inches. For this report, all replacement lines are recommended to be eight inch.**
67	City of East Palo Alto, Planning Department	The draft Master Plan successfully lists what CIP projects are needed to meet future demand, but it doesn’t specify a strategy on how to get there. It would be useful to develop a long term strategy for achieving these goals including: o How to finance these projects. o A schedule for timing of improvements. (How much should we attempt to do each year?) o A system to evaluate the value of projects (For example: if we have to choose between building a storage tank vs. building a ground water well, what should we choose?)	**A finance section has been added as Section 8.** **The pipe replacement is listed in groups as high to low priority. As the City has funds, the projects should be implemented.** **Improvement for the system are based on fire flow and optimum customer service.**
68	City of East Palo Alto, Planning Department	The cover pages uses a very low resolution City logo. We can provide a higher resolution image.	**Please provide**
69	City of East Palo Alto, Planning Department	Chapter 5.1 says that the City draws its entire supply from the Hatch Hetchy Aqueduct. Is this statement inaccurate since the City draws from the Gloria Well for non-potable water?	**The City's potable water supply is exclusively from the Hatch Hetchy system. The water used from the Gloria Bay well is minimal an typically less than 0.5%.**
70	City of East Palo Alto, Engineering	Section 7.1 mentions additional water mains that would not meet standard pressures or fire flows with the addition of the Ravenswood Business District demands but fails to identify such mains! Can these sub-standard mains be fully ascertained/described/pinpointed so that when Ravenswood is prime for development the City knows what to ask for from the District's Developers/Engineers? Section 7.1 goes on to further mention that existing water mains serving the new Ravenswood Business District need to be upsized to a minimum of 12". Can these mains be properly identified?	**To be supplied at a later date.**

#	Organization	Comment	Response
71	City of East Palo Alto, Engineering	Report calls for only 555 ft of existing 12" main on Newbridge (from Mello to Bay) to be upsized to 16" while the current July 2009 Water Atlas Book prepared by California-American Water Company for EPA indicates the existence of approximately 1000 ft of 12" on this stretch instead. If only 555 ft out of roughly 1000 ft of existing 12" get upsized, what happens to the remaining 445 ft? Is this an error? If so, the price difference is $80,545. Will the total cost of Pipeline Replacement Project for Group I (Table 7-2) need to be revised?	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
72	City of East Palo Alto, Engineering	Report calls for the upsizing of 1550 ft of existing 6" to 8" on E. Bayshore from Ralmar to Donohoe. The existing 6" on E. Bayshore only stretches between Ralmar to Glen. Please revise accordingly.	**Please see comment 44 above. The model has been checked and a better clarification should be East Bayshore and the corner of Menalta Ave, east to Poplar Ave., then south to Green St, east to Ralmar Ave., and then south on Ralmar to Donohoe St.**
73	City of East Palo Alto, Engineering	Report calls for the upsizing of an existing 6" to 8" on Donohoe between Ralmar & W. Bayshore. There is no existing 6" on Donohoe between this stretch! The latest Water Atlas Book only indicates an existing 2" cast-iron (from Menlo Park Distribution System) and a 4" cast-iron (from O'Connor Distribution Main). Further, Donohoe between Ralmar to W. Bayshore is only measured at roughly 1300 ft as opposed to 1620 ft as indicated in the report. Why the discrepancy? Does Table 7-2 need to be revised to reflect the right quantity and the right cost?	**The upgrades to the pipe are dictated by the model provided by the City of east Palo Alto. The model indicates a 6" pipe along these streets. Actual footages will be confirmed during engineering.**
74	City of East Palo Alto, Engineering	Report calls for the upsizing of 551 ft of existing 6" to 8" on O'Connor from Clark to Larkspur. This stretch measures approximately 750 ft instead! Why the difference (200 ft)? $20,000 difference!	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
75	City of East Palo Alto, Engineering	858 ft of existing 6" on University from Woodland to O'Connor is recommended for upsizing to 8". The latest Water Atlas Book shows the existing 6" on this stretch as abandoned! If the main has already been abandoned, why the replacement? Need further investigation. Revise Table 7-2 as necessary.	**The upgrades to the pipe are dictated by the model provided by the City of East Palo Alto. The model shows the line as active.**
76	City of East Palo Alto, Engineering	Report calls for 780 ft of existing 8" on Bell St from Euclid to Cooley to be upsized to 12". This stretch measures roughly 1200 ft instead! Why the difference of 420 ft? Also, Table 7-2 does not provide any cost figures for the upgrading of existing 8" mains to new 12" mains. How will the City know the cost involved?	**Footages have been updated at the request of City of East Palo Alto, Engineering. Table has been updated to show the cost for 8" to 12".**

#	Organization	Comment	Response
77	City of East Palo Alto, Engineering	Report calls for 1,210 ft of existing 6" on Demeter St from Bay to Purdue to be upsized to 12". This stretch measures roughly 1,550 ft instead! Why the difference of 340 ft (or $45,560 in price as indicated on Table 7-2)? Need further investigation. Report goes on to call for the upsizing of 990 ft of existing 10" on Demeter St (Bay to Purdue) to 12". This stretch of the 10" measures only roughly 730 ft! Why the difference of 260 ft (or $34,840). Need further investigation. Revise Table 7-2 as necessary.	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
78	City of East Palo Alto, Engineering	Recommend upgrading approximately 450 ft of existing 6" cast-iron main on W. Bayshore between Donohoe and Euclid to 8" to complete the loop. Seems odd to leave this stretch at 6" while everything else connecting to it is either 8" or 12". Update Table 7-2 as necessary.	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
79	City of East Palo Alto, Engineering	930 ft of existing 10" on Clarke from Woodland to W. Bayshore is recommended for upsizing to 12". This stretch measures only roughly 730 ft! Why the difference of 200 ft (or $26,800 in price)? Need further investigation.	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
80	City of East Palo Alto, Engineering	Report calls for the upsizing of 1,890 ft of existing 10" to 12" on O'Connor from O'Connor to Euclid. This stretch appear to fall within the City of Menlo Park boundary! Shouldn't it be Menlo Park's responsibility to upgrade if they choose to? Please clarify. Does Table 7-2 need to be revised?	**Some pipes do run outside the city boundary. These pipes serve the City of East Palo Alto and are maintained by the City.**
81	City of East Palo Alto, Engineering	Report calls for the upsizing of 770 ft of existing 8" to 12" on O'Connor from Euclid to University. The latest Water Atlas Map shows a live 8" only from Euclid to Manhattan. The remaining stretch from Manhattan to University is currently shown as abandoned! Need further investigation.	**The upgrades to the pipe are dictated by the model provided by the City of East Palo Alto. The model shows the line as active.**
82	City of East Palo Alto, Engineering	8 ft of existing 8" on Green St from Cooley to Clarke is recommended for upsizing to 12". This is definitely an error! This stretch measures roughly 1,300 ft! Revise Table 7-2 as necessary.	**Updated Report to refelct 1,290 LF.**
83	City of East Palo Alto, Engineering	Report calls for 575 ft of existing 6" on Pulgas between W. Bayshore & E. Bayshore to be upsized to 12". The latest Water Atlas Map shows an existing 6" along this stretch that's roughly 250 in length instead! Why the difference of 325 ft? Need further investigation.	**Footages have been updated at the request of City of East Palo Alto, Engineering.**

#	Organization	Comment	Response
84	City of East Palo Alto, Engineering	Report calls for 8,019 ft of existing 8" on Pulgas between W. Bayshore to northern end of Pulgas to be upsized to 12". This should be revised to say 8,019 ft of 8" from E. Bayshore to northern end of street instead.	**Street description has been updated.**
85	City of East Palo Alto, Engineering	Report calls for the upsizing of 350 ft of existing 4" on Garden between Pulgas and Terra-Villa. What about the remaining stretch of 4" on Garden between Clarke and Terra-Villa? Would it not make sense to upgrade this stretch to 8" as well to complete the loop? Need further investigation.	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
86	City of East Palo Alto, Engineering	Report calls for 276 ft of existing 6" on Sage St from Pulgas to Larkspur to be upsized to 8". This stretch measures roughly 750 ft instead! Why the difference of 494 ft (or $49,400 price difference)? Need further investigation.	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
87	City of East Palo Alto, Engineering	If report already calls for 3,426 ft of existing 6" on Camellia from Pulgas to Larkspur to be upgraded to 8", why another 1,940 ft ($194,000 price difference) of upsizing existing 6" to 8" on Gardenia from Camellia to Larkspur? This stretch of Gardenia (from Camellia to Larkspur) is already accounted for in the 3,426 ft on Camellia from Pulgas to Larkspur. Need further investigation & clarification. Update Table 7-2 as necessary.	**A better description is as follows: The 1,940 ft is on Gardenia, starting at the intersection of Gardenia and Verbena heading east, then takes a left on Azalia and then a right to get back on Gardenia where it stops at Larkspur.**
88	City of East Palo Alto, Engineering	Recommend upsizing roughly 385 ft of existing 6" on Daphne from Wisteria to eastern end of street to complete the 8" loop on Daphne. It makes little sense to leave this stretch at 6"!	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
89	City of East Palo Alto, Engineering	Recommend upsizing approximately 250 ft of existing 6" connecting the Abelia main to the Daphne loop to 8". Seems odd not to!	**Footages have been updated at the request of City of East Palo Alto, Engineering.**

#	Organization	Comment	Response
90	City of East Palo Alto, Engineering	Report calls for the upsizing of 1,670 ft of existing 6" to 8" on E. Bayshore from Donohoe to Pulgas. This should say Cooley to Pulgas instead per the latest Water Atlas Map. Further, this stretch measures approximately 3,300 ft instead! Why the difference of 1,630 ft (or $163,000 price difference)? Report goes on to call for 2,487 ft of existing 12" to be upsized to 16" on the same stretch. The latest Water Atlas Map shows roughly 1,250 ft of 12" to be upgraded only! Why the discrepancy of 1,237 ft (or $223,897 price difference)? Need further investigation.	**In response to the first question, the model was previously set up by others as a skeleton of the system and not every line was included in the model. The section of 6" pipe being referenced in the CIP report is along East Bayshore from Clarke to Pulgas and is representative of the actual amount of line along this specified section. The 6" line west of Clarke was not part of the model that we received and utilized for this report and therefore, it is not included in the CIP recommendations. Heading west after Clarke, the 12" line is modeled which begins at Clarke and connects on Cooley. The length of the 12" line to be upgraded is accurate, but after reviewing the description it might be mis-leading, a better description would be along East Bayshore from Clarke to Cooley.**
91	City of East Palo Alto, Engineering	Report calls for 1,210 ft of existing 6" on Bay Rd from Westminster to Newbridge to be upsized to 8". Report goes on to call for an additional of 620 ft of 6" also on the same stretch to be upgraded to 8". Why the break-down if the entire main is 6"? Need explanation.	**The CIP projects are based on the model results. The model did not show that this pipe needed to be upgraded to meet minimum requirements.**
92	City of East Palo Alto, Engineering	Recommend upsizing roughly 700 ft of existing 8" on Bay between Newbridge and Dumbarton to 12" to complete Bay.	**Footages have been updated at the request of City of East Palo Alto, Engineering. Added to Bay (Dumbarton to End of Road)**
93	City of East Palo Alto, Engineering	Report calls for 1,035 ft of existing 6" on E. Bayshore from western end of line to Menalto to be upsized to 8". The latest Water Atlas Map shows roughly 700 ft only! Why the difference of 335 ft (or $33,500 price difference)?	**Footages have been updated at the request of City of East Palo Alto, Engineering.**
94	City of East Palo Alto, Engineering	Report calls for 1,500 ft of existing 8" on Gloria Wy between Bay and Kavanaugh to be upsized to 12". The latest Water Atlas Map shows only 250 ft of existing 8" on Gloria from Bay to Grace Ave. The remaining stretch is 10"! Will the existing 10" need to be upsized to 12" as well. Need further clarification.	**The upgrades to the pipe are dictated by the model provided by the City of east Palo Alto. The model indicates an 8" pipe. The entire line will be upgraded whether it is an 8" or 10". Actual footages will be confirmed during engineering.**
95	City of East Palo Alto, Engineering	Report calls for 620 ft of existing 10" east of Notre Dame from Demeter to Pulgas to be upgraded to 12". Notre Dame does not run between Demeter and Pulgas! Need further clarification.	**This line is located in the easement Demeter and Pulgas.**