



City of Tukwila



Comprehensive Water Plan



Project Number: 10-WT01


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JULY 2013

CITY OF TUKWILA COMPREHENSIVE WATER PLAN

2014

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City of Tukwila

COMPREHENSIVE WATER PLAN

FINAL

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CITY OF TUKWILA
COMPREHENSIVE WATER PLAN

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AACE	American Association of Cost Estimators
ADD	Average Day Demand
AFY	Acre-feet per Year
AL	Action Level
CCI	Construction Cost Index
CCR	Consumer Confidence Report
CFR	Code of Federal Regulations
CIP	Capital Improvements Plan
CPR	Conservation Planning Requirements
CRPL	Cedar River Pipeline
C-value	Roughness Coefficient Value
CWA	Cascade Water Alliance
DBPR	Disinfectants and Disinfection By-Products Rule
DNS	Determination of Non-significance
DOH	Washington State Department of Health
ENR	Engineering News Record
ERU	Equivalent Residential Unit
<i>E. coli</i>	<i>Escherichia coli</i>
ES	Equalizing Storage Component
FY	Fiscal Year
G	General Improvements
gpd	Gallons per Day
HAA	Haloacetic Acid

HGL	Hydraulic Grade Line
IDSE	Initial Distribution System Evaluation
KCWD	King County Water District
LCR	Lead and Copper Rule
LF	Linear Feet
LRAA	Locational Running Annual Average
MCL	Maximum Contamination Level
MDD	Maximum Day Demand
mgd	Million Gallons per Day
MG	Million Gallons
mg/L	Milligrams per Liter
$\mu\text{g/L}$	Micrograms per Liter
mL	Milliliter
MRDL	Maximum Residual Disinfectant Level
P	Piping
pH	A measure of the acidity or alkalinity of a solution
PHD	Peak Hour Demand
PRV	Pressure Reducing Valve
PS	Pump Station
PSE	Puget Sound Energy
psi	Pounds per Square Inch
Qs	Sum of All Source of Supply Capacities
RAA	Running Annual Average
RCW	Revised Code of Washington

ROE	Report of Examination
ROW	Right-of-way
RTU	Remote Telemetry Unit
RWSA	Retail Water Service Area
SCADA	Supervisory Control and Data Acquisition
SEPA	State Environmental Policy Act
SMP	Standard Monitoring Program
SPU	Seattle Public Utility
SS	Supply Station
SSS	System-Specific Study
ST	Storage
TCR	Total Coliform Rule
THM	Trihalomethane
TUC	Tukwila Urban Center
TVS	Tukwila Valley South
UV	Ultraviolet
VFD	Variable Frequency Drive
VPN	Virtual Private Network
WAC	Washing Administrative Code
WFI	Water Facility Inventory
WSPL	West Seattle Pipeline
WUE	Water use Efficiency

Comprehensive Water Plan
EXECUTIVE SUMMARY

This Comprehensive Water Plan (Plan) has been developed in accordance with Chapter 246-290 of the Washington Administrative Code (WAC), as presented in the Washington State Department of Health (DOH) regulations for Group A Public Water Systems. This plan is primarily an update to the City of Tukwila's (City's) 2005 Plan. The City of Tukwila water system identification number is 89500F.

The purpose of this Plan is to document changes to the City's water system, to identify required system modifications, and to outline capital improvement projects to resolve existing deficiencies and meet future water demands. Updated every six years, the Plan evaluates the existing system and its ability to meet the anticipated requirements for water source, quality, transmission, storage, and distribution over a twenty-year planning period. Water system improvement projects have been developed to meet the changing demands of regulatory impacts, population growth, and infrastructure repair and replacement. The Plan also identifies planning level costs of the improvement projects and provides a financial plan for funding the projects.

The data used for this Plan was current as of December 31, 2009 and the Plan was developed in 2010 through 2013. This Plan will be used as a guide in maintaining and improving the water system in the short-term over the next six years and also provide a planning framework over the long-term 20-year planning horizon.

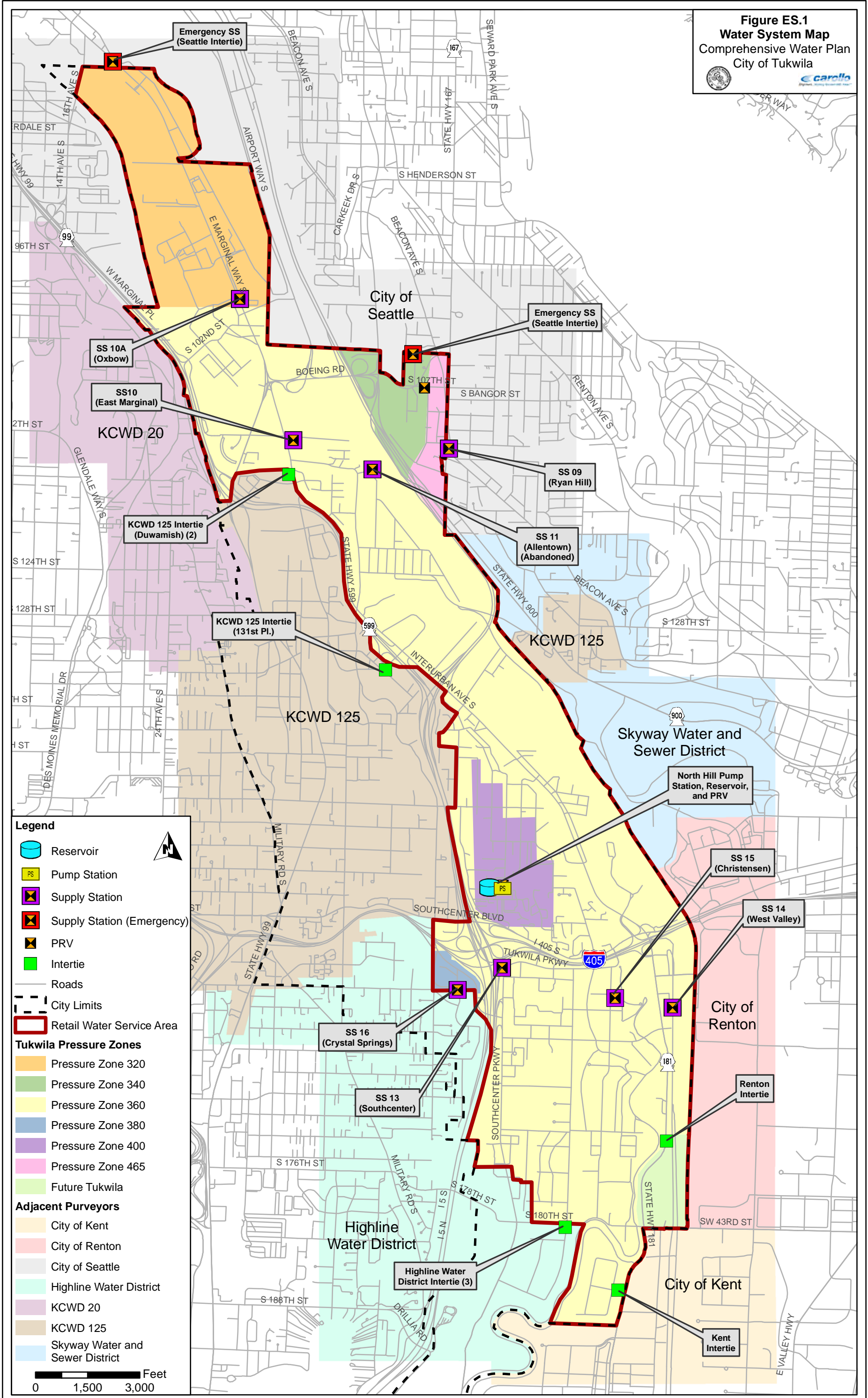
ES.1. INTRODUCTION

The City encompasses 8.6 square miles and is located in the central Puget Sound region, 12 miles south of the City of Seattle, 17 miles north of the City of Tacoma, and directly east of the Seattle-Tacoma International Airport. A map showing the City's water system facilities, Retail Water Service Area (RWSA), and pressure zones is presented in Figure ES.1. The City owns their water system and serves the majority of the City as delineated by the RWSA. The water system is operated and maintained by the Department of Public Works, which is managed by the Public Works Director.

The policies that govern the City's water system are based on City policies as defined in the City of Tukwila Comprehensive Plan (2008) and the City's water system design criteria. Chapter 1 presents the policies and criteria relevant to the City's water system, including the following categories:

- Service policies
- Source criteria
- Booster pump station criteria
- Distribution storage criteria
- Distribution system criteria
- Fireflow requirements
- Financial policies

Figure ES.1
Water System Map
Comprehensive Water Plan
City of Tukwila



Legend

- Reservoir
- Pump Station
- Supply Station
- Supply Station (Emergency)
- PRV
- Intertie
- Roads
- City Limits
- Retail Water Service Area

Tukwila Pressure Zones

- Pressure Zone 320
- Pressure Zone 340
- Pressure Zone 360
- Pressure Zone 380
- Pressure Zone 400
- Pressure Zone 465
- Future Tukwila

Adjacent Purveyors

- City of Kent
- City of Renton
- City of Seattle
- Highline Water District
- KCWD 20
- KCWD 125
- Skyway Water and Sewer District

0 1,500 3,000 Feet

ES.2. DEMOGRAPHIC ANALYSIS AND DEMAND PROJECTIONS

Chapter 2 presents an analysis of historical water use from 2005 to 2009, and provides projections for the planning period of 2010 to 2030. The City is served primarily by the Tukwila water system, and also by King County Water District (KCWD) 125, Highline Water District, and the City of Renton. The City purchases all of its water from Cascade Water Alliance through seven supply taps. The average annual purchase from 2005 to 2009 was 2.12 million gallons per day (mgd). The City provided water to 2,201 retail customers as of the end of 2009. From 2005 to 2009, the total number of connections decreased by 4.3 percent, while the total water consumed decreased by 3.6 percent.

Growth projections were prepared by the City Planning and Engineering staff. Most of the growth is planned for Tukwila South and the Urban Center. There will also be residential infill and fluctuation on Boeing employment. The growth projections were categorized by customer classification. The City is projecting near 9,000 new jobs that may come from both commercial customer classes; these are represented in the projected increase in commercial accounts.

Historical consumption and supply data were used to develop the value of an equivalent residential unit (ERU) equal to 160 gallons per day (gpd) and the maximum-day peaking factor equal to 1.70. This data was then used to convert the population projections into projected average and maximum day future demands for the planning period. Table ES.1 shows the existing and projected ERUs for the City over the planning period. A summary of projected average day demand (ADD) and maximum day demand (MDD) is provided in Table ES.2. These values include seven percent distribution leakage, based on the average distribution leakage from 2007 through 2009. These future water demands were used for the analysis of the water system and for development of the recommended capital improvement program (CIP).

Customer Class	2010	2016	2020	2030
Single-family	1,223	1,381	1,486	1,750
Multi-family	1,571	3,023	3,991	6,411
Commercial	7,544	9,437	10,700	13,855
Total	10,338	13,841	16,177	22,016

Demand	2010	2016	2020	2030
ADD ¹ , mgd	1.79	2.39	2.80	3.81
MDD, mgd	3.05	4.08	4.77	6.49
Notes:				
1. ADD includes 7% allowance for unaccounted-for water.				

ES.3. SUPPLY ANALYSIS

Chapter 3 reviews and evaluates existing supplies to meet future demands, reviews distribution system water quality, summarizes the City's current Water Use Efficiency (WUE) Program, and provides potential impacts of reclaimed water use on system water demands.

The City has an expanding water system. As the number of customers grows, the City is evaluating their current water supplies to meet projected increases in demand. The City currently receives its water from Cascade Water Alliance (Cascade), which receives most of its water from the City of Seattle. The City's arrangement for a full supply commitment from Cascade is adequate to meet the needs for the next 20 years.

The City also holds one water right of its own; a certificate for use of surface water from the Green River. The water right is for 104.0 maximum acre-feet per year (AFY).

Water System Reliability

The City's source reliability is tied to the City of Seattle, since Cascade's current primary source of water is its contract with Seattle. Seattle's system is flexible and redundant as it has the capability to draw from three separate sources. Furthermore, Seattle has a Water Shortage Contingency Plan, on which the City would rely in the case of a water shortage (Appendix H). In addition to Cascade/Seattle's redundant supplies, the emergency interties that the City maintains with KCWD 125, Highline Water District, City of Renton, and the City of Kent ensure that the City would still have access to water if a major catastrophe were to debilitate the Seattle system.

Distribution System Water Quality

While Cascade is responsible for source water quality at the point of delivery from Cascade to the City, the City is responsible for the quality within the distribution system. The City is in compliance with all current regulatory requirements, including monitoring and reporting requirements. The City is required to monitor for total coliforms, lead and copper, but is not required to monitor for asbestos. The City is in compliance with the Stage 2 Disinfection Byproducts Rule (DBPR). The recent promulgation of the Revised Total Coliform Rule (TCR), means the City needs to update its Coliform Monitoring Plan per the new rule to maintain future compliance once the rule becomes effective in 2016. Another future regulation that will affect the City includes revisions to the Lead and Copper Rule.

Water Use Efficiency

The City operates under Cascade's Water Conservation Program. In 2008, Cascade adopted a six-year conservation savings goal (2008-2013) of 1 mgd. The City accomplished 61 percent of this six-year goal as of December 2009. Currently, Cascade provides rebates to homeowners and businesses served by Cascade member agencies to encourage conservation. Chapter 3 summarizes the specific measures implemented by the Cascade and the City as well as additional measure to be included in the future. Based on the results

of the existing conservation program, the City predicts an ERU value of 133.4 gpd by year 2030.

Reclaimed Water Use

The City's reclaimed water evaluation is presented in Chapter 3. Class A reclaimed water from King County's Renton Treatment Plant has been used by the City since 1998. The reclaimed water is used primarily for irrigation of ball fields (Starfire Sports Complex), city street tree irrigation, and a city operated fill station for street sweeping. From 2005 to 2010, reclaimed water purchases from King County averaged 8,332 gpd. Tukwila is examining strategies to increase its use of reclaimed water. Two strong possibilities for reclaimed water for the City in the near term are the Seattle Rendering Plant and Foster Links Golf Course.

ES.4. EXISTING SYSTEM

Chapter 4 presents an overview of the City's existing water distribution facilities. The water system currently consists of six pressure zones, one reservoir, one pump station, nine pressure reducing valves (PRVs), thirteen check valves, and approximately 45 miles of transmission and distribution pipelines. The City maintains a total of nine interties with four adjacent water purveyors. The existing water system map showing the City's water system facilities, RWSA, and pressure zones is presented as Figure ES.1.

The source of the City's water supply is the Cedar River. Raw water is diverted from the Cedar River at Landsburg, where it is screened, chlorinated, and fluoridated before being sent to Lake Youngs. At the Lake Youngs regulating basin, water is disinfected via ozonation and ultra violet (UV), treated with lime to adjust pH levels for corrosion control, and chlorinated for further disinfection prior to customer delivery. The water is then transmitted to the Puget Sound area via four high-pressure transmission mains, known as the Cedar River Pipelines.

The City's interties with KCWD 125, Highline Water District, and the Cities of Renton, Seattle, and Kent provide a network of redundant supplies that give the City operational flexibility under emergency conditions.

The City water system currently operates 2 million gallons (MG) of storage at North Hill Reservoir, which is supplied primarily by Supply Station 13 (Cedar River Pipeline No. 4). The City's water system has a single booster pump station located at the North Hill reservoir. The station is configured with two sets of pumps designed to pump to two separate pressure zones, as well as a high-capacity fire flow pump. No emergency power is available at this location.

ES.5. HYDRAULIC MODEL UPDATE

The City's WaterCAD model was updated to reflect the 2013 current conditions of the water system. The model was then calibrated with six hydrant flow tests to identify any other necessary adjustments to improve the model's ability to accurately predict actual conditions of the City's distribution system. Based on the calibration results, small modifications to the model were made including adjusting the roughness coefficient of pipes and adjusting the performance of the High Pumps. The adjustments allow the model to match field conditions to within a standard criterion. Given the updates and calibration, the model is considered to be sufficient for representing the distribution system for the system analysis.

ES.6. DISTRIBUTION SYSTEM ANALYSIS

The City's water distribution system was evaluated for deficiencies in the storage facilities, pump stations, and pipelines against the selected criteria presented in Chapter 1. The evaluation focused on ensuring adequate capacity of the system is available for future water demands in the City. The hydraulic model was used to evaluate the 2016 and 2030 demand conditions.

The system analysis yielded a number of deficiencies in storage, pumping, and fire flow provision. The deficiencies are largely correlated to the City's need to provide fire flow suppression to large fires (up to 4,000 gpm) in its commercial areas. To address these deficiencies, several improvements were recommended, as explained in Chapter 6. Projects to address deficiencies found in the year 2016 are of higher priority than those to address deficiencies in the year 2030.

ES.7. OPERATIONS AND MAINTENANCE

A detailed review of the City's water system operation and maintenance was performed. Chapter 7 details the organizational structure of the City's Water Utility Department, training of staff, system operation and maintenance, water quality operations, the cross connection control program, emergency response operations, department coordination, records documentation, and future operation and maintenance needs.

A future improvement to the water system operation includes the installation of a fix-based auto-read meter system. The proposed auto read system would allow real time reading of meters so that bills for new accounts and account close-outs can be done at the counter, and meters can be turned on or off without staff traveling to the customer. The City is also considering developing a uni-directional flushing program designed to systematically flush the distribution system. Such a program would reduce flushing water demands, improve flushing efficiency, reduce water quality complaints resulting from flushing activity, and possibly improve water quality.

ES.8. CAPITAL IMPROVEMENTS PLAN

Chapter 8 presents a cohesive CIP for the City to continue consistent, efficient water supply to its retail water service area. Programs listed in this chapter consider storage and pumping requirements, improvements to the hydraulic system, and general recommendations. Table ES.3 summarizes the short- and long-term CIP elements starting in fiscal year (FY) 2013.

Planning-level cost estimates were developed for each of the recommended projects for budgeting purposes. Cost estimates are presented as total project costs in December 2011 dollars. The capital projects identified can be categorized into storage (ST), pump stations (PS), piping (P), and general improvements (G). The CIP projects have been assigned a project identification number (Project ID) and are shown on Figure ES.2.

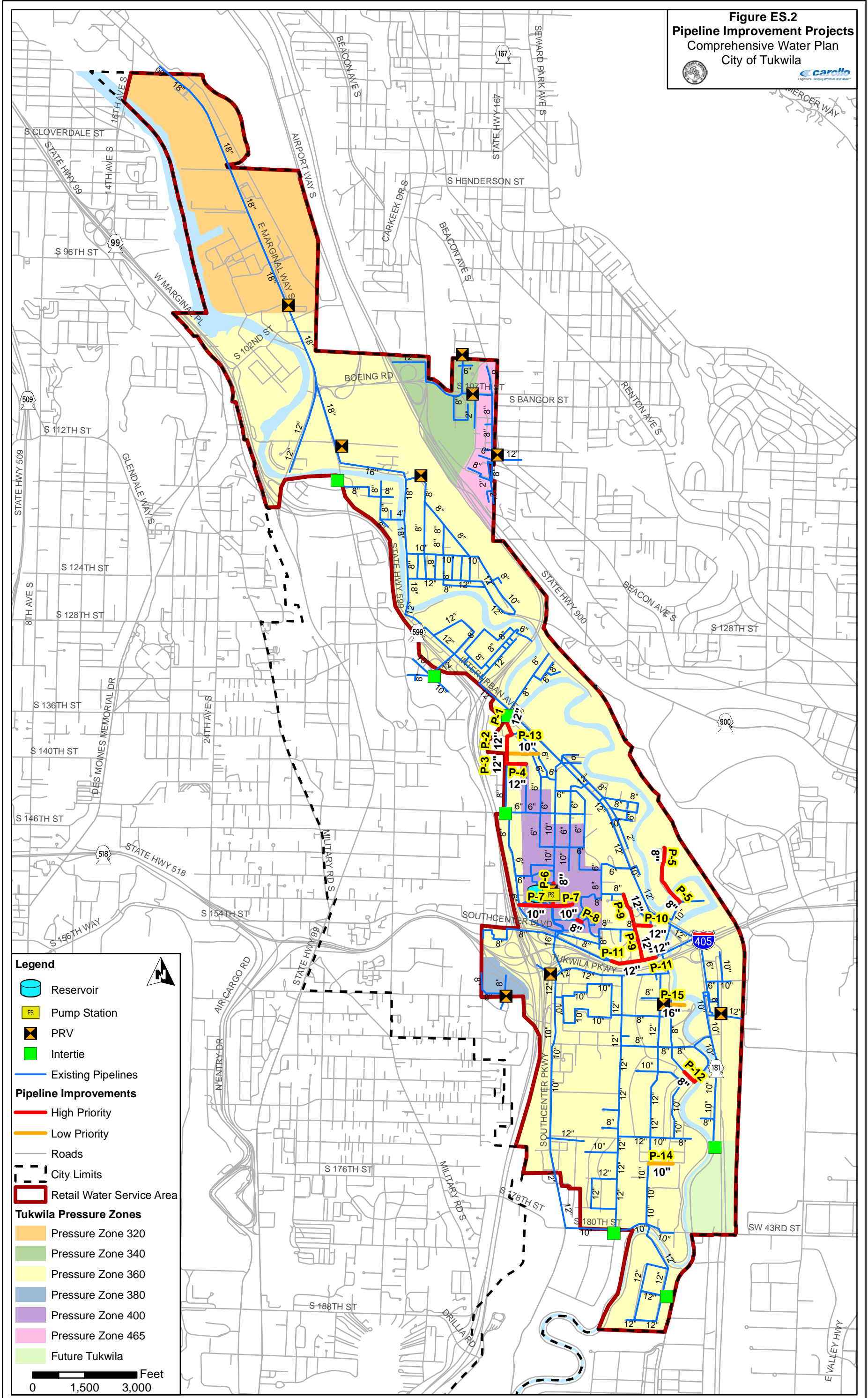
The Short- and Long-Term projects result in a CIP estimated cost of \$31,978,000. The total CIP is allocated to storage project costs of \$3,511,000, Pump Station project costs of \$2,942,000, pipeline project costs of \$4,000,000, and general water system project costs of \$21,525,000 (excluding annual pipeline replacement costs).

Table ES.3 Capital Improvements Plan												
	ID	NAME	COST	YEAR	SHORT-TERM							LONG-TERM
					FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2013 - 2018 Total	FY 2019 - 2032 Total
General												
	G-1	Pipeline Asset Management Study	\$ 15,000	2013	\$ 15,000							\$ 15,000
	G-2	Annual Pipeline Replacement Program	\$ 20,760,000	Annual	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 6,228,000
	G-3	Comprehensive Water Master Plan Updates	\$200,000 EACH	Every 5 Years							\$ 200,000	\$ 200,000
	G-4	Interurban Water Reuse	\$ 150,000		\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 150,000
		Subtotal	\$ 21,525,000		\$ 1,078,000	\$ 1,063,000	\$ 1,063,000	\$ 1,063,000	\$ 1,063,000	\$ 1,063,000	\$ 1,263,000	\$ 6,593,000
Storage												
	ST-1	1.3-MG Buried Reservoir	\$ 3,511,000	2013-2018	\$ 30,000				\$ 493,000	\$ 2,988,000	\$ 3,511,000	
		Subtotal	\$ 3,511,000		\$ 30,000	\$ -	\$ -	\$ -	\$ 493,000	\$ 2,988,000	\$ 3,511,000	
Pump Stations												
	PS-1	1,000-gpm Pump Station at New Reservoir	\$ 2,570,000	2017-2018					\$ 428,000	\$ 2,142,000	\$ 2,570,000	
	PS-2	Back-up Power at North Hill BPS	\$ 372,000	2013	\$ 372,000						\$ 372,000	
		Subtotal	\$ 2,942,000		\$ 372,000	\$ -	\$ -	\$ -	\$ 428,000	\$ 2,142,000	\$ 2,942,000	
Pipes		Street										
	P-1	52nd Ave S/53rd Ave S	\$ 233,000	2013	\$ 233,000						\$ 233,000	
	P-2	157th St/53rd Ave S	\$ 197,000	2013	\$ 197,000						\$ 197,000	
	P-3	53rd Ave	\$ 94,000	2013	\$ 94,000						\$ 94,000	
	P-4	140th St	\$ 173,000	2014		\$ 173,000					\$ 173,000	
	P-5	Starfire Sports Complex park access road	\$ 481,000	2014		\$ 481,000					\$ 481,000	
	P-6	57th Ave S	\$ 179,000	2015			\$ 179,000				\$ 179,000	
	P-7	S 152nd St	\$ 449,000	2015			\$ 449,000				\$ 449,000	
	P-8	S 152nd Pl	\$ 37,000	2016				\$ 37,000			\$ 37,000	
	P-9	65th Ave S	\$ 616,000	2016				\$ 616,000			\$ 616,000	
	P-10	S 153rd St	\$ 150,000	2017					\$ 150,000		\$ 150,000	
	P-11	Southcenter Blvd	\$ 406,000	2017					\$ 406,000		\$ 406,000	
	P-12	East of Andover Park E	\$ 157,000	2018						\$ 157,000	\$ 157,000	
	P-13	139th St	\$ 265,000	Long-Term							\$ -	\$ 265,000
	P-14	Costco Dr	\$ 300,000	Long-Term							\$ -	\$ 300,000
	P-15	SS 15	\$ 263,000	Long-Term							\$ -	\$ 263,000
		Subtotal	\$ 4,000,000		\$ 524,000	\$ 654,000	\$ 628,000	\$ 653,000	\$ 556,000	\$ 157,000	\$ 3,172,000	\$ 828,000
TOTAL			\$ 31,978,000		\$ 2,004,000	\$ 1,717,000	\$ 1,691,000	\$ 1,716,000	\$ 2,540,000	\$ 6,550,000	\$ 16,218,000	\$ 15,760,000

Figure ES.2
Pipeline Improvement Projects
Comprehensive Water Plan
City of Tukwila



carollo
Engineering, Planning, Architecture & Construction



ES.9. FINANCIAL ANALYSIS

The City water utility is accounted for separately from other City departments and is operated in a self-sufficient manner. The Public Works Department manages the system, the Finance Department manages the billing, collection and accounting services, and the two departments jointly prepare and monitor the annual budget. The water utility has been meeting the operating expenses and dept repayment in each year and has been maintaining a level of reserves for emergency and future replacement.

Chapter 9 present the financial program, including financial history, outstanding debt, fees and charges, and capital improvement funding. A six-year plan is presented to fund the CIP. The City's current financial plan anticipates rate increases of 10 percent in 2013 through 2018. The six-year water financial plan proposed in Chapter 9 includes an additional rate increase of 2.5 percent per year from 2014 through 2018 for capital improvement projects, positive cash flow and to rebuild the reserves.

**CHAPTER NO. 1
INTRODUCTION**

The City prepared this Plan to document the status and analyze the future needs of the water utility system. This plan is largely an updated version of the City's 2005 Plan. The purpose of this Plan is to document changes to the City's water system, to identify required system modifications, and to appropriately outline capital improvement projects to resolve existing deficiencies and concerns as well as meet future water demands. Maintaining a current Plan is required to meet the regulations of the DOH and the requirements of the Washington State Growth Management Act. This plan complies with the requirements of DOH as set forth in the WAC 246-290-100, Water System Plan.

The City decided to update the Comprehensive Water Plan at the same time as it updated the Sanitary Sewer Plan. A well-developed Plan will be a living document and tool that the City staff can use to anticipate the capacity, the timing, and the cost of improvements necessary to accommodate growth. An integrated plan will provide staff with the tools to quickly and knowledgeably answer questions from the City Council and the public about the costs of growth and how to pay for it.

The data used for this Plan was current as of December 31, 2009 and the Plan was developed in 2010 through 2013. This Plan will be used as a guide in maintaining and improving the water system in the short-term over the next six years and also provide a planning framework over the long-term 20-year planning horizon.

1.1 AUTHORIZATION

Recognizing the importance of planning, developing, and financing water system facilities to provide reliable service for the existing customers and to serve anticipated growth, the City initiated the preparation of this Plan. In 2010, the City selected Carollo Engineers to prepare the updated Plan in accordance with applicable rules and regulations governing planning for water utility systems.

1.2 OBJECTIVE

This Plan has been prepared to serve as a guide for planning and designing the future water system. Identified in this Plan are system improvements intended to meet the expanding and changing needs of the City. Specific objectives of this Plan are addressed by individual chapters presented herein and include the following:

- Develop a basis for planning for the overall system plan by establishing the service area goals and policies and by identifying the RWSA boundaries.
- Develop a demographic analysis summarizing the population, employment, and land use projections for the City.
- Develop accurate demand projections for the water system to forecast future expansion needs.
- Describe and inventory the City's water distribution system.

- Assess the existing system's ability to meet the needs of the existing and forecasted population in the City's water service area.
- Summarize the system improvements identified through the system analysis.
- Develop the recommended CIP for the City.
- Develop a funding strategy that will provide financial strength and viability of the City to implement the schedule of capital improvements.
- Support the City with the SEPA and agency approval process.

1.3 LOCATION

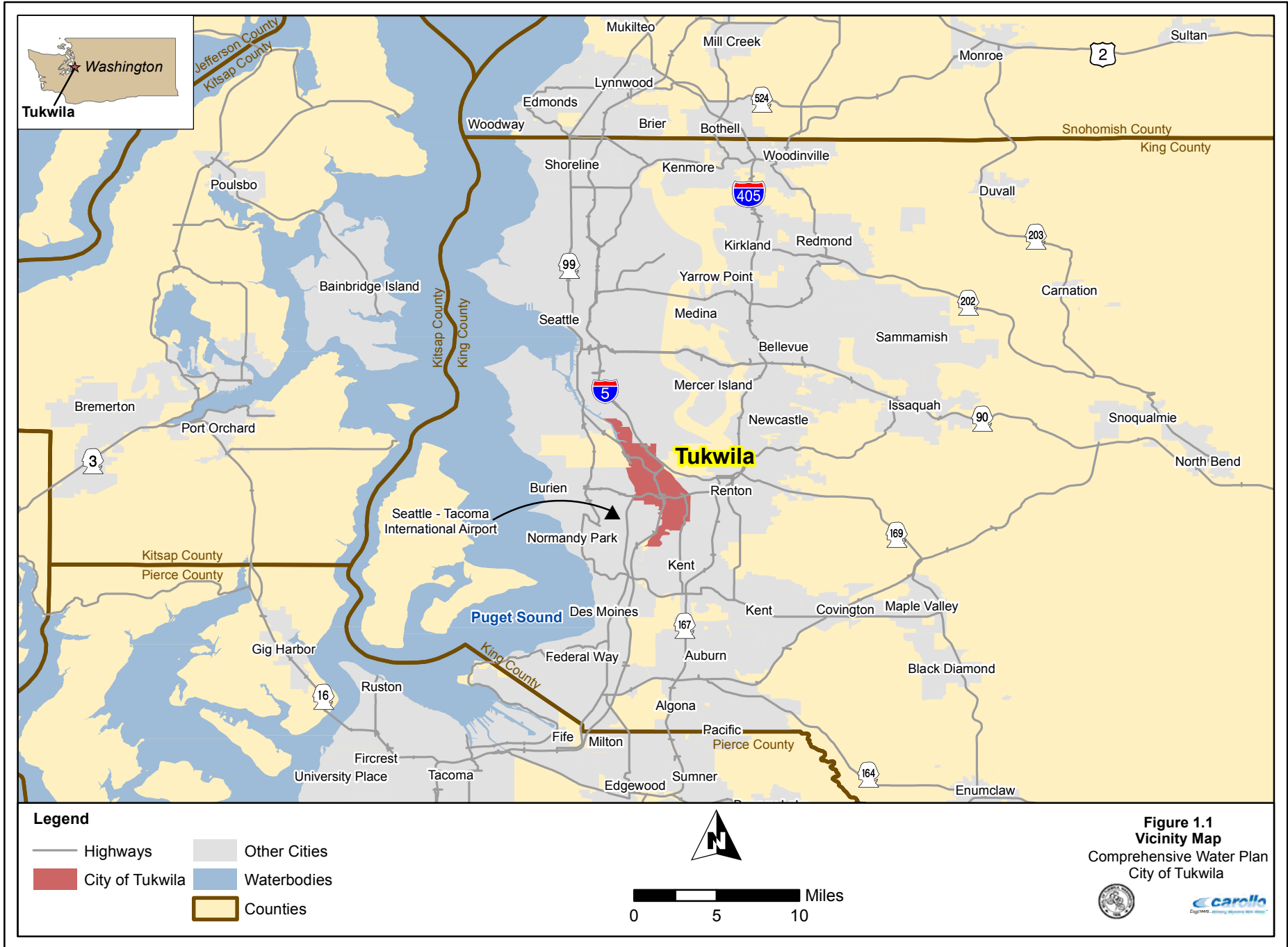
The City encompasses 8.6 square miles and is located in the central Puget Sound region, 12 miles south of the City of Seattle, 17 miles north of the City of Tacoma, and directly east of the Seattle-Tacoma International Airport. A vicinity map for the City is presented in Figure 1.1.

1.4 HISTORY OF THE CITY

The City of Tukwila was incorporated in 1908 and at that time had an area of 418 acres. By 1959, through a series of major annexations, the City's area had increased to 1,739 acres. By 1988 the area had grown to 2,880 acres, again through annexations.

In 1989, another wave of annexations increased the City's area to 5,176 acres. These annexations included the neighborhoods known as Riverton, Foster, Thorndyke, and Cascade View, as well as the area served by Fire District No. 1. The annexations brought with them significant population growth. From a population of 800 in 1950, the City grew to a population of 3,160 in 1978 and to 10,793 in 1989. By 1991, this figure had increased to 14,631. The population when the 1999 Addendum was prepared was approximately 15,000 and rose to 17,000 when the Plan was updated in 2005.

Except for increases due to the annexations, Tukwila's growth has closely paralleled that of the adjacent communities of Kent, Renton, and Auburn. The construction of Southcenter Shopping Center and several industrial parks has also affected population increases.



Legend

- Highways
- Other Cities
- City of Tukwila
- Waterbodies
- Counties

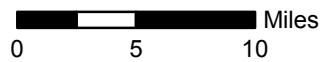


Figure 1.1
Vicinity Map
Comprehensive Water Plan
City of Tukwila



1.5 OWNERSHIP AND MANAGEMENT

The City owns their water system (DOH ID 89500F) and serves the majority of the City as delineated by the RWSA. The RWSA boundaries are further described in Chapter 2. The water system is operated and maintained by the Department of Public Works which is managed by the Public Works Director.

Contact information for the Public Works Director is presented below:

Public Works Director: Bob Giberson
Address: 6300 Southcenter Boulevard
Tukwila, WA 98188
Phone: (206) 443-0179

The emergency contact for the water system is: Pat Brodin and he can be reached at (206) 433-1861.

1.6 POLICIES AND CRITERIA

The policies that govern the City's water system are based on City policies as defined in the City of Tukwila Comprehensive Plan (2008) and the water system design criteria as defined by the City. The policies and criteria relevant to the City's water system are summarized below and are organized according to the following categories:

- Service policies
- Source criteria
- Booster pump station criteria
- Distribution storage criteria
- Distribution system criteria
- Fireflow requirements
- Financial policies

Table 1.1 Service Policies

	Subject	Policy	Source
1.1	Policies for City Managed Utilities -- Service Extension and Level of Service	<ul style="list-style-type: none"> • Use adopted level-of-service standards to meet public health and safety requirements, address deficiencies, and assure quality of service. • Ensure that the City utility functional plans and operations meet applicable federal, state, regional, and county requirements and regulations. • Require the use of Tukwila's adopted level-of-service standards in the design and construction of all utility service extensions. • Base the extension and sizing of utility system components on the Comprehensive Plan land use element for the area. 	Comprehensive Plan (2008), Policies 12.1.1 – 12.1.4
1.2	Policies for City Managed Utilities – Coordination of Service Providers	<ul style="list-style-type: none"> • Coordinate with other jurisdictions and agencies in planning and implementing utility operations, facility additions, and improvements located in or affecting multiple jurisdictions. • Participate in the regulation of all water, sewer, and surface water utility services within the City's eventual boundaries. • Consider annexing water and sewer providers when requests of or within the Districts occur, or to achieve efficiencies and minimum levels of service for customers of the Districts. • Coordinate and allow utility service outside City limits only when the need is caused by adjustments of City limits or when temporary service is necessary because of an emergency. • Establish and maintain franchises and working agreements with sewer and water utilities currently operating within the City limits to ensure that the level of service provided is consistent with the City's requirements and neighborhood revitalization plans. • Allow special-purpose sewer and water districts to continue to operate and serve Tukwila residents and businesses, when appropriate. 	Comprehensive Plan (2008), Policies 12.1.8– 12.1.13
1.3	Policies for City Managed Utilities – Concurrency and Implications for Growth	<ul style="list-style-type: none"> • Schedule and phase utility extensions to occur concurrently with expected growth and development. • Approve development only if adequate utilities are available when a need is created for those facilities, or within a reasonable period as approved by the City. 	Comprehensive Plan (2008), Policies 12.1.14– 12.1.15
1.4	Policies for City Managed Utilities – Env Responsibility	<ul style="list-style-type: none"> • Balance environmentally sound operations with cost effective methods in water, sewer, and surface water management utilities operations. • Make conservation an integral part of the City's utility operations and management. 	Comprehensive Plan (2008), Policies 12.1.16– 12.1.18, 12.1.20

	Subject	Policy	Source
1.5	Policies for City Managed Utilities – Facility Impact	Design, construct, and maintain facilities so as to minimize their impact on adjacent neighborhoods and businesses.	Comprehensive Plan (2008), Policy 12.1.21
1.6	Policies for City Managed Utilities – Sewer Utility	Serve all existing and potential residences and businesses with a sewer utility.	Comprehensive Plan (2008), Policy 12.1.24
1.7	Policies for Non-City Owned Utilities	<ul style="list-style-type: none"> Actively coordinate project implementation with individual utilities based upon the City's Comprehensive Plan and development regulations. Require utilities operating in the right-of-way to obtain a franchise that includes service levels and requirements meeting Comprehensive Plan forecasts and other applicable City regulations. Encourage utilities to consolidate facilities and minimize visual impacts of facilities where technically feasible. Encourage communication among the City, the Washington Utilities and Transportation Commission, and the utilities regarding cost distribution and rate-setting for existing and proposed facilities and services. 	Comprehensive Plan (2008), Policy 12.1.33 – 12.1.36
1.8	Annexation – Annexation Area Policies	<ul style="list-style-type: none"> Work with King County and other local jurisdictions to coordinate services and service extension to identified areas. Consider the annexation boundary as the extent of the City's annexation area. 	Comprehensive Plan (2008), Policy 6.1.2 – 6.1.3
1.9	Annexation – Public Services Policy	Ensure annexations do not detract from adopted level of service standards.	Comprehensive Plan (2008), Policy 6.1.5
1.10	Annexation – Planning and Zoning Policy	Ensure that zoning proposed for an annexation area is consistent with Tukwila's adopted Comprehensive Plan and other land use requirements.	Comprehensive Plan (2008), Policy 6.1.6
1.11	Annexation – Interjurisdictional Policies	<ul style="list-style-type: none"> Establish appropriate interlocal agreements that provide solutions to regional concerns, including but not limited to water, wastewater, storm and surface water drainage, transportation, parks and open space, development review, and public safety. Allow existing public services for utilities outside City limits when there is a need created by boundary adjustments between the City and adjacent jurisdictions or when such temporary service is necessary because of an emergency. 	Comprehensive Plan (2008), Policy 6.1.7 – 6.1.8

	Subject	Policy	Source
1.12	Policies for City Managed Utilities – Timely and Reasonable Service	<p>The City of Tukwila is committed to providing retail water service to all property within its defined Retail Water Service Area in a timely and reasonable manner, consistent with applicable City resolutions and policies, the Municipal Water Law, Washington State Department of Health rules and regulations and other applicable federal, state and local laws. Pursuant to RCW 43.20.260, as a municipal water supplier as defined in RCW 90.03.015, the City has a duty to provide retail water service within its service area if:</p> <ul style="list-style-type: none"> • City water service can be available in a timely and reasonable manner; • The City has sufficient water sources of supply to provide the service; • The City has sufficient capacity to serve the water in a safe and reliable manner as determined by DOH; and • It is consistent with the requirements of applicable comprehensive plans or development regulations adopted under chapter 36.70A RCW (GMA) or any other applicable comprehensive plan, land use plan, or development regulation adopted by a city, town, or county for the service area. 	City

	Subject	Policy	Source
2.1	Source Criteria	The system should be designed such that the source(s) alone can meet the MDD.	DOH Water System Design Manual 5.2.1.2

	Subject	Policy	Source
3.1		Pump stations will have power connections to two independent primary public power sources, or either portable or in-place auxiliary power or pigging available, if the pumps provide fireflow or are pumping from ground-level storage.	DOH Water System Design Manual 5.7.1

	Subject	Policy	Source
3.2		System should provide a minimum of 20 psi at the intake of the pumps under peak hour demand (PHD) or fireflow-plus-MDD-rate conditions.	DOH Water System Design Manual 5.7.1
3.3		An automatic shut-off in place for when the intake pressure drops below 10 psi.	DOH Water System Design Manual 5.7.1

	Subject	Policy	Source
4.1		Storage facilities will include an alarm system that notifies the operator(s) of overflows, or when the storage level drops below the point where the equalizing storage volume is depleted.	DOH Water System Design Manual 5.7.1
4.2		Storage is sufficient to ensure that fire suppression service will be available while not allowing pressure to drop below 20 psi at any service connection.	DOH Water System Design Manual 5.7.1
4.3		A minimum standby volume of 200 gallons per residential equivalent residential unit (ERU) and 100 gallons per commercial ERU is provided regardless of the capacity of the sources available.	DOH Water System Design Manual 5.7.1

	Subject	Policy	Source
5.1		Distribution mains should be looped whenever feasible.	DOH Water System Design Manual 5.7.1
5.2		Pipeline velocities will not be designed to exceed 8 feet per second (fps) under PHD conditions.	DOH Water System Design Manual 5.7.1
5.3		All pipelines should be capable of being flushed at a flow velocity of at least 2.5 fps.	DOH Water System Design Manual 5.7.1

	Subject	Policy	Source
5.4		All mains and distribution lines should be constructed with appropriate internal and external corrosion protection.	DOH Water System Design Manual 5.7.1
5.5		Any pipeline designed to provide fire flow must be at least six inches in diameter. In residential zones, water mains shall be 8-inches in diameter. In non-residential zones, water mains shall be at least 12-inches in diameter.	DOH Water System Design Manual 8.1.2; City of Tukwila Infrastructure Design and Construction Standards 7.2.1
5.6		Distribution pipelines must be able to sufficiently deliver water to meet PHD at 30 psi at every existing and proposed service connection.	DOH Water System Design Manual 8.1.3
5.7		Distribution system pressures would optimally be maintained between 40 psi and 120 psi during ADD	City

	Subject	Policy	Source
6.1		The City has established fire flow criteria of: <ul style="list-style-type: none"> • 1,000 gpm for all residential areas and • 1,500 gpm for all commercial areas. The fire flow criteria described above are a minimum requirement. Fire flows in excess of the above criteria may be required by the Fire Authority to provide fire protection for specific types of building construction and use.	Water System Plan Update, 2005
6.2		Fire flows are to be provided at MDD while maintaining a minimum system pressure of 20 psi.	Water System Plan Update, 2005, DOH System Design Manual 8.1.4

Table 1.6 Fireflow Requirements

	Subject	Policy	Source
6.3		<p>The time duration for which a fire flow is to be provided is based on the quantity of fire flow required as described below:</p> <ul style="list-style-type: none"> • Required fire flow = 2,000 gpm or less, assumed fire duration = 2 hours • Required fire flow = 2,001 to 3000 gpm, assumed fire duration = 3 hours • Required fire flow = 3,001 to 4000 gpm, assumed fire duration = 4 hours • Required fire flow = 4,001 to 5000 gpm, assumed fire duration = 5 hours • Required fire flow = 5,001 to 6000 gpm, assumed fire duration = 6 hours • Required fire flow = 6,001 to 7000 gpm, assumed fire duration = 7 hours • Required fire flow = 7,001 to 8000 gpm, assumed fire duration = 8 hours 	International Building Code

Table 1.7 Financial Policies			
7.1	Capital Facilities – General Government Policies	<ul style="list-style-type: none"> • Ensure that capital facilities are provided within six years of the occurrence of impacts that degrade standards. • Update the six-year financial planning model annually to review and reassess growth, revenue, and cost totals and forecasts. • Review capital facilities needs every three years. • Continue to target a minimum of 33 percent of General Fund proceeds to pay for capital projects. • Balance infrastructure investment between the residential and commercial sectors. • Support policies and practices that will maintain an A-1 bond rating or better for the City by sound governmental budgeting and accounting principals, revenue diversity, and promoting the economic well-being of the City. • Allow issuance of bonds for facilities if repayment can be made from revenue allocations. • Consider projects identified in the CIP for general operating revenues if substantial funding from grants, developers, other jurisdictions, or other funding sources becomes available. • Include a dedicated facility fund and allocation for future building needs in the financial planning model. • Consider City funding for preliminary engineering and design of commercial street projects if the City determines that the public’s health, safety, and welfare will be benefited. • Use a mitigation-based fee system for each affected City function as determined in the SEPA evaluation of individual development applications. • Continue to pay for and improve residential area local access streets and collector arterials in accordance with the prioritized list of residential street projects, and provide interfund loans or transfers for neighborhood water and sewer deficiencies. • To provide a more timely option for residential street improvements, property owners may form local improvement districts and the City may pay for the design, preliminary engineering, construction engineering, and local improvement district formation costs. Residents will pay the other costs such as, undergrounding utilities in the street and undergrounding from the street to their house, for the actual construction, and for any improvements on private property such as rockeries, paved driveways, or roadside plantings. 	Comprehensive Plan (2008), Policies 14.1.1 – 14.1.13

Table 1.7 Financial Policies

7.2	Capital Facilities – Enterprise Fund Policies	<ul style="list-style-type: none"> • Structure utility rates and charges for services to ensure adequate infrastructure development in addition to operation and maintenance requirements. • Maintain adequate reserved working capital balances for each enterprise fund’s annual expenditures. • Provide sewers to all residential and commercial areas in the City as a safety and health issue by using a combination of operating revenues, grants, loans, bonds, voluntary local improvement district formations, and interfund loans. • Use bonded indebtedness as a funding alternative when there is a general long-term benefit to the respective enterprise fund. • Continue to fund the correction of single-family residential neighborhood infrastructure deficiencies. 	Comprehensive Plan (2008), Policies 14.1.16 – 14.1.20
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1.7 INVENTORY OF RELATED STUDIES

In preparing this Plan, related studies were reviewed to ensure coordination between this Plan and previous studies. Related plans reviewed and a brief synopsis of each plan follows:

- **City of Tukwila 2005 Water System Plan Update:** The previous Water System Plan provided evaluation of needs and recommended improvements to the City's system for 2005 through 2010. The 2005 plan constitutes the basis for this Plan.
- **Comprehensive Plan, City of Tukwila Planning Department, 2008:** The Comprehensive Plan is a broad statement of community goals and policies that direct the orderly and coordinated physical development of a city into the future. It reflects current community goals and needs, anticipates change and provides specific guidance for future legislative and administrative actions. It reflects the results of citizen involvement, technical analysis, and the judgment of decision makers. The goals, policies, and maps of this Comprehensive Plan provide the basis for implementing regulations, programs, and services. The plan serves as a guideline for designating land uses and infrastructure development and for developing community services.

In addition to the studies listed above, the water system plans from the following neighboring water systems were considered during the preparation of this Plan.

- Highline Water District, 2008 Comprehensive Water System Plan (BHC Consultants).
- King County Water District No. 20, 2004 Comprehensive Water System Plan (CHS Engineers).
- King County Water District No. 125, Water System Plan 2006 (PACE Engineers, Inc.).
- Skyway Water and Sewer District, 2005 Comprehensive Plan (PACE Engineers, Inc.).
- City of Renton, Water System Plan 2005 (RW Beck Inc., City of Renton).
- City of Kent, 2008 Water System Plan (PACE Engineers).
- City of Seattle, 2007 Water System Plan (Brown and Caldwell).

1.8 APPROVAL PROCESS

This Plan is required to meet state, county, and local requirements. It complies with the requirements of Ecology, the DOH, and the RCW as shown in Table 1.7. The Plan has addressed all comments and is consistent with local government plans and regulations. The Local Consistency Statement is also included in Appendix B. Additionally, the Plan is in compliance with any adopted water quality management plan under the Federal water Pollution Control act as amended. A SEPA checklist and determination of non-significance (DNS) has been prepared for this Plan. The City anticipates this Plan does not have probable significant adverse impacts on the environment in accordance with the DNS. Many of the projects proposed within the Plan will require subsequent project specific environmental review and SEPA checklists as part of their preliminary and final design process. The SEPA checklist and DNS are included in Appendix A (to be inserted later).

The City will submit this plan to DOH, King County, adjacent utilities, and local governments for review. Comment letters will be attached in Appendix B (to be inserted later). The Adopting

Resolution will be included in Appendix C (to be inserted later), upon Plan approval by the City Council.

Table 1.8 WAC 246-290-100 Water Plan Requirements	
Requirement	Location
Description of the water system including <ul style="list-style-type: none"> • Ownership and management, including the current names, addresses, and telephone numbers of the owners, operators, and emergency contact person for the system • System history and background • Related plans, such as coordinated water system plans, abbreviated coordinated water system plans, local land use plans, ground water management plans, and basin plans • Service area maps, characteristics, agreements, and policies. Water systems must include their existing service area and future service area. Municipal water suppliers must define their retail water service area and meet the requirements under WAC 246-290-106. Municipal water suppliers must identify where their water rights place of use will be expanded to their service area if the requirements under WAC 246-290-107 have been met. • Satellite management, if applicable. 	Chapter 1 Chapter 1 Chapter 1 Chapter 2
Basic planning data including: <ul style="list-style-type: none"> • Current population, service connections, water use, and equivalent residential units. • Sufficient water production and consumption data to identify trends including the following elements: <ul style="list-style-type: none"> – Monthly and annual production totals for each source, including water purchased from another public water system. – Annual usage totals for each customer class as determined by the purveyor – Annual usage totals for water supplied to other public water systems – For systems serving one thousand or more total connections, a description of the seasonal variations in consumption patterns of each customer class defined by the purveyor. • Designated land use, zoning, future population, and water demands for a consecutive six-year and twenty-year planning period within the water system's service area. 	Chapter 2 Chapter 2 Chapter 2 Chapter 2 Chapter 2 Chapter 2
Demand forecasts, developed under WAC 246-290-221, for a consecutive six-year and twenty-year planning period. These shall show future use with and without savings expected from the system's water use efficiency program.	Chapter 2
For systems serving one thousand or more connections, a demand forecast projecting demand if the measures deemed cost-effective per WAC 246-290-810 were implemented	Chapter 3

Table 1.8 WAC 246-290-100 Water Plan Requirements	
System analysis including:	
• System design standards	Chapter 1
• Water quality analysis	Chapter 3
• System inventory description and analysis	Chapter 4
• Summary of system deficiencies	Chapter 6
Water resources analysis including:	
• A water use efficiency program. Municipal water suppliers must meet the requirements in WAC 246-290-810.	Chapter 3
• Supply analysis, which includes:	
– An evaluation of water supply alternatives if additional water rights will be pursued within twenty years.	Chapter 3
– A narrative description of the system's water supply characteristics and the foreseeable effect from current and future use on the water quantity and quality of any body of water from which its water is diverted or withdrawn based on existing data studies	Chapter 3
• A water shortage response plan as a component of the reliability and emergency response requirements under WAC 246-290-420	Appendix H
• Water rights self-assessment	N/A
• Water supply reliability analysis	Chapter 3
• Interties	Chapter 4
• For systems serving one thousand or more total connections, an evaluation of opportunities for the use of reclaimed water, where they exist, as defined in RCW 90.46.010(4).	Chapter 3
Source water protection under WAC 246-290-135	NA
Operation and maintenance program under WAC 246-290-415 and 246-290-654(5), as applicable	Chapter 7
Improvement program, including a six-year capital improvement schedule	Chapter 8
Financial program, including demonstration of financial viability by providing	
• A summary of past income and expense	Chapter 9
• A one-year balanced operational budget for systems serving one thousand or more connections or a six-year balanced operational budget for systems serving less than one thousand connections.	Chapter 9
• A plan for collecting the revenue necessary to maintain cash flow stability and to fund the capital improvement program and emergency improvements.	Chapter 9
• An evaluation that has considered:	
– The affordability of water rates	Chapter 9
– The feasibility of adopting and implementing a rate structure that encourages water demand efficiency	Chapter 9
Other documents such as:	
• Documentation of SEPA compliance	Appendix A
• Agency Comment Letters and Responses	Appendix B
• Adopting Resolution	Appendix C
• Intertie Agreements	Appendix D

1.9 ACKNOWLEDGEMENTS

The Carollo Engineers team wishes to acknowledge and thank the following individuals for their efforts and assistance in completing this Plan:

- Mike Cusick, PE, Utility Engineer.
- Katy Isaksen, Financial Consultant, Katy Isakson & Associates.
- Pat Brodin, PE, Operations Manager.
- Bryan Still, Superintendant (Water Department).

DEMOGRAPHIC ANALYSIS AND DEMAND PROJECTIONS

2.1 INTRODUCTION

The purpose of this chapter is to present an analysis of historical water use from 2005 to 2009, and provide projections for the planning period of 2010 to 2030. The planning data generated is used to estimate future water demand and supply needs for the City's water system. Historical consumption and supply data were used to develop the value of an ERU and the maximum-day peaking factor. This data was then used to convert the population projections into projected average and maximum day future demands for the planning period. The future water demands were used for the analysis of the water system and for development of the recommended CIP.

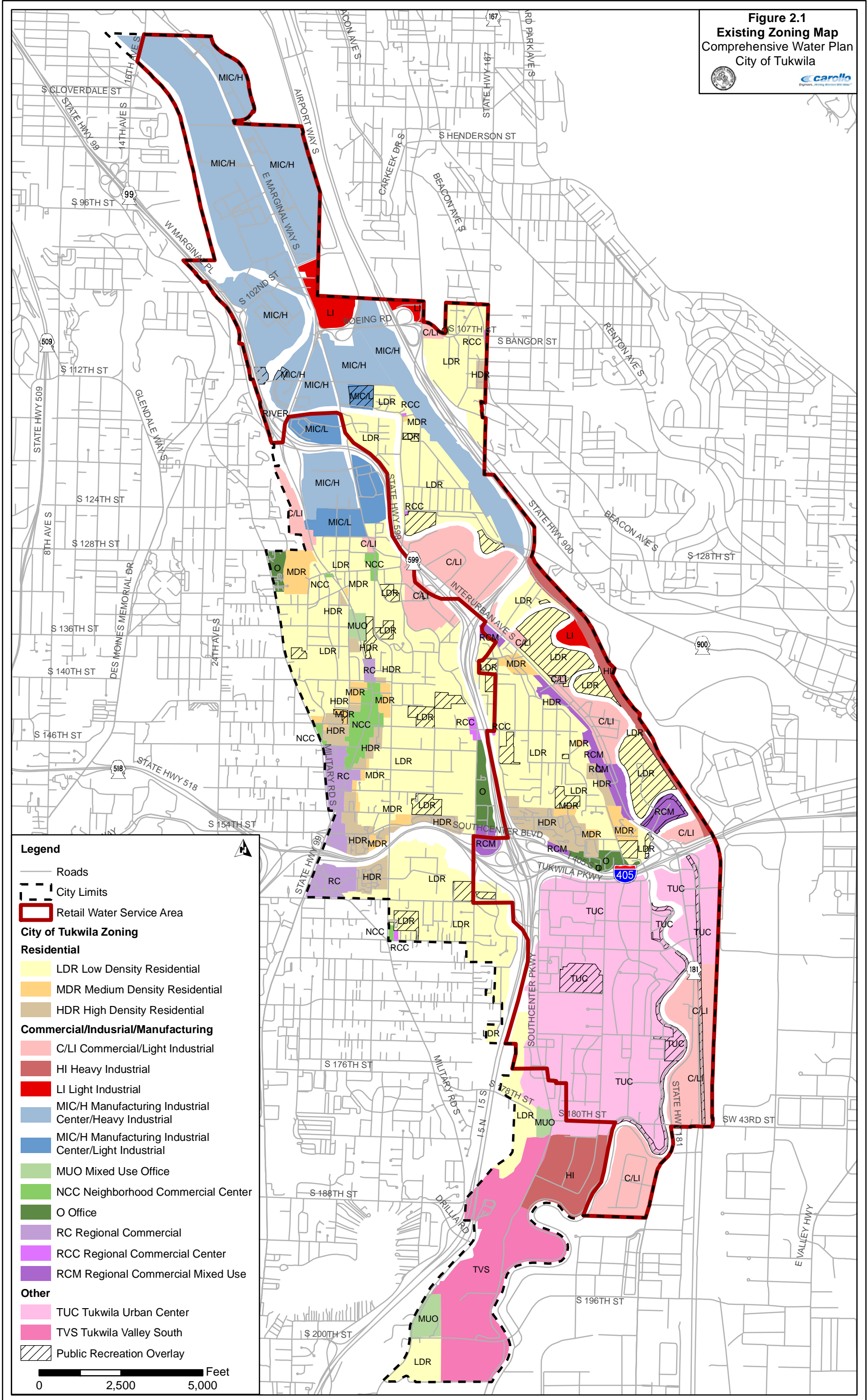
2.2 LAND USE

Land use designations and regulations provide important information in evaluating existing water distribution and determining future water requirements. Land use determines the area available for various types of development including both single-family and multi-family residential development, as well as commercial and other types of land use that provide the economic base necessary to support residential development.

The City's Comprehensive Land Use Plan (December 2008) provides a broad statement of community goals and policies that direct the orderly and coordinated physical developments of the city into the future. This Water System Plan is consistent with the policies in Tukwila's Comprehensive Plan. A map of existing zoning in the City for the RWSA is provided in Figure 2.4. Based on the discussions with City staff, Tukwila Urban Center (TUC) could change significantly with the Urban Center Plan. Uses in Tukwila South are expected to change dramatically in keeping with Tukwila Valley South (TVS) zoning.

The zoning for land within the City of Tukwila is defined in Title 18 Zoning of the Tukwila Municipal Code. Table 2.1 presents a description of the zoning designations. A portion of the future service area is located in unincorporated King County. Zoning information was for this area was based on the 2008 King County Comprehensive Plan with 2010 Update, as presented in Figure 2.1.

Figure 2.1
Existing Zoning Map
Comprehensive Water Plan
City of Tukwila



#	Code	Name	Description
1	C/LI	Commercial / Light Industrial	Areas characterized by a mix of commercial, office or light industrial uses.
2	HDR	High Density Residential	Areas characterized by multi-family buildings; 15-21.8 units per net acre, with senior citizen housing allowed up to 60 units per net acre.
3	HI	Heavy Industrial	Areas characterized by heavy or bulk manufacturing uses and distributive and light manufacturing uses, with supportive commercial and offices uses.
4	LDR	Low Density Residential	Areas characterized by detached single-family residential structures; 0 to 6.7 units per net acre.
5	LI	Light Industrial	Areas characterized by distributive and light manufacturing uses, with supportive commercial and office uses.
6	MDR	Medium Density Residential	Areas characterized by residential duplexes, triplexes, and four-plexes; 6.8 to 14.5 units per net acre.
7	MIC/H	Manufacturing Industrial Center / Heavy	A major employment area containing distributive, light manufacturing and heavy manufacturing uses, with supportive commercial and office uses.
8	MIC/L	Manufacturing Industrial Center / Light	A major employment area containing distributive, light manufacturing, and limited office uses, with supportive commercial and office uses.
9	MUO	Mixed Use Office	Areas characterized by professional and commercial office structures, mixed with certain complementary retail, and residential uses and senior citizen housing allowed up to 60 units per net acre.
10	NCC	Neighborhood Commercial Center	Pedestrian-friendly areas characterized and scaled to serve multiple residential areas with a diverse mix of uses. Uses include certain commercial uses mixed with residential at second story or above (senior citizen housing allowed up to 60 units per net acre); retail; service; office; and recreational and community facilities, generally along a transportation corridor.
11	O	Office	Areas characterized by professional and commercial office structures mixed with certain complementary retail.
12	RC	Regional Commercial	Areas characterized by commercial services, offices, lodging, entertainment, and retail activities with associated warehousing and accessory light industrial uses, along a transportation corridor and intended for high-intensity regional uses. Residential uses are also allowed in appropriate areas off of the principle arterial with a maximum density determined by code standards and design review criteria.

#	Code	Name	Description
13	RCC	Residential Commercial Center	Pedestrian-friendly areas characterized and scaled to serve a local neighborhood, with a diverse mix of uses. Uses include certain commercial uses mixed with residential at second story or above, with a maximum density of 14.5 units per acre; retail; service; office; and recreational and community facilities.
14	RCM	Regional Commercial Mixed Use	Areas characterized by commercial services, offices, lodging, entertainment, and retail activities with associated warehousing and accessory light industrial uses. Residential uses mixed with certain commercial uses are allowed, at the second story or above, subject to special design standards, and a maximum density of up to 14.5 units per acre (senior citizen housing allowed up to 60 units per net acre).
15	TUC	Tukwila Urban Center	A specific area characterized by high-intensity regional uses that include commercial services, offices, light industry, warehousing and retail uses, with a portion covered by the TUC Urban Center Mixed Use Residential Overlay.
16	TVS	Tukwila Valley South	A specific area characterized by distributive and light manufacturing uses, with supportive commercial and office uses.

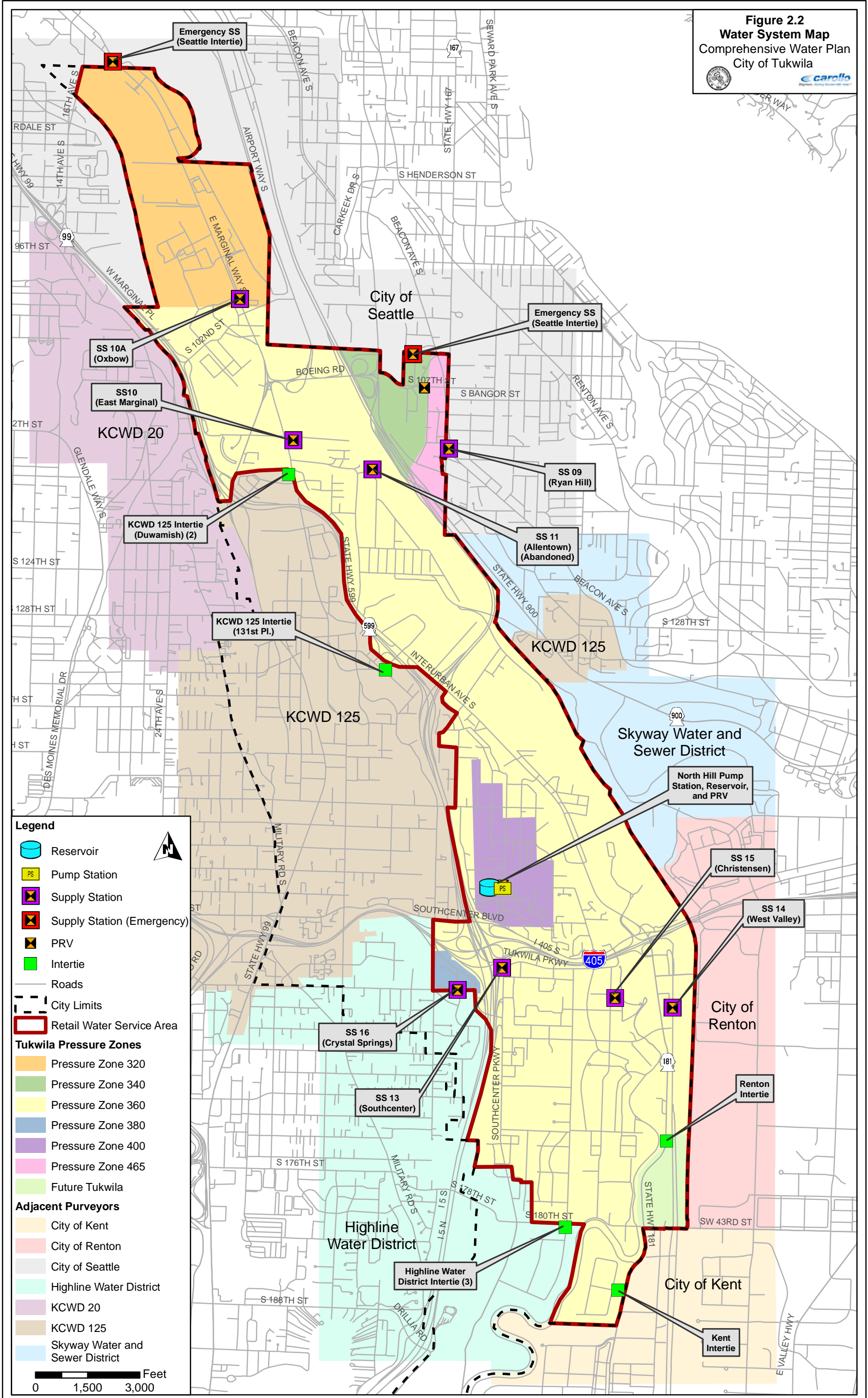
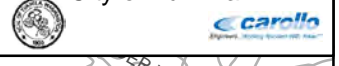
2.3 RETAIL WATER SERVICE AREA

The City water system was first established in 1929 when a six-inch diameter steel water line to connect Seattle's Beacon Hill to the City's North Hill area was constructed. Up to that time, drinking water was supplied by several groundwater wells and the Green River. As the City annexed land in the late 1950's and early 1960's, and later in the late 1980's, the City also began to take over some of the water services for areas within the City limits from other water districts and public utilities. Today, the City is served primarily by the Tukwila water system, and also by KCWD 125, Highline Water District and the City of Renton. A map showing the City's water system facilities, RWSA, and pressure zones is presented in Figure 2.2.

2.3.1 Potential Service Areas

Based on the discussions with the City staff, two areas were identified that will be served by the City in future, as shown in Figure 2.2. The area in the southeast corner of the RWSA is currently served by the City of Renton and is identified as a short-term annexation. The other area that will be served by the City in the future, which is east of the City limits and enclosed within the Skyway Water and Sewer District, is currently served by KCWD 125 and is planned for long-term annexation.

Figure 2.2
Water System Map
Comprehensive Water Plan
City of Tukwila



Legend

- Reservoir
 - Pump Station
 - Supply Station
 - Supply Station (Emergency)
 - PRV
 - Intertie
 - Roads
 - City Limits
 - Retail Water Service Area
 - Tukwila Pressure Zones**
 - Pressure Zone 320
 - Pressure Zone 340
 - Pressure Zone 360
 - Pressure Zone 380
 - Pressure Zone 400
 - Pressure Zone 465
 - Future Tukwila
 - Adjacent Purveyors**
 - City of Kent
 - City of Renton
 - City of Seattle
 - Highline Water District
 - KCWD 20
 - KCWD 125
 - Skyway Water and Sewer District
- 0 1,500 3,000 Feet

2.4 POTABLE WATER PURCHASES

The City purchases all of its water from Cascade Water Alliance through seven supply taps. The annual quantity of water purchased from 2005 through 2009 is summarized in Table 2.2. This data was provided by the City. The average annual purchase over the last five years has been 2.12 mgd.

Figure 2.3 compares the historical water purchase presented in Table 2.2 to the projections presented in the City's 2005 Water System Plan Update. Historical water purchases have been less than the 2005 Plan projections for a number of reasons including: relocation of businesses, and general trend in economic and population growth seen in the area.

2.5 HISTORICAL CONNECTIONS AND WATER USE

The City provided water to 2,201 retail customers as of the end of 2009. From 2005 to 2009, the total number of connections decreased by 4.3 percent, while the total water consumed decreased by 3.6 percent.

2.5.1 Retail Customer Classes

The City officially divides its water customers into four customer categories: Single-family, Multi-family, Commercial – Regular, and Commercial – High Demand. Table 2.3 presents the total number of connections by customer class from 2005 through 2009. Figure 2.4 presents graphical representation of the customer class distribution in 2009.

The Single-family category consists of a single dwelling unit or a duplex. These account for approximately 58 percent of the connections and 11 percent of water use. As illustrated in Table 2.2, there was a significant drop in Single-family connections from 2005 to 2006. However, the number of connections steadily increased between 2006 to 2009 with a net increase of 31 new single-family connections, or an increase of 2.4 percent since 2005.

The Multi-family category consists of connections serving more than one dwelling unit. In Tukwila these accounts total to approximately 8 percent of the connections and 12 percent of water use. Similar to Single-family connections, there was a decrease of 5 percent in the connections from 2005 to 2006. The number of accounts from 2006 to 2009 was stable at 173 connections.

The City tracks regular and high demand commercial customer classes. The Commercial-Regular category are connections serving non-residential facilities such as offices and businesses. These accounts comprise 34 percent of the connections and 55 percent of water use.

Table 2.2 Total Water Purchased 2005-2009 (gallons per year)

Year	Supply Taps							Total, gallons per year
	Oxbow PRV 08	Ryan Hill SS 169	East Marginal SS 10	Southcenter SS 13	W.Valley SS 14	Christensen SS 15	Crystal Springs SS 16	
2005	13,034,800	12,771,500	58,942,600	690,336,400	-	22,117,600	635,800	799,782,100
2006	11,653,900	12,776,700	57,842,200	716,032,000	-	700	715,100	799,473,200
2007	8,406,600	10,991,800	59,205,200	688,962,300	700	24,648,200	850,500	793,065,300
2008	10,089,700	11,375,600	42,981,500	537,545,000	700	140,658,800	724,100	743,375,400
2009	9,551,900	12,398,200	55,080,400	442,646,600	3,700	219,630,500	479,500	739,790,800
Average	10,547,380	12,062,760	54,810,380	615,104,460	1,020	81,411,160	681,000	775,097,360
Percentage (%)	1.40%	1.60%	7.10%	79.40%	0.00%	10.50%	0.10%	100.00%

Table 2.3 Historical Number of Connections by Customer Class

Customer Class	2005	2006	2007	2008	2009
Single-family/Duplex	1,236	1,159	1,181	1,265	1,267
Multi-family	182	172	173	173	173
Commercial - Regular	873	864	877	849	751
Commercial - High Demand	10	10	10	10	10
Total	2,301	2,205	2,241	2,297	2,201

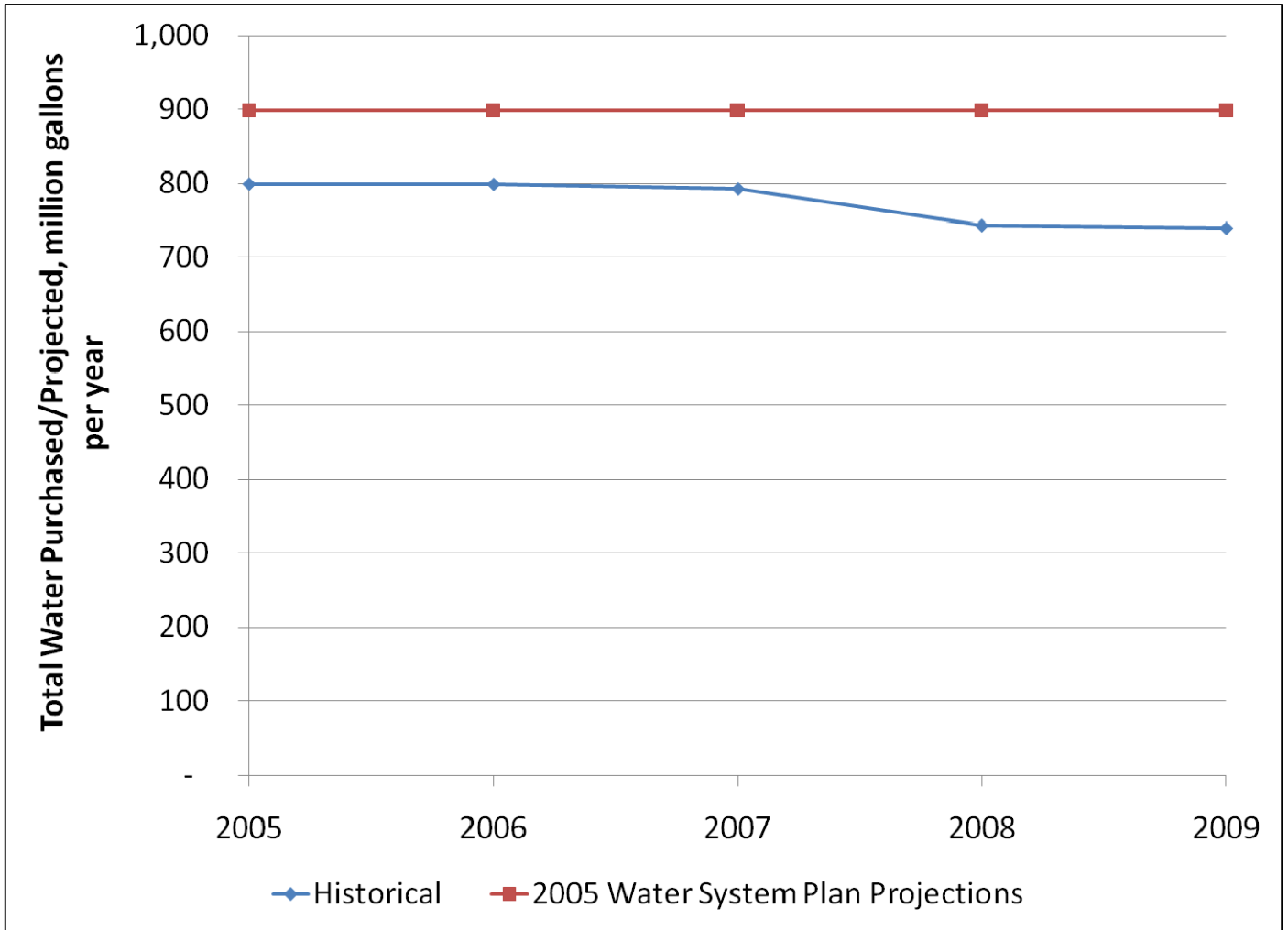


FIGURE 2.3
COMPARISON OF HISTORICAL PRODUCTION (2005-2009) TO
PROJECTIONS PER 2005 WATER SYSTEM PLAN UPDATE
Comprehensive Water Plan
City of Tukwila

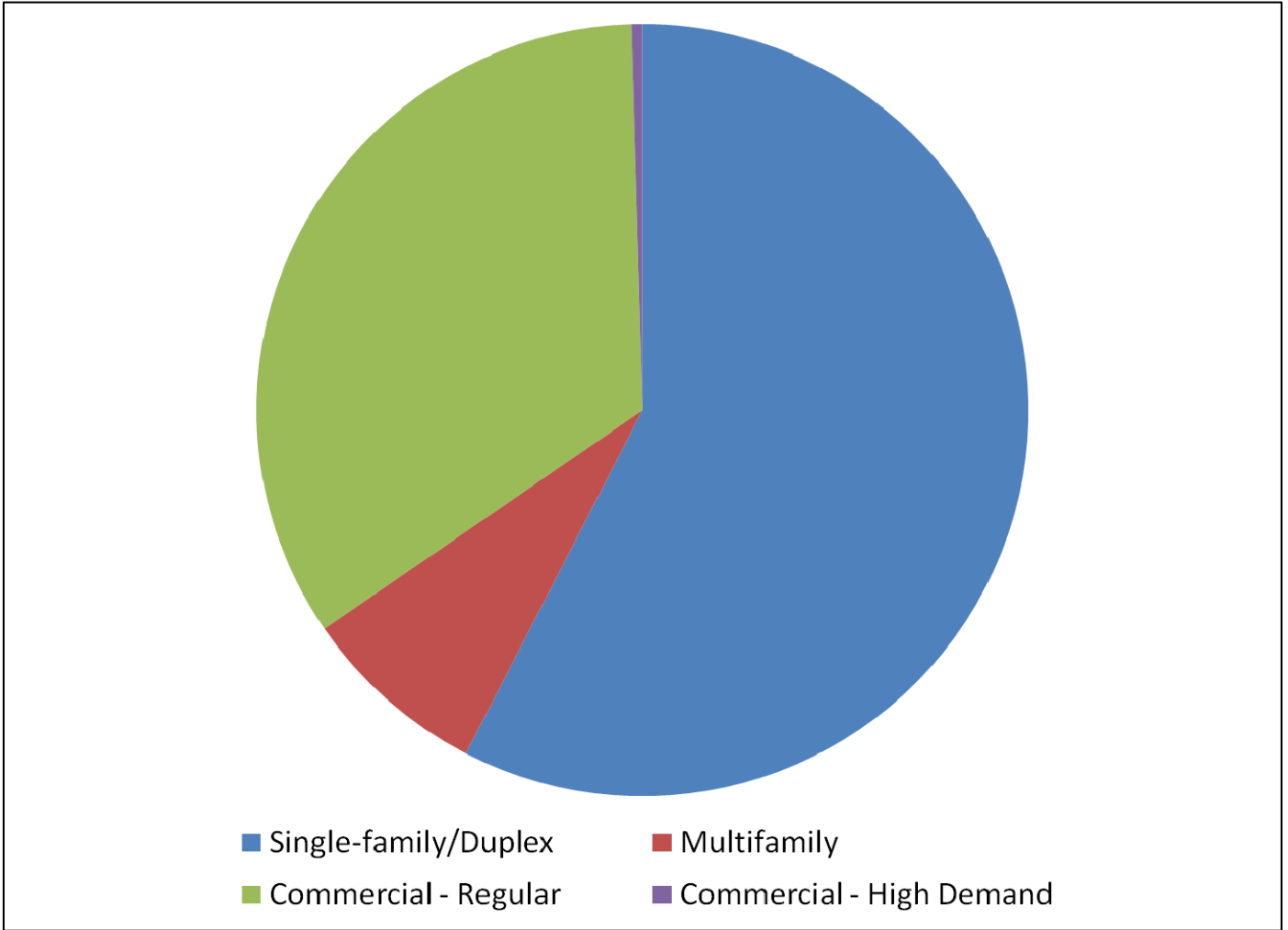


FIGURE 2.4
POTABLE WATER ACCOUNTS DISTRIBUTION
BY CUSTOMER CLASS (2009)
Comprehensive Water Plan
City of Tukwila

The Commercial – High Demand customers are those with high water demand. The Commercial – High Demand category consists of six customers: Shasta Beverage, Jorgensen Forge, Embassy Suites, Westfield (2 accounts), Boeing (4 accounts), and Legacy Associates. The Commercial - High Demand accounts total to 0.5 percent of the connections and 22 percent of water use.

Table 2.4 presents the total potable water sold to each customer category. Figure 2.5 shows the percent of water consumed by each class.

Table 2.4 Historical Annual Water Sold by Customer Category (gpd)						
Customer Class	2005	2006	2007	2008	2009	% Water Sold
Residential						
Single-family	196,973	187,369	184,498	188,164	202,767	11.1%
Multi-family	284,439	252,991	245,467	240,511	215,742	11.9%
Total Residential	481,412	440,360	429,965	428,676	418,508	23.0%
Commercial						
Commercial - Regular	1,017,862	1,012,458	1,015,184	976,886	1,001,475	55.0%
Commercial - High Demand	389,505	385,254	441,315	406,230	400,479	22.0%
Total Commercial	1,407,367	1,397,712	1,456,498	1,383,116	1,401,954	77.0%
Total Water Consumed	1,888,779	1,838,072	1,886,463	1,811,791	1,820,463	100.0%

2.6 EQUIVALENT RESIDENTIAL UNITS

The demand of each customer class can be expressed in terms of ERUs for forecasting and planning purposes. One ERU is defined as the average quantity of water beneficially used by one average, full-time, single-family residence per day. The quantity of water used by other customer classes, and by the whole system, can be expressed in terms of ERUs. The ERU calculation does not include non-revenue water or distribution leakage. Table 2.5 shows the historical annual average water consumption per connection used to determine the ERU planning value. Based on the data from 2005 through 2009, the average quantity of water used by one typical, full-time single-family residence ERU is equal to 157 gpd. Table 2.5 presents the commercial customer class as regular and high demand, however, a combined ERU value was used for future planning in Section 2.9 because future developments are anticipated to be a combination of regular and high demand customers.

Since water use varies yearly, an ERU planning value higher than the average is generally recommended for demand forecasting. The 75th percentile value over the five-year period was used to select the ERU value, which is 160 gpd. The value used in the 2005 Plan was similar at 155.8 gpd per single-family household. The other customer class planning values were also selected by determining the 75th percentile over the 5-year historical period.

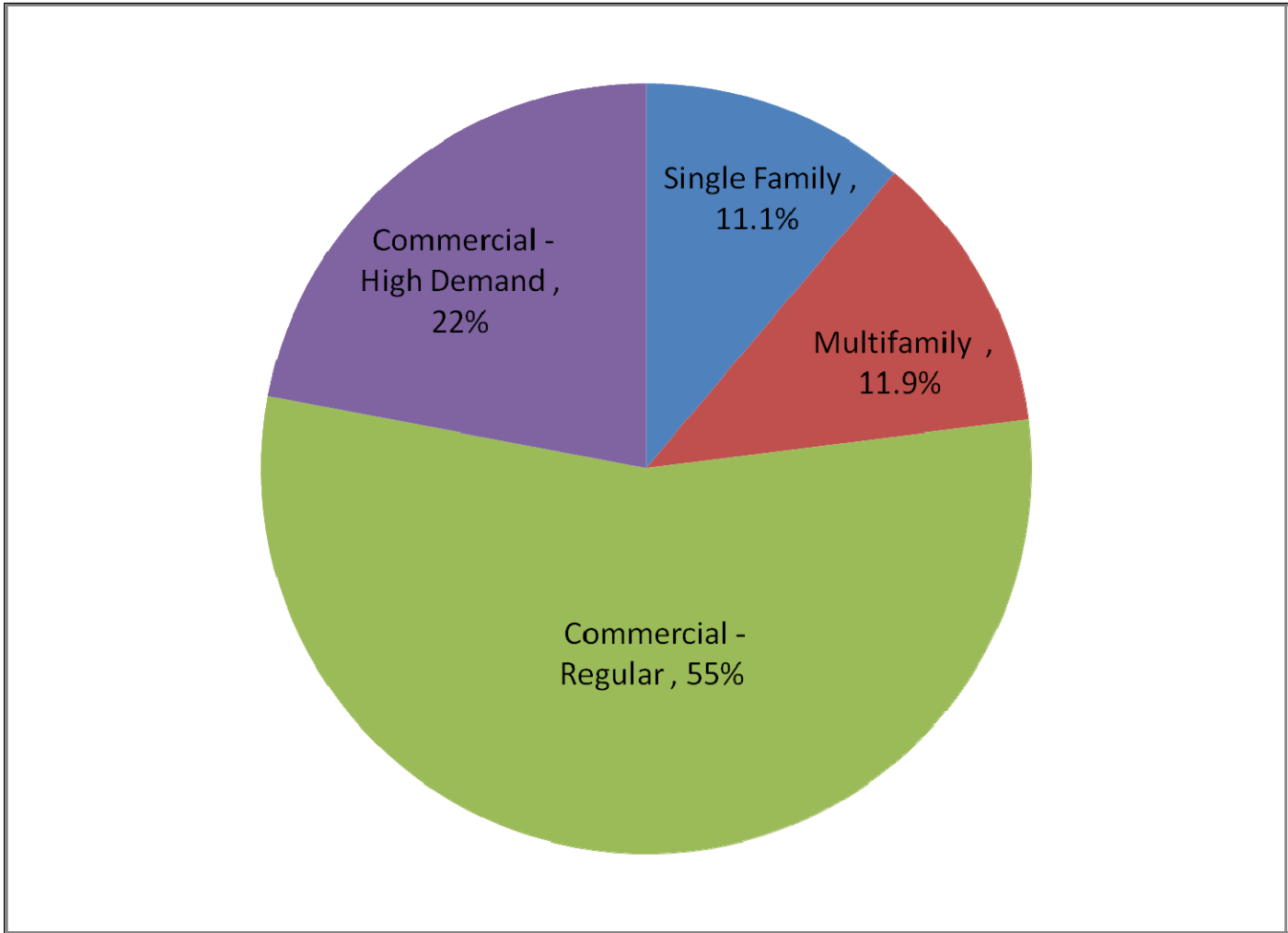


FIGURE 2.5
PERCENT POTABLE WATER CONSUMED
BY CUSTOMER CLASS (2009)
Comprehensive Water Plan
City of Tukwila

Table 2.5 Historical Annual Average Water Consumption Per Account by Customer Category (gpd/connection)

Customer Class	2005	2006	2007	2008	2009	Average	Planning Value	ERUs per Account
Single-family/Duplex	159	162	156	149	160	157	160	1.0
Multi-family	1,563	1,471	1,419	1,390	1,247	1,418	1,470	9.2
Commercial - Regular	1,166	1,172	1,158	1,151	1,334	1,196	1,170	7.3
Commercial - High Demand	38,950	38,525	44,131	40,623	40,048	40,456	40,620	253.9
Total	41,839	41,330	46,864	43,313	42,789	43,227		

2.7 HISTORICAL WATER DEMANDS

2.7.1 Average and Maximum Demands

The average and maximum water demands for the entire water system, including non-revenue water, are also fundamental values when performing system and supply analyses. Table 2.6 illustrates the historical ADD, MDD, and peaking factors from 2005 to 2009. From 2005 to 2009, the ADD decreased by 8 percent.

MDD is used for storage and fire flow analyses. Determination of MDD is critical because it is the benchmark for supply capability, pump station discharge rates, reservoir capacity, and pipe sizes. The MDD from 2005 to 2009 fluctuates from year to year between 3.4 mgd and 4.0 mgd.

The historical peaking factor, shown in Table 2.6, is the relative magnitude of MDD compared to ADD. Like the MDD, the peaking factor fluctuates ranging from 1.55 to 1.99. The average annual peaking factor of 1.70 was used for future demand projections.

2.7.2 Seasonal Demands

In order to better assess the City's water use and prepare for future growth, an analysis was also performed on seasonal water use. Table 2.7 presents the total water purchased by month and by location which is also shown graphically on Figure 2.6. Based on water use patterns shown in Figure 2.6, summer was defined to be May through October and winter to be November through April. The winter months show a relatively constant monthly usage, while summer months show an increase, peak, and decrease in water usage.

The summer ADD for 2005 to 2009 was 2.5 mgd and winter ADD for the same period was 1.7 mgd.

2.8 DISTRIBUTION LEAKAGE

Distribution leakage is calculated as the difference between the total amount of water purchased and the sum of water sold and authorized water usage. The Water Use Efficiency (WUE) Rule requires that the three-year average of distribution leakage be maintained at less than 10 percent of the supply. Distribution leakage does not include authorized water usage such as water used for fire protection, flushing, construction, and other maintenance and operations practices. However, to be credited, this must be accounted for by metering or by estimating using credible means. All water that is not accounted for is considered distribution leakage.

Water purchased, water sold, and total distribution leakage for the last three years (2007 through 2009) are shown in Table 2.8. The three-year average leakage is 7 percent of the supply. Given the WUE rule requires a 10 percent or less distribution leakage, the City has acceptable level of distribution system leakage.

Table 2.6 Historical Annual ADD, MDD, Maximum Day, and Peaking Factor

Parameter	2005	2006	2007	2008	2009
Average Day Demand (ADD), mgd	2.19	2.19	2.17	2.04	2.03
Maximum Day Demand (MDD), mgd and Maximum Day	3.39	3.66	3.58	3.38	4.03
Date	8/11/2005	8/22/2006	7/17/2007	7/22/2008	8/23/2009
Peaking Factor ⁽¹⁾	1.55	1.67	1.65	1.66	1.99

Notes:

1. Peaking factor is equal to the MDD divided by the ADD (MDD/ADD=peaking factor).

Table 2.7 Monthly Average Water Purchases for 2005-2009 (gpd)

Month	Oxbow	Ryan Hill	East Marginal	Southcenter	W.Valley	Christensen	Crystal Springs	Total
	#08	#09	#10	#13	#14	#15	#16	
January	20,526	29,994	97,961	1,372,952	-	176,631	1,057	1,701,932
February	21,886	32,604	101,094	1,312,630	-	329,634	1,026	1,798,900
March	20,125	28,025	89,061	1,196,706	-	315,117	893	1,665,565
April	18,282	28,785	87,033	1,401,816	-	238,558	1,262	1,784,526
May	17,664	27,480	88,458	1,612,772	-	5,980	1,366	1,759,221
June	24,122	33,019	163,085	2,232,770	10	5,745	2,294	2,464,361
July	38,295	35,906	292,671	2,493,091	24	-	3,113	2,864,271
August	52,851	34,859	348,355	2,676,610	-	17,326	3,407	3,134,940
September	51,581	48,194	225,781	2,006,794	-	519,466	3,915	2,855,843
October	41,070	29,550	98,675	1,340,853	-	477,545	1,486	1,989,181
November	21,215	41,562	111,923	1,409,999	-	282,828	1,376	1,868,916
December	18,455	27,186	92,724	1,139,579	-	322,998	1,158	1,602,234
Annual Average	28,839	33,097	149,735	1,683,048	3	224,319	1,863	2,124,157

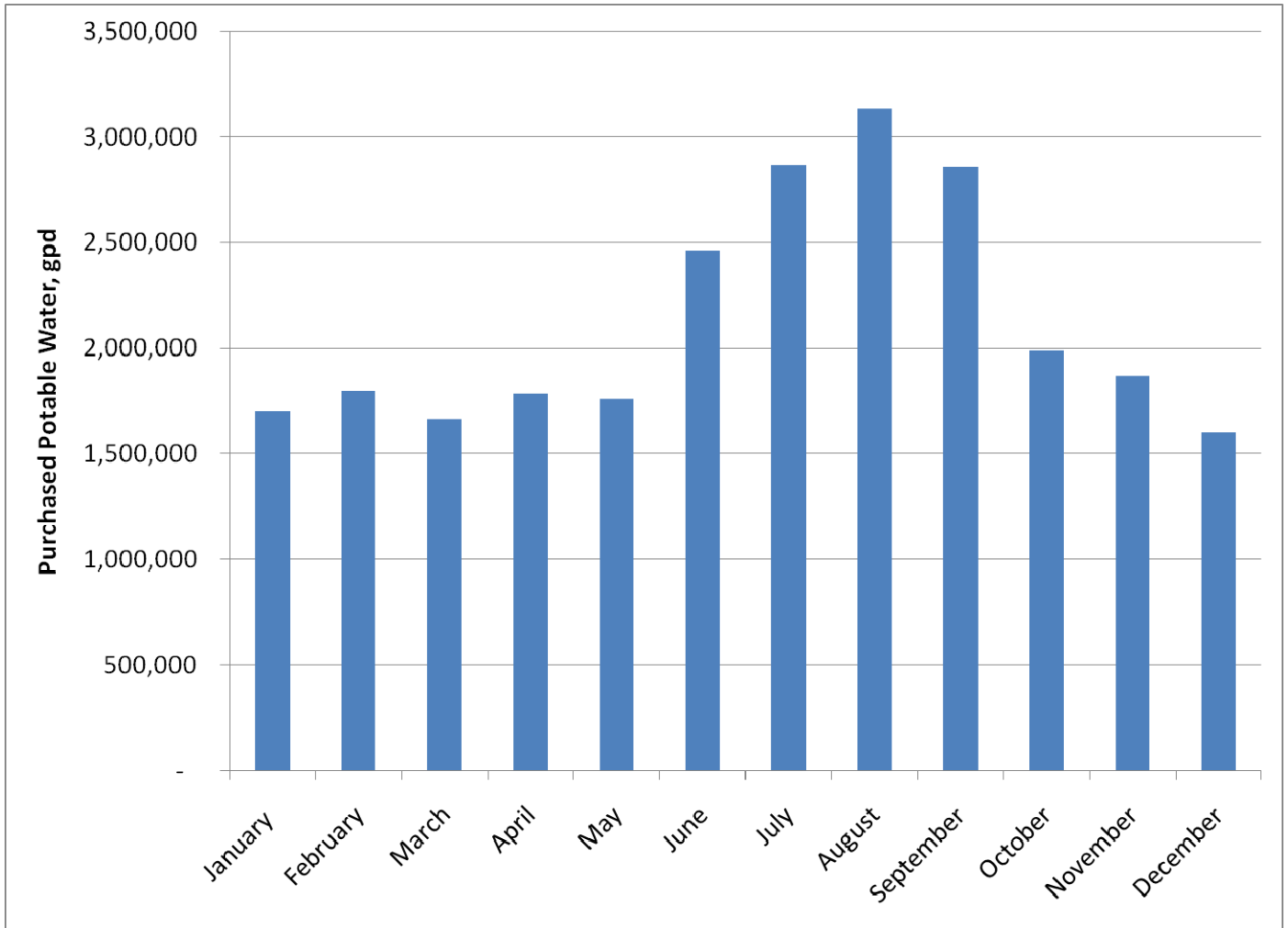


FIGURE 2.6
MONTHLY DISTRIBUTION OF PURCHASED
POTABLE WATER (2005-2009 AVERAGE)
Comprehensive Water Plan
City of Tukwila

The City's water loss in 2009 was dramatically lower than the previous two years due to the following:

- Completion of Westfield Mall construction and installation of two 10-inch meters with backflow preventers.
- Proactive reporting from the Fire Department in the event of emergency
- Repair of Burlington Northern leakage
- Installation of flush meters to account for non-revenue water and tracking water used within City's departments
- Proactive tracking of any breakage via telemetry. The City did not have any significant main breakages in 2009.

The City's distribution leakage is discussed more in detail in Chapter 6 – Distribution System Analysis.

Table 2.8 Three-Year Historical Distribution Leakage				
Description	2007	2008	2009	Average
Total Purchased (MG)	793	743	740	759
Total Sold (MG)	689	661	664	671
Accounted-for Non-revenue (MG)	9	8	72	30
Distribution Leakage (MG)	96	74	3	58
Distribution Leakage (% of Total)	12%	10%	0.4%	7%

2.9 PROJECTED GROWTH

Many factors influence growth. The state of the economy, interest rates, annexation of adjacent areas, and up-zoning all influence new development and population growth. Growth management policies, along with coordination between local governments, should make development more predictable and growth projections more accurate than they have been historically. However, significant changes to the regional economy will continue to affect growth timing and patterns. It is not uncommon for actual growth rates within the City to vary from those predicted. In addition, growth rates will vary between different parts of the City based on the availability of services and the costs to develop the land for the zoned use. Although these factors were considered in developing the information included within this Plan, it should be noted that the rates of future growth will likely vary from those included within the Plan due to the shifting of growth between areas within the City and between the City and adjoining jurisdictions.

Growth projections were prepared by the City Planning and Engineering staff. Most of the growth is planned for Tukwila South and the TUC. There will also be residential infill and fluctuation on Boeing employment. The growth projections were categorized by customer

classification, which included: Single-family, Multi-family, and Commercial (combined regular and high demand). The City is projecting nearly 9,000 new jobs during the 20-year planning period that may come from both commercial customer classes and are represented in the projected increase in commercial accounts. The projections for the planning period are shown in Table 2.9.

Customer Class	2010	2016	2020	2030
Single-family	1,223	1,381	1,486	1,750
Multi-family	171	329	434	698
Commercial	736	921	1,044	1,352
Total	2,130	2,631	2,965	3,799

2.10 POTABLE WATER PROJECTED DEMAND

Projecting future water demand is one of the key elements of the comprehensive water system planning process. Identification of system improvements such as supply, pumping, storage, and piping requirements are all related to demand projections.

Future water system demands are based on projected ERUs, which in turn are based on the projected water consumption by customer classification and the projected number of accounts discussed in Section 2.9. Table 2.10 shows the existing and projected ERUs for the City over the planning period. This table does not include distribution leakage.

Customer Class	2010	2016	2020	2030
Single-family	1,223	1,381	1,486	1,750
Multi-family	1,571	3,023	3,991	6,411
Commercial	7,544	9,437	10,700	13,855
Total	10,338	13,841	16,177	22,016

The ADD for each service area was based on multiplying the projected ERUs by the planning value of 160 gpd per ERU. The projected MDD is simply the projected ADD multiplied by the MDD/ADD factor of 1.7. A summary of projected ADD and MDD is provided in Table 2.11 and Figure 2.7. These values include 7 percent leakage, based on the average system leakage over the past three years. The ADD and MDD projections were utilized in the system and supply analysis. The deficiencies identified will serve as the basis for the Capital Improvements Plan. A projected demand with the City's conservation goals is included in the Supply Analysis, Chapter 3.

Demand	2010	2016	2020	2030
ADD ¹ , mgd	1.79	2.39	2.80	3.81
MDD, mgd	3.05	4.08	4.77	6.49
Notes:				
1. ADD includes 7% allowance for unaccounted-for water.				

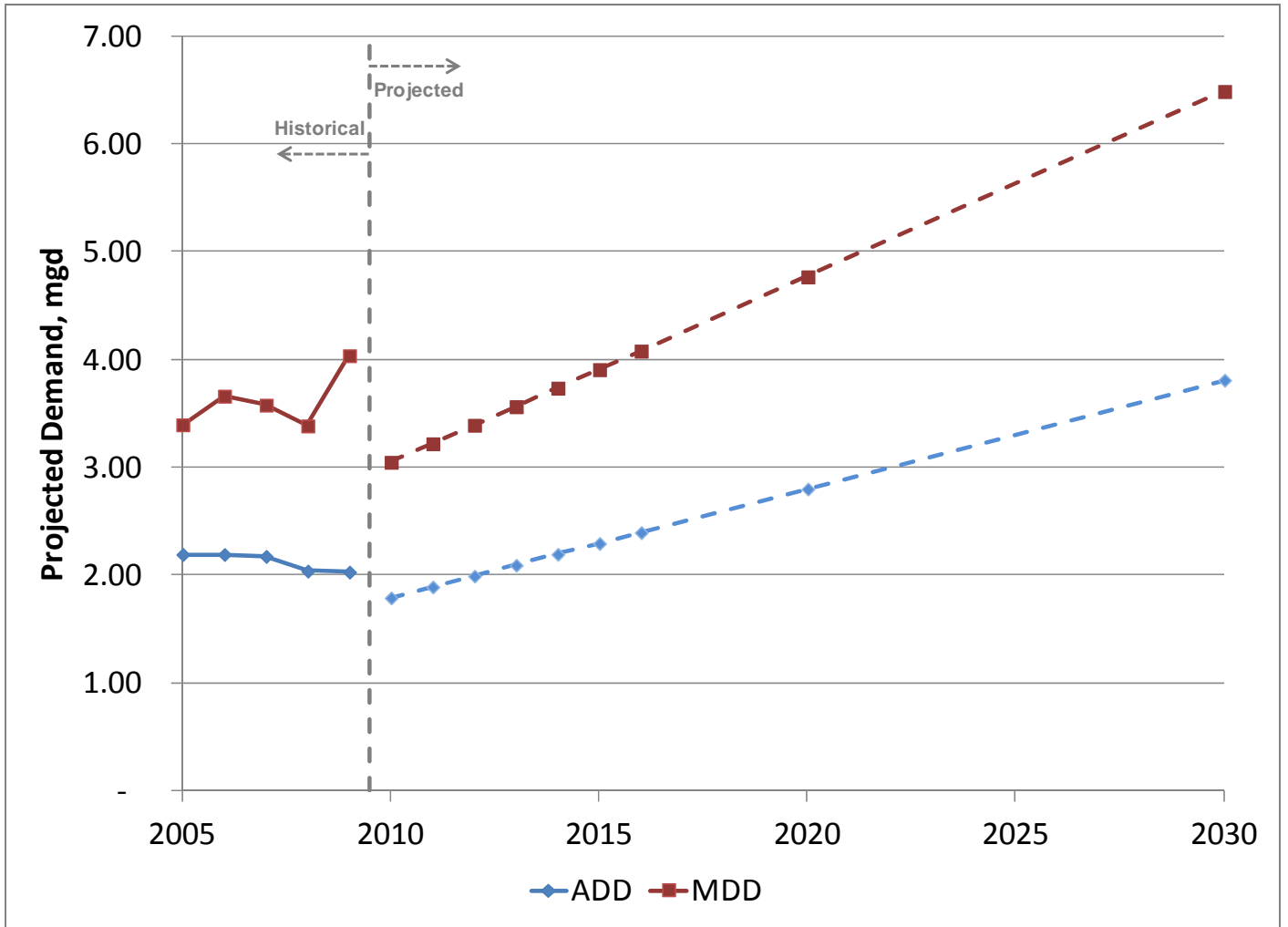


FIGURE 2.7
PROJECTED ADD AND MDD
FOR THE RWSA
Comprehensive Water Plan
City of Tukwila

SUPPLY ANALYSIS

3.1 INTRODUCTION

The City has an expanding water system. As the City's number of customers within the RWSA grows, the City is evaluating their current water supplies to meet projected increases in demand. The City currently receives its water from Cascade Water Alliance (Cascade). Cascade, formed in April 1999, is a group of eight municipal water utilities and districts formed to provide water supply for the current and future demands of its members. Cascade currently receives most of its water from the City of Seattle under a declining block contract (attached in Appendix E).

Cascade, in partnership with other members, has developed other supply options to augment water supply obtained from Seattle in the future. This includes purchasing water rights associated with Lake Tapps in Pierce County, a conservation program, and receiving water from the City of Tacoma.

The purpose of this chapter is to review and evaluate existing supplies to meet future demands, review distribution system water quality, summarize the City's current Water Use Efficiency Program, and provide potential impacts of reclaimed water use on system water demands.

3.2 SUPPLY SOURCES

Supply source analysis is required by the DOH for water systems that will be pursuing water rights within the next 20 years to meet their demand forecast. The City's arrangement for a full supply commitment from Cascade is adequate to meet the needs for the next 20 years. Therefore, a source of supply analysis is not technically needed for the City, however, the following information is provided relevant to the alternative sources of supply suggested by DOH.

3.2.1 Cascade Water Alliance Supply Purchase

In the past, Tukwila purchased water under contract from Seattle Public Utilities (SPU). This supply was supported by Seattle's water rights in the Cedar River Basin, South Fork Tolt River Basin, and Highline Wellfield. As of January 1, 2004, Tukwila receives this supply under contract with Cascade. Under the Interlocal Agreement among the eight Members of Cascade, Cascade is to provide a full supply commitment to Tukwila.

The members of Cascade act collectively to negotiate a contract with Seattle for delivery of water. This contract is structured as a declining block contract, with the first block of 30.3 mgd extending to December 31, 2023. Beginning January 1, 2024 through December 31, 2029 Cascade will receive 25.3 mgd.

In addition to these supplies, Cascade has acquired a new water right from Puget Sound Energy (PSE) for water from Lake Tapps, located in Pierce County, negotiated additional supply from Seattle, and is currently updating its Transmission and Supply Plan.

Cascade is also in the process of negotiating a water supply agreement with Tacoma Public Utilities for delivery of water from the Second Supply Project. Under the agreement, Tacoma will supply Cascade with 15 mgd average day demand (20 mgd maximum day demand). This arrangement will be supported by Tacoma's water rights in the Green River Basin.

3.2.2 Existing Water Rights

The City does hold one water right of its own. This is a certificate for use of surface water from the Green River. The city currently uses this water for irrigation of the Foster Links Golf Course. The water right is for 104.0 maximum AFY, which translates to 34 mg or 0.09 mgd on an average annual basis. The City has the capability to irrigate Foster Links Golf Course with reclaimed water purchased from King County if needed in the future to supplement or replace this supply.

3.2.3 Enhanced Conservation Measures

Cascade's mission is to provide water supply to its members to meet current and future needs in a cost-effective and environmentally responsible manner. Since its formation, Cascade's conservation program has achieved an annual savings equivalent to 0.5 percent to 1.0 percent of total member use, offsetting demand from growth and keeping total water usage flat.

Cascade is including conservation as a key factor in an update to its Transmission and Supply Plan. It plans to maintain current levels of conservation programs and services through 2011 and beyond. In 2010, approximately 75 percent of Cascade's conservation budget was directed to homeowners and small businesses for various incentive programs such as rebate incentives for plumbing fixtures, irrigation hardware upgrades, commercial operation upgrades, and training for key industry groups, including plumbers and irrigation contractors. The program also included direct services such as audits for businesses and homeowners, plumbing fixture installation at apartments, rain sensor installation for homeowners and businesses, high-efficiency fixtures delivered to businesses and apartments, free conservation items available through Cascade's website, and public education and participation in community events.

The current conservation program is anticipated to delay the Lake Tapps Phase 1 and Phase 2 construction by five to six years.

3.2.4 Reclaimed Water

The City considers reclaimed water a valuable component of its water supply strategy. The City has been using Class A reclaimed water from King County's Renton Treatment Plant (reclamation permit number WA-002958-1) since 1998. A supply line extends from the treatment plant to Fort Dent Park and ends at the Foster Links Golf Course. The reclaimed

water is used primarily for irrigation of ball fields (Starfire Sports Complex), city street tree irrigation, and a city operated fill station for street sweeping.

Tukwila is examining strategies to increase its use of reclaimed water. While opportunities certainly exist, they are constrained by the extension of new reclaimed water pipelines and finding customers with significant non-potable water needs. Therefore, ideal candidates are customers with large non-potable needs located near the current reclaimed water pipeline. Typical candidates for reclaimed water in any community include large water customers and irrigation customers.

Two strong possibilities for reclaimed water for the City in the near term are:

- **Seattle Rendering Plant:** The plant is currently served by potable water from the KCWD 125. In the future, they would evaluate the feasibility of using reclaimed water at this site.
- **Foster Links Golf Course:** The golf course is currently irrigated using the existing water right on Green River. The City has the capability to irrigate with reclaimed water if needed.

A discussion on reclaimed water including impact on projected demands is presented in Section 3.6.

3.3 WATER SYSTEM RELIABILITY

The water system reliability evaluation includes reviewing the supply criteria established by the City and identifying any supply deficiencies. Table 1.2 of Chapter 1 presents the City's supply criteria, consistent with DOH requirements. The supply criteria require meeting the system MDD.

The supply commitment from Cascade called the Water Supply Commitment (Appendix F) specifically states that:

“The policy of Cascade is to supply wholesale water to its Members at the twenty-four hour average flow rate (Annual Average Demand [ADD] and Maximum Day Demand [MDD]). Members are expected to provide storage for peaking above such average flow rates”

Projected ADD and MDD for the RWSA are presented in section 2.10 of Chapter 2.

The City's source reliability is tied to its current ultimate source of supply, the City of Seattle, since Cascade's current primary source of water is its block contract with Seattle. Seattle's system is flexible and redundant. Seattle has the capability to draw from three sources: the Cedar River watershed, the Tolt River watershed, and the Highline Wellfields. This is particularly helpful in the event of an emergency such as a pipeline break or earthquake. Seattle also maintains emergency interties with other systems for backup.

Seattle has a Water Shortage Contingency Plan, on which the City would rely in the case of a water shortage (Appendix H). The Water Shortage Contingency Plan provides guidelines to manage water supply and demand during short-term supply disruptions, such as a pipeline

break or drought. The plan also discusses operating actions and communication strategies for both a phased curtailment during a drought and an immediate curtailment such as with a pipeline break.

In addition to Cascade/Seattle's redundant supplies, the emergency interties that the City maintains with KCWD 125, Highline Water District, City of Renton, and the City of Kent also contribute towards the system reliability. Highline Water District, City of Renton, and the City of Kent have sources that are independent of the Seattle system. Therefore, if a major catastrophe were to debilitate the Seattle system, the City would still have access to water.

The City also maintains a well-looped distribution system that provides flexibility in the event of the loss of a particular pipeline.

3.4 DISTRIBUTION SYSTEM WATER QUALITY

The City benefits from the inclusion in Seattle's Regional Monitoring program for many current water quality regulations. Per the Cascade Water Alliance Interlocal contract (Appendix G), Cascade is responsible for source water quality that meets all State and Federal requirements at the point of delivery from Cascade to the City. However, ultimately the responsibility for compliance resides with Tukwila. The City is directly responsible for the quality within the distribution system. Hence, this section provides a summary of distribution system water quality only. The following are included in this section:

- Review of current regulations and summary of monitoring requirements
- Future regulatory requirements
- Summary of water quality complaints
- Consumer confidence reports
- Recommendations

3.4.1 Current Water Quality Regulations

Regulations that address distribution system water quality are described herein.

3.4.1.1 Total Coliform Rule

Coliform bacteria describe a broad category of organisms routinely monitored in potable water supplies. Though not all coliform bacteria are pathogenic in nature, they are relatively easy to identify in laboratory analysis. If coliform bacteria are detected, then pathogenic organisms may also be present. Bacterial contamination in a water supply can cause a number of waterborne diseases; therefore, these tests are strictly monitored and regulated by DOH.

The Total Coliform Rule (TCR) specifies two types of maximum contamination level (MCL) violations, "non-acute" and "acute." A purveyor is required to notify both DOH and system consumers if an MCL violation occurs. A violation of bacteriological MCLs occurs during routine sampling when:

- Coliform is detected in two or more routine samples in a single month, but no follow-up violations occur (non-acute MCL);
- Coliform is present in any of the repeat samples collected as a follow-up to a sample with fecal coliform or *Escherichia coli* (*E. coli*) (acute MCL);
- Fecal coliform or *E. coli* is present in any of the repeat samples collected as a follow up to a sample with coliform presence (acute MCL).

The TCR also requires secondary disinfection in accordance with the following:

- A sample with heterotrophic plate count (HPCs) less than 500 colony forming units per 100 mL is assumed to carry the required minimum residual.

The TCR requirements are effective until April 1, 2016 when the Revised TCR takes effect. The RTCR is discussed in Section 3.2.2: Anticipated and Future Regulations.

Monitoring Requirements

Monitoring requirements are described in the City's *Coliform Monitoring Plan*, as presented in Appendix I. The City currently collects 21 samples per month based on a residential population of 8,260 provided by the City on its 2012 DOH Water Facility Inventory (WFI) form. These samples are taken at the following locations:

- TU-1: 65th Avenue South, north of Southcenter Boulevard,
- TU-2: South 122nd Street, west of 46th Ave South,
- TU-3: 1232 Andover Park West, and
- TU-4: 53rd Ave South, south of 140th Street.

3.4.1.2 Asbestos

Asbestos is the name for a group of naturally occurring, hydrated silicate minerals with fibrous morphology. Included in this group are chrysotile, corcidolite, amosite, and the fibrous varieties of anthophyllite, tremolite, and actinolite. Most commercially mined asbestos is chrysotile. Historically, the flexibility, strength, and chemical and heat resistance properties of asbestos have adapted it to many uses including building insulation, brake linings, and water pipe.

In recent years, there has been much concern with the health risks associated with the use of asbestos in the everyday environment. Several studies and case histories have documented the hazards to internal organs as a result of inhalation of asbestos fibers. Data is limited on the effects of ingestion of asbestos fibers or on the effects of inhalation exposure from drinking water. Ingestion studies have not caused cancer in laboratory animals, though studies of asbestos workers have shown increased rates of gastrointestinal cancer.

Monitoring Requirements

The City replaced some asbestos cement pipe near Fort Dent Park in Year 2003 and is not required to monitor asbestos.

3.4.1.3 Stage 1 Disinfectants and Disinfection By-Products Rule

The Stage 1 Disinfectants and Disinfection By-Products Rule (DBPR) was promulgated in December 1998 and is applied to systems that apply a chemical oxidant/disinfectant. The portions of the Stage 1 DBPR relevant to the City are the MCLs for trihalomethanes (THMs) and haloacetic acids (HAAs) of 0.080 and 0.060 mg/L, respectively. The four regulated THMs are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The five regulated HAAs are monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. Compliance with the THM and HAA MCLs is based on a system-wide running annual average (RAA) of quarterly samples taken in the distribution system. The Stage 1 DBPR also introduced a maximum residual disinfectant level (MRDL) of 4 mg/L for free chlorine, based on an RAA of samples collected concurrent with TCR monitoring.

Monitoring Requirements

Monitoring requirements under the Stage 1 and 2 DBPRs are described in the City's Initial Distribution System Evaluation (IDSE) Report, as presented in Appendix J. Based on the results, the City is not required to monitor for Stage 1 disinfectants.

3.4.1.4 Stage 2 Disinfectants and Disinfection By-Products Rule (2006)

The Stage 2 DBPR was promulgated by the USEPA on January 4, 2006. The key provisions of the Stage 2 DBPR consist of:

- An IDSE to identify distribution system locations with high DBP concentrations. Further information is provided below.
- Site-specific locational running annual averages (LRAAs) instead of system-wide RAAs to calculate compliance data. LRAAs will strengthen public health protection by eliminating the potential for groups of customers to receive elevated levels of DBPs on a consistent basis.

The MCLs for THM4 and HAA5 remain unchanged from the Stage 1 DBPR at 0.080 and 0.060 mg/L, respectively, although they are now calculated as LRAAs.

The IDSE is the first step in Stage 2 DBPR compliance. Its intent is to identify sampling locations for Stage 2 DBPR compliance monitoring that represent distribution system sites with high THM and HAA levels. For systems serving more than 500 people, three options were available for the IDSE:

- 40/30 Waiver, which allows systems with no samples exceeding THM and HAA concentrations of 40 and 30 µg/L, respectively, during eight consecutive quarters to apply to waive the IDSE requirements.

- Standard Monitoring Program (SMP), which involves a one-year distribution system monitoring effort to determine locations that routinely show high THM4 and HAA5 concentrations.
- System-Specific Study (SSS), based on historical data and a system model.

The City has submitted an IDSE Report to the USEPA.

Monitoring Requirements

Monitoring requirements under the Stage 1 and 2 DBPRs are described in the City's IDSE Report, as presented in Appendix J.

Monitoring requirements under the Stage 2 Rule are based on the population served. Compliance monitoring for the DBPR Stage 2 occurs at sampling intervals of 90 days. During each sample period, samples are collected at the sites specified in the IDSE Report. The site identifications and physical locations of the four compliance monitoring sites specified for the City are:

- T-3: Hydrant located at 15335 Sunwood Blvd
- T-1: Hydrant #51 at S. 147th St and 59th Ave S
- H-1: SS-8 at 7755 E Marginal Way S
- T-2: Hydrant #38-C at Fort Dent Way and Starfire Way

Per the laboratory results, the City is in compliance with the Stage 2 Disinfectants and Disinfection By-Products Rule.

3.4.1.5 Lead and Copper

In 1991, the EPA promulgated the Federal Lead and Copper Rule (LCR). The State of Washington adopted this rule in 1995 with minimal changes. The LCR is intended to reduce the tap water concentrations that can occur when corrosive source water causes lead and copper to leach from water meters and other plumbing fixtures. Possible treatment techniques to reduce lead and copper leaching include addition of soda ash or sodium hydroxide to the source water prior to distribution.

The LCR establishes an action level (AL) of 0.015 mg/L for lead and 1.3 mg/L for copper based on 90th percentile level of tap water samples. The most recent revisions (2007) added the following requirements (required as of 12/10/09):

1. Monitoring. The rule adds a new reduced monitoring requirement, which prevents water systems above the lead action level to remain on a reduced monitoring schedule.
2. Treatment. Water systems must provide advanced notification and gain the approval of the primacy agency for intended changes in treatment or source water that could increase corrosion of lead.

3. Consumer notification. All utilities must now provide a notification of tap water monitoring results for lead to owners and/or occupants of homes and buildings who consume water from the taps that are part of the utility's sampling program.
4. Lead service line replacement. Utilities must reconsider previously "tested-out" lines when resuming lead service line replacement programs. This provision only applies to systems that have:
 - a. Initiated a lead service line replacement program;
 - b. Complied with the lead action level for two consecutive monitoring periods and discontinued the lead service line replacement program; and
 - c. Subsequently were re-triggered into lead service line replacement.
 - d. All previously "tested-out" lines would then have to be tested again or added back into the sampling pool and considered for replacement.

An AL exceedance is not a violation but can trigger other requirements that include water quality parameter monitoring, corrosion control treatment, source water monitoring/treatment, public education, and lead service line replacement.

Samples must be collected at cold water taps in homes/buildings that are at high risk of lead/copper contamination as identified in 40 CFR 141.86(a). The number of sample sites is based on system size.

Monitoring Requirements

Monitoring requirements for lead and copper are described in the City's *IDSE Standard Monitoring Plan*, as presented in Appendix K. The latest residential monitoring in the City occurred in 2012, which are also provided in Appendix K. All samples were well below the action level of 0.015 mg/L for lead and 1.30 mg/L for copper.

3.4.2 Future Regulatory Requirements

Anticipated future regulatory requirements are summarized in Table 3.1. This table includes ongoing programs to introduce new regulatory requirements, under the Unregulated Contaminant Monitoring Rule and the Contaminant Candidate List, as well as specific rules and regulations currently under consideration. A brief description of anticipated requirements under each rule is provided herein.

Proposed Rule	Affected Contaminants	Proposed Publication Date⁽¹⁾	Rule Effective Date⁽¹⁾
Total Coliform Rule Revisions	Coliform Fecal Indicators	February 13, 2013	April 1, 2016
Lead and Copper Rule Revisions	Lead Copper	Unknown	Unknown
Notes: Effective and compliance dates were obtained from the Federal Register and EPA's Drinking Water Hotline and represent the best information available as of the date of this report.			

3.4.2.1 Revisions to Total Coliform Rule

The Revised Total Coliform Rule was promulgated in February 2013 and becomes effective April 1, 2016. The revised rule maintains the routine sampling structure of the TCR. The primary focus of the revision is elimination of the total coliform MCL. Positive coliform samples trigger further assessment for *E. coli*, which then leads to corrective actions. On the other hand, according to the TCR, positive coliform samples alone trigger corrective action or notification. The revisions are anticipated to be positive for the City, as it reduces the probability of requiring public notification for total coliform samples that do not indicate a public health risk.

3.4.2.2 Revisions to the Lead and Copper Rule

Stakeholder meetings were held in October 2008 to discuss the long-term revisions that will replace the short-term revisions promulgated in 1999. Items subject to revision will be tiering criteria, service line replacement, corrosion controls, and water quality parameters. It is unknown when these revisions will be finalized.

3.4.3 Water Quality Complaints

The City investigates water quality complaints when presented and takes corrective action such as flushing, as needed. The City began documenting customer water quality complaints in 2003. Tukwila estimates that they receive less than 20 water quality complaints each year. In the past, Tukwila has received seasonal taste and odor complaints due to seasonal algae at the Cedar River source. However, after the City of Seattle's upgrade to its treatment plant to include ozonation, the City did not receive any complaints. Other complaints are typically water discoloration, which can be caused by dead-end mains or activities such as hydrant usage.

3.4.4 Consumer Confidence Reports

Under the Consumer Confidence Report Rule promulgated in 1998, community water systems are required to provide an annual Consumer Confidence Report (CCR) describing the source of their drinking water and levels of any contaminants found. The annual report must be supplied to all customers by July 1 and must include:

- Name and phone number of a contact person;

- Description of source water;
- Definitions;
- A table describing detected regulated and unregulated contaminants, measured levels, MCLs and Maximum Contaminant Level Goals, and likely sources;
- If an MCL is violated, information on health effects; and
- If EPA requires it, information on levels of unregulated contaminants.

The City is in compliance with the CCR Rule. Annual CCRs have been published as required.

3.4.5 Recommendations

The City is in compliance with all current regulatory requirements, including monitoring and reporting requirements. It is recommended to monitor the future total coliform rule and update their coliform monitoring plan per the new rules to maintain future compliance.

3.5 WATER USE EFFICIENCY

As populations continue to climb, demand for limited water supplies is steadily increasing in the Pacific Northwest. Efficient water use is critical for water systems to support growth in their communities and provide water for other environmental uses. The efficient use of water helps ensure reliable water supplies are available for the City well into the future. It is important to the City to not only conserve water, which reduces use, but also promote efficient use, which both conserves water and reduces wasteful uses. This section summarizes the City's Water Use Efficiency Program (WUE), and includes the demand savings anticipated from the program.

3.5.1 History

The City participated in the City of Seattle's One Percent Water Conservation Program through year 2003. The One Percent Program was a regional comprehensive program that reaches every sector and promotes both equipment upgrades and behavior changes. Since the inception of Cascade in 2004, the City operates under Cascade's Water Conservation Program. Cascade's mission is to produce a regional water conservation program that benefits the ratepayers of Cascade Members and provides long-term sustainability of water resources.

In 2008, Cascade adopted a six-year conservation savings goal (2008-2013) of one million gallons per day. For the City, this WUE goal for conservation translated to achieve a savings of 52,000 gallons of water per day on an average annual basis compared to the current usage by December 31, 2013. The City accomplished 61 percent of this six-year goal as of December 2009 per the Water Use Efficiency Annual Performance Report – 2009 (submitted to Department of Health in June 2010). Multi-family bathroom aerators, commercial pre-rinse spray heads, and commercial restroom aerators were the most effective conservation measures utilized.

3.5.2 Regulatory Requirements

The Washington Water Utilities Council, DOH, and Ecology jointly developed the Conservation Planning Requirements (CPR). Interim guidelines were first established in 1990, and subsequently finalized and approved in 1994. The DOH published the CPR in 1994, which was the basis of Seattle's (and hence the City's) 1995 and 2001 conservation programs.

In 2003, the Washington State Legislature passed Engrossed Second Substitute House Bill 1338, better known as the Municipal Water Law, to address the increasing demand on our state's water resources. The law established that all municipal water suppliers must use water more efficiently in exchange for water rights certainty and flexibility to help them meet future demand. The Legislature directed the DOH to adopt an enforceable WUE program, which became effective on January 22, 2007. The WUE program replaced the CPR. The new WUE requirements emphasize the importance of measuring water usage and evaluating the effectiveness of the WUE program.

Three additional conservation conditions are required of the City, either directly or indirectly, as part of its membership in the Cascade:

- **Cascade Interlocal Contract:** Section 7.2 of the contract states, in part, that "Cascade shall develop and carry out, and Members must participate in, water conservation programs that are uniform among Members. The Board shall develop and implement a Cascade conservation management plan that provides a mandatory base conservation program that functions to reduce both average and peak demands. Members that fail to comply with base programs as set forth in Cascade's conservation management plan may be required to assume a disproportionate reduction in water supply or to pay penalty charges, or both."
- **Cascade-Seattle Contract:** Article VI of the contract states that "Each party is committed to the principles of water conservation and each intends to achieve its anticipated savings by implementing water conservation programs either unilaterally or in partnership with other agencies."
- **Cascade Water Right Report of Examination (ROE):** Sections 5.3.20 and 5.3.21 of the ROE require Cascade to prepare a water conservation plan in accordance with DOH's Conservation Planning Requirements.

The conservation requirements for a public water system of the City's size (presented in Table 3.2) are grouped into four categories: public education, technical assistance, system measures, and incentives or other measures. The City strives to meet all these requirements.

Table 3.2 Conservation Requirements for Public Water Systems Serving 1,000 – 25,000 Connections		
Category	Item	City of Tukwila Status
Public Education	Program Promotion: Publicize the need for water conservation through media outreach and/or other means.	Addressed as a part of the Cascade program.
Technical Assistance	<p>Purveyor Assistance: Assist wholesale customers to develop and implement conservation programs.</p> <p>Customer Assistance: Provide assistance and information to customers, which facilitate water conservation.</p> <p>Bill Showing Consumption History: Show percentage increase or decrease in water use over the same period from the previous year.</p>	<p>Not applicable. The City does not have wholesale water customers.</p> <p>Addressed as a part of the Cascade program. In addition, the City's staff meet with customers to help manage irrigation demand.</p> <p>Consumption for current and previous years are collected per water bills and are presented in the WUE Annual Performance Reports.</p>
System Measures	<p>Source Meters: Use master source meters for all sources and maintain periodic meter testing and repair program.</p> <p>Service Meters: Use individual meters for all water uses and maintain periodic meter testing and repair program.</p> <p>Unaccounted Water / Leak Detection: If unaccounted water is in excess of 20 percent, conduct a regular and systematic program of finding and repairing leaks.</p>	<p>All potable water has source meters, which are maintained by Cascade. The water used for irrigating the Foster Golf Course is not metered.</p> <p>All water users are metered and the City has a meter testing and maintenance program. All commercial meters are tested every three years.</p> <p>The average unaccounted water for the past three years is 7 percent. The City proactively conducts regular leak detection surveys as part of valve and hydrant maintenance program.</p>

Table 3.2 Conservation Requirements for Public Water Systems Serving 1,000 – 25,000 Connections		
Category	Item	City of Tukwila Status
Incentives / Other Measures	<p>Single Family / Multifamily Kits: Distribute kits containing easily installed water saving devices to single family and multifamily residences.</p> <p>Nurseries / Agriculture: Encourage and/or require the use of current technology for large agricultural/irrigation operations.</p> <p>Landscape Management / Playfields: Promote low water demand landscaping in all retail customer classes.</p> <p>Conservation Pricing: Use a rate structure that provides economic incentives to conserve water.</p>	<p>Addressed as a part of the Cascade program.</p> <p>Not applicable. Tukwila does not have large scale nurseries or agriculture.</p> <p>Addressed as a part of the Cascade program. The City uses reclaimed water on Starfire Sports soccer field, and streetscapes. The City also operates fill station for street sweeping with reclaimed water.</p> <p>The City uses seasonal rates, which is a recognized conservation pricing technique.</p>

3.5.3 Water Conservation Program for 2011 and Beyond

Water conservation is a critical part of Cascade's supply management strategy. Conservation helps ensure a reliable supply of drinking water, keeps utility operating costs lower, and allows more water to stay in streams. The 2011 and beyond program will be a continuation of the 2008-2010 conservation program. Currently, Cascade provides rebates to homeowners and businesses served by Cascade member agencies to encourage conservation. These include the following:

- **Toilet Replacement Program:** Cascade offers a \$100 rebate for the replacement of old tank-style toilets with new WaterSense® labeled toilets.
- **Clothes Washer Rebates Program:** Cascade offers up to a \$100 rebate to residences for the purchase of high-efficiency clothes washers.
- **Irrigation Efficiency Program:** The Cascade Commercial/Multifamily Rebate Program is now suspended. However, it is planned to resume in 2011, funding permitting.
- **Commercial Kitchen Program:** Cascade provides rebates to commercial kitchens for the installation of high-efficiency commercial dishwashers and boilerless steamers.
- **Free Rain Sensor Installation Program:** The Cascade Rain Sensor Program is now suspended. The program will resume in 2011, funding permitting.

3.5.4 Projected Water Demand

The projected water savings are shown in Table 3.3 and Figure 3.1. The water demand reduction presented in this section are based upon the existing conservation program, discussed earlier herein, developed for the 6-year implementation period (2008 through 2013). In the demand estimates, 52,000 gpd savings were applied to the year 2013 ADD estimate, consistent with the existing conservation program. This resulted in an ERU value of 158.2 gallons per day (gpd) in 2013. Beyond year 2013, a one percent reduction was applied per ERU through the planning period. This reduced the ERU value of 158.2 gpd in year 2013 to 133.4 gpd by year 2030. This WUE goal is consistent with the Municipal Water Law and obligations as a member of Cascade Water.

Year	Without Conservation		With Conservation		Demand Reduction	
	ADD, mgd	MDD, mgd	ADD, mgd	MDD, mgd	At ADD, mgd	At MDD, mgd
2010	1.79	3.05	1.78	3.04	0.01	0.01
2011	1.89	3.22	1.88	3.20	0.01	0.02
2012	1.99	3.39	1.97	3.36	0.02	0.03
2013	2.09	3.56	2.07	3.52	0.02	0.04
2014	2.19	3.73	2.15	3.66	0.05	0.08
2015	2.29	3.91	2.22	3.79	0.07	0.12
2016	2.39	4.08	2.30	3.91	0.10	0.17
2020	2.80	4.77	2.58	4.39	0.22	0.37
2030	3.81	6.49	3.17	5.41	0.63	1.08

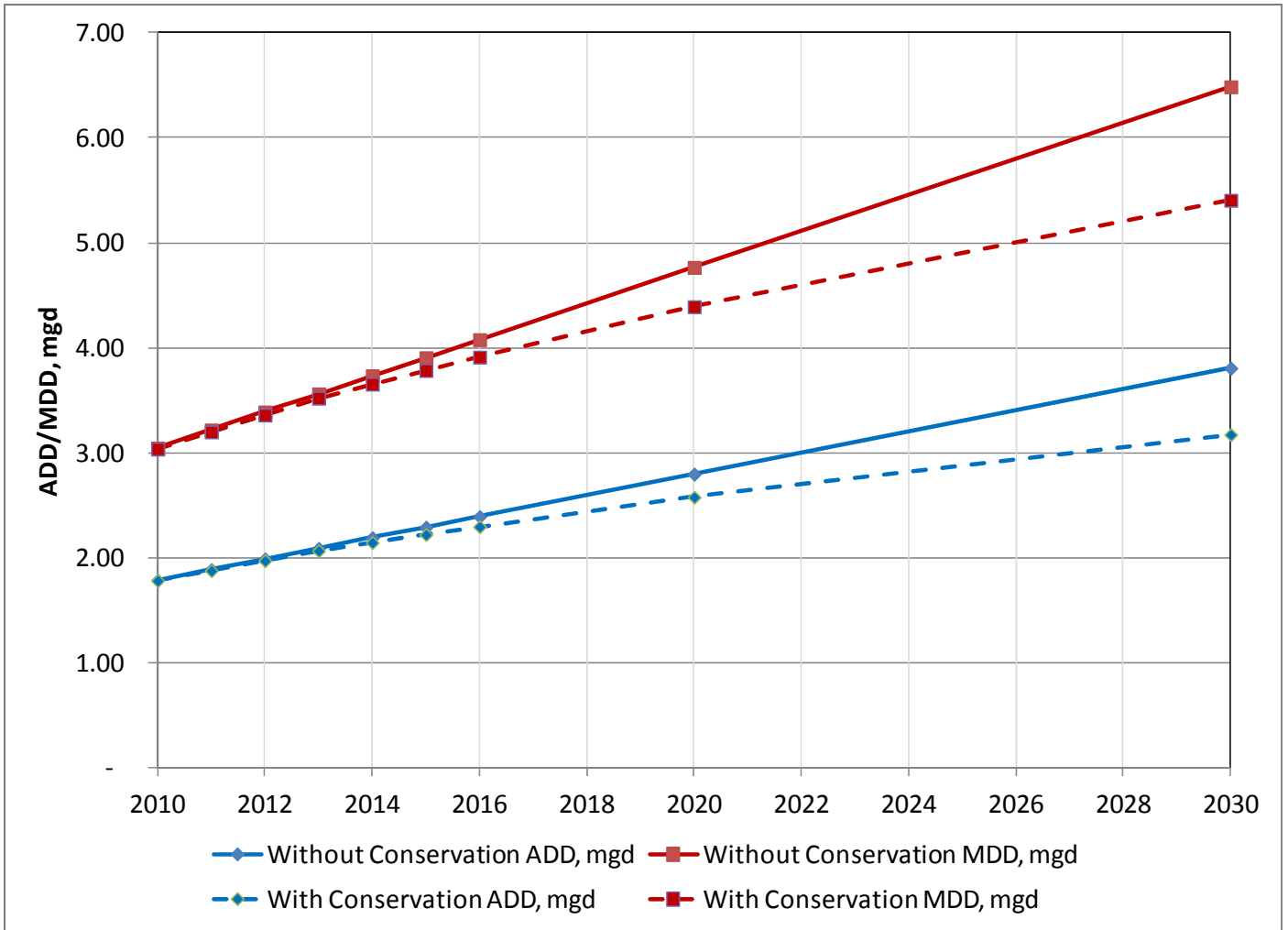


FIGURE 3.1
ADD AND MDD PROJECTIONS WITH AND WITHOUT CONSERVATION
Comprehensive Water Plan
City of Tukwila

3.6 RECLAIMED WATER

Reclaimed water can be a valuable source of supply when used either directly by the customer or indirectly through the mitigation of new potable supply. According to WAC 246-290-100 and the WUE requirements, water systems with over 1,000 connections must collect and evaluate information on reclaimed water opportunities. Evaluation of reclaimed water use is required in the WUE program and reclaimed water use can be used as a WUE program measure.

The City has a contract to send all of its sewage to the King County Metro sewer system, placing prime responsibility to future wastewater reuse opportunities with the County, which is the final manager of the sewage. One of King County's goals in the Regional Water Supply Planning effort is to explore the use of reclaimed water as a potential water supply. The City is currently working with King County Metro to find additional customers as documented in Appendix N - King County Water Reclamation Evaluation Checklist. The City has several potential end users for reclaimed water including golf courses, cemeteries, and parks. The City's reclaimed water evaluation is presented in Chapter 3 of the Comprehensive Sewer Plan Update. This section presents a summary of reclaimed water usage by the City and the impacts of projected reclaimed water plan on demands.

3.6.1 Reclaimed Water Purchases and Sales

The six most recent years of reclaimed water purchases from King County are shown in Table 3.4. Purchases have ranged from a low of 2,429 gpd in 2008 to a high of 10,731 gpd in 2006. In year 2008, Starfire did not irrigate their ballfields due to construction activities for expansion. Since the year 2008 is an outlier compared to the rest of the years, the average of purchases shown in the table is calculated without including that data. This average is used for demand forecasting.

The average monthly distribution of reclaimed water is presented in Figure 3.2. Reclaimed water is purchased almost exclusively for irrigation of ballfields at the Starfire sports complex. Therefore, the purchases are centered on the summer months, with little or no purchases in the non-summer months. Within the summer months, reclaimed water purchases form a bell curve that peaks in August.

Reclaimed water sales are nearly identical to reclaimed water purchases. There is essentially no non-revenue water for the reclaimed water system. This is not unexpected as the system infrastructure is new and the types of uses that make up non-revenue water, such as water system flushing and leaks, are not common in a new reclaimed water system.

Table 3.4 Reclaimed Water Purchases 2005-2010, gpd

Month	2005	2006	2007	2008	2009	2010	Average¹
January	45	-	-	-	-	-	9
February	-	-	-	-	4	-	1
March	-	-	-	-	-	139	28
April	12	150	109	105	381	232	177
May	8	685	619	527	506	492	462
June	1,463	1,506	2,209	207	1,922	670	1,554
July	1,908	2,092	1,752	14	1,705	1,172	1,726
August	2,338	3,703	2,058	-	1,154	1,670	2,185
September	2,519	2,187	1,400	2	689	1,539	1,667
October	1,160	387	8	47	531	445	506
November	-	20	-	-	-	64	17
December	6	-	-	1,527	-	-	1
Annual	9,460	10,731	8,155	2,429	6,892	6,423	8,332

Notes:
1. Does not include 2008 data.

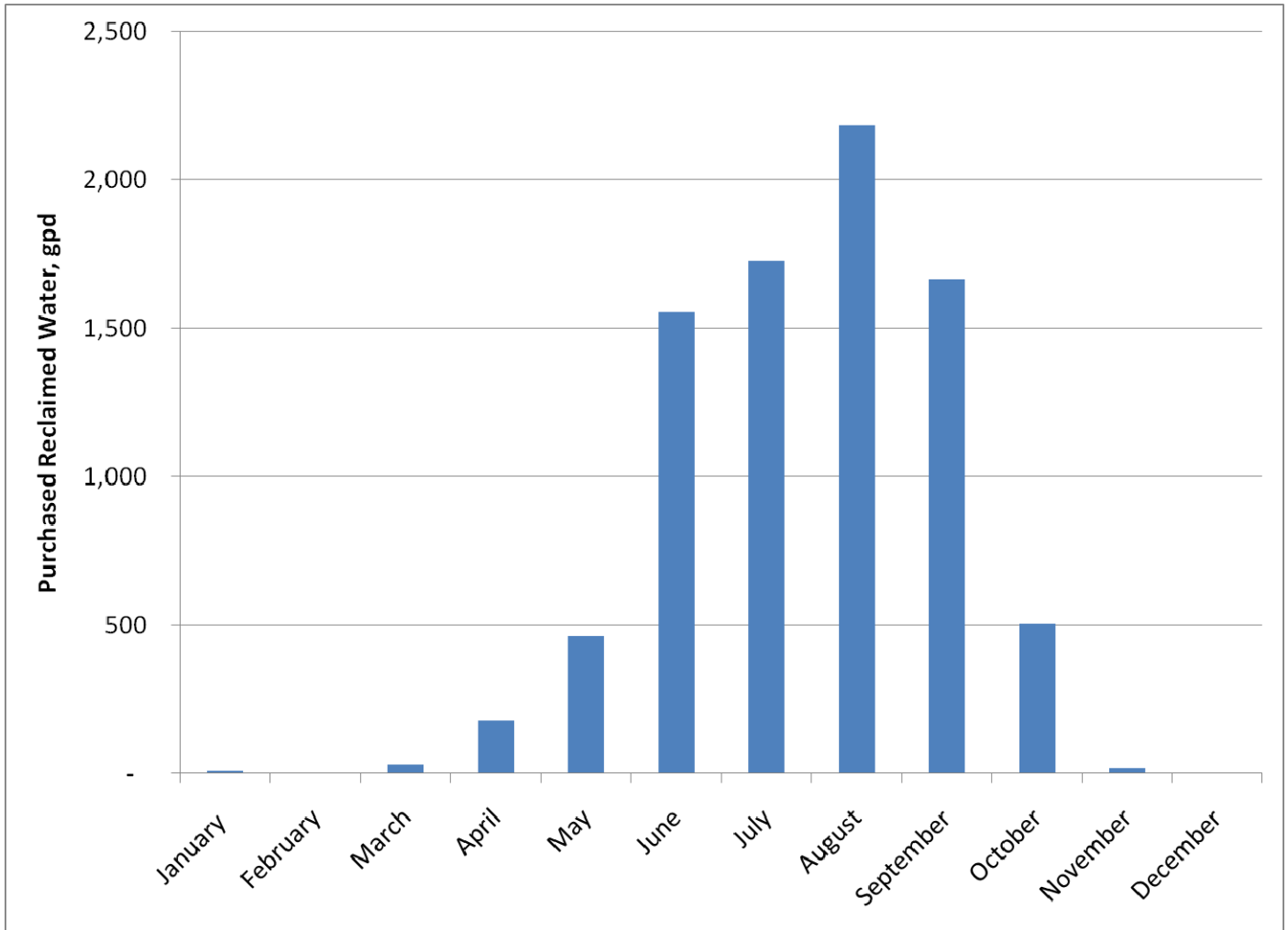


FIGURE 3.2
MONTHLY DISTRIBUTION OF
RECLAIMED WATER
Comprehensive Water Plan
City of Tukwila

3.6.2 Reclaimed Water Projected Demand

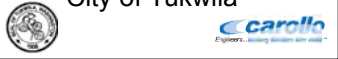
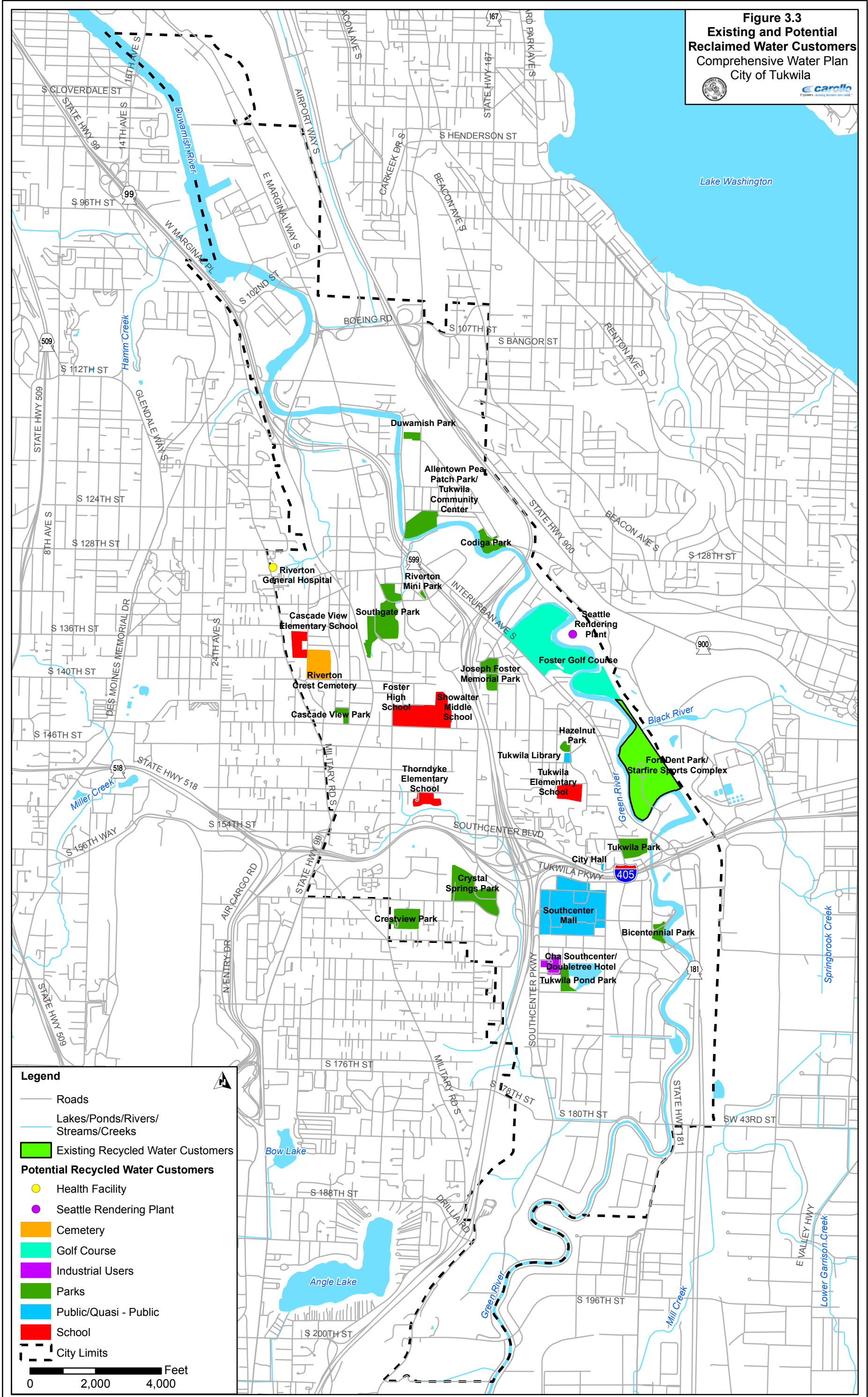
The existing and potential reclaimed water customers are presented in Figure 3.3. Reclaimed water demand was projected by estimating that the new customers will grow at the same rate as the City's commercial customers and two new customers are assumed to be served by year 2016. The two new customers are:

- **Seattle Rendering Plant:** The plant is currently served by potable water from the KCWD 125. Billing records from KCWD 125 show the demand from this customer to be 59,573 gpd on an average annual basis.
- **Foster Links Golf Course:** The golf course is currently irrigated using the existing water right on Green River. City staff generated an estimate of 99,438 gpd average annual demand, or 167,000 gpd during the main irrigation season of April to October, for the golf course.

The projected water demand with reclaimed water usage is presented in Table 3.5.

Year	With Conservation		With Conservation and Reclaimed Water Usage	
	ADD, mgd	MDD, mgd	ADD, mgd	MDD, mgd
2010	1.78	3.04	1.78	3.04
2011	1.88	3.20	1.87	3.19
2012	1.97	3.36	1.97	3.35
2013	2.07	3.52	2.06	3.51
2014	2.15	3.66	2.14	3.64
2015	2.22	3.79	2.21	3.77
2016	2.30	3.91	2.13	3.63
2020	2.58	4.39	2.41	4.11
2030	3.17	5.41	3.00	5.12

Figure 3.3
Existing and Potential
Reclaimed Water Customers
 Comprehensive Water Plan
 City of Tukwila

EXISTING SYSTEM

4.1 INTRODUCTION

This chapter presents an overview of the City's existing water distribution facilities including the existing supply and transmission facilities, system inerties, pressure zones, storage and pumping facilities, distribution system facilities, and telemetry and supervisory control systems. This chapter relies on the information provided by the City staff and the City's 2005 Water System Plan Update completed by HDR Engineering.

The Tukwila water system is owned and operated by the City. The system currently consists of six pressure zones, one reservoir, one pump station, nine pressure reducing valves, thirteen check valves, and approximately 45 miles of transmission and distribution pipelines. The City maintains a total of nine inerties with four adjacent water purveyors. The existing water system map showing the City's water system facilities, retail water service area, and pressure zones is presented in Chapter 2 (Figure 2.2). Figure 4.1 presents the hydraulic profile of the system.

4.2 WATER SUPPLY

The Tukwila water system was first established in 1929 with the construction of a six-inch diameter steel water line to connect Seattle's Beacon Hill to Tukwila's North Hill area. Up to that time, drinking water was supplied by several groundwater wells and the Green River. As the City annexed land in the late 1950's and early 1960's, and later in the late 1980's, the City also began to take over some of the water services for areas within the City limits from other water districts and public utilities. Today, the City is served primarily by the Tukwila water system, and also by KCWD 125, Highline Water District and the City of Renton.

As of January 1, 2004 the City's sources of water are supplied mostly by the Cascade Water Alliance (Cascade). Cascade, formed in April 1999, is a group of eight municipal water utilities and districts formed to provide water supply for the current and future demands of the utilities and districts involved. Cascade currently receives most of its water from the City of Seattle under a declining block contract, with the first block of 30.3 mgd extending through December 31, 2023 (Appendix E).

Two additional sources of water used by the City for irrigation purposes only are reclaimed water through a contract with King County, and water from the Green River currently used only at the Foster Golf Links golf course.

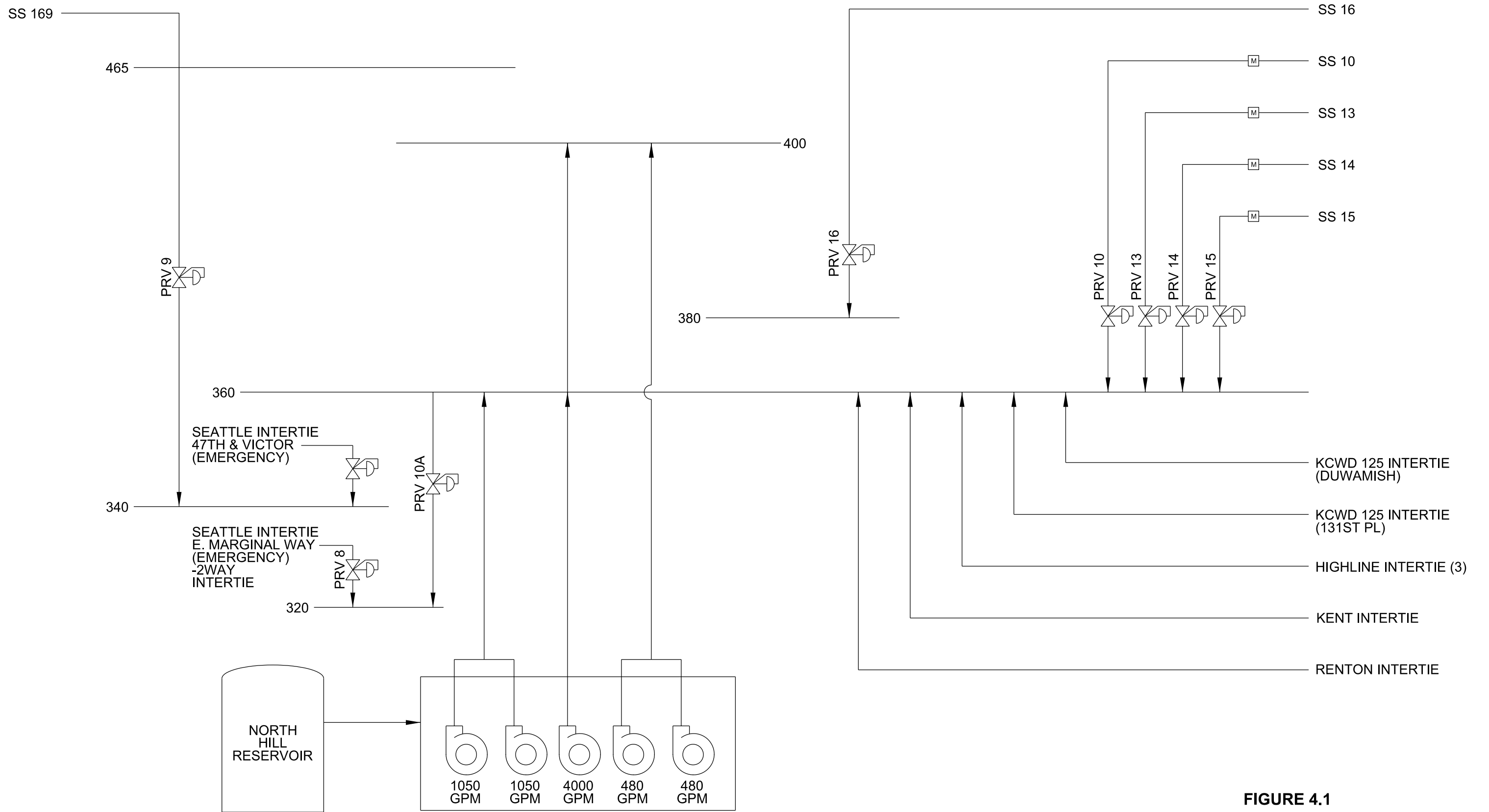


FIGURE 4.1
EXISTING SYSTEM HYDRAULIC PROFILE
 Comprehensive Water Plan
 City of Tukwila

4.2.1 Cedar River and West Seattle Pipelines

The source of the City's water supply is the Cedar River. Raw water is diverted from the Cedar River at Landsburg, where it is screened, chlorinated, and fluoridated before being sent to Lake Youngs. At the Lake Youngs regulating basin, located east of Renton, water is disinfected via ozonation and ultraviolet (UV), treated with lime to adjust pH levels for corrosion control, and chlorinated for further disinfection prior to customer delivery. The water is then transmitted to the Puget Sound area via four high pressured transmission mains, known as the Cedar River Pipelines.

4.2.2 Reclaimed Water

The City receives reclaimed water from King County's South Treatment Plant, located in the City of Renton. Reclaimed water is defined by RCW 90.46 as "effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for a beneficial use or a controlled use that would not otherwise occur and is no longer considered wastewater". This reclaimed water is currently used to irrigate ball fields and streetscapes. Reclaimed water is more thoroughly discussed in Chapter 3.

4.2.3 Green River

The City has a surface water right on the Green River. This untreated water is currently used to irrigate Foster Golf Links; however, the City is planning to use reclaimed water to augment this irrigation in the future.

4.3 EMERGENCY INTERTIES

The City maintains a network of emergency interties with KCWD 125, Highline Water District, and the Cities of Renton, Seattle, and Kent. These interties provide a network of redundant supplies that give the City operational flexibility under emergency conditions. Table 4.1 presents the City's existing system interties.

Water Purveyor	Size	Pressure	Location	
KCWD 125	6-inch metered	118 psi	131st Pl and 44th Ave (131st Pl)	
	8-inch	108 psi	S 116th St and Interurban Ave S (Duwamish)	
	3-inch	118 psi	S 116th St and Interurban Ave S (Duwamish)	
Highline	Highline to City	12-inch metered	50 psi	Andover Park W and S 180th St
	Highline to City	3-inch	50 psi	Andover Park W and S 180th St
	City to Highline	6-inch	110 psi	Andover Park W and S 180th St
Renton	8-inch metered	76 psi	17200 W Valley Highway	
Kent	10-inch	90 psi	W Valley Highway and Todd Blvd	
Seattle	6-inch metered	125/70 psi	47th Avenue S. and Victor Street	
	12-inch	130 psi	E. Marginal Way at North City limit	

4.3.1 KCWD 125

The City and KCWD 125 have three emergency interties. The 6-inch intertie was originally established in 1986 at the request of KCWD 125, primarily to supply additional fire flows above what KCWD 125's system could maintain. The maximum amount of flow at the 6-inch interties point is 1,000 gpm. The agreement assumes water will be supplied from the City to KCWD 125, although reciprocity was also established. A copy of the intertie agreement is presented in Appendix D. Two additional interties were subsequently added: a 3-inch and 8-inch intertie at S. 116th St. and Interurban Avenue South.

4.3.2 Highline

At the south end of the City in the Segale Park area, the City and Highline Water District have an intertie with a pressure reducing valve and a meter. Flow is possible in both directions and is set to flow into the City when pressures drop below 125 pounds per square inch (psi) at the intertie. This intertie was established in 1979 when Highline was called KCWD 75. Costs for purchased water were established as \$0.22/ccf and were amended to \$0.25/ccf in the following year. A copy of the intertie agreement is presented in Appendix D.

4.3.3 Renton

In 1978, Tukwila entered into an agreement with the City of Renton for an 8 inch metered intertie 17200 West Valley Highway. In 1995 a new agreement was executed that stipulated new rates, quantity of water, and required both cities to install and maintain metering

devices. Water is regulated to flow into the City from Renton when pressures drop below 76 psi at the intertie. The maximum amount of flow at the Renton intertie is not to exceed 2.7 mgd. A copy of the intertie agreement is presented in Appendix D.

4.3.4 Kent

The City has a 10 inch intertie with the City of Kent through which water is regulated to flow into the City from Kent when pressures drop below 90 psi at the intertie. This intertie was established in 1979 with the purpose of providing emergency water flow and water supply to meet Kent's needs during times of peak demand and for emergency flow and fire protection in both cities. The facility was constructed and financed by Kent, and is owned and operated by Kent. A copy of the intertie agreement is presented in Appendix D.

4.3.5 Seattle

Tukwila has two emergency interties with the City of Seattle. One intertie is at the boundary between the two cities on E. Marginal Way. The second intertie is at 47th Avenue South and Victor Street. The agreements for these interties are included in the water supply agreement between the City of Seattle and Cascade Water Alliance (Appendix E).

4.4 PRESSURE ZONES

The service area is divided into six pressure zones. The zones are labeled according to the elevation, relative to mean sea level, of the static pressure head in each zone. The zone boundaries are located to provide a service pressure range of 60 to 155 psi under maximum and average day demand conditions. Zone boundaries are shown in Figure 2.2 and include the following:

- 360 Zone – City Zone
- 320 Zone – North Boeing Field Zone
- 380 Zone – Crystal Springs Zone
- 400 Zone – North Hill Zone
- 465 Zone – Upper Ryan Hill Zone
- 340 Zone – Lower Ryan Hill Zone

The 360 City Zone is the largest pressure zone in the City that extends from the southern City limit to the South Norfolk Road at the south end of Boeing Field/King County International Airport, and includes the City's Central Business District. This zone is supplied through five supply stations where the water flow from the source point is metered, and the water pressure reduced through PRVs. Supply station SS10 is located in the north and taps from the West Seattle Pipeline, while supply stations SS13, SS14 and SS15 are located in the south and tap from the Cedar River Pipeline No. 4.

The 320 North Boeing Field Zone is located at the north end of the City, from north of South Norfolk Road to the northern City limit. This zone is supplied by the 360 City Zone through a PRV.

The 380 Crystal Springs Zone is located in a small area directly south-west of the I-5 and Highway 518/I-405 junction. This zone is supplied through a PRV from supply station SS16 that taps from the Cedar River Pipeline No. 4.

The 400 North Hill Zone is located northeast of the 380 Crystal Springs Zone, directly northeast of the I-5 and Highway 518/I-405 junction. This zone is supplied by the North Hill Pump Station, which pumps from the North Hill Reservoir.

The 465 Upper Ryan Hill Zone is located on the northeast section of the City and is approximately bounded by 49th Avenue South to the west, the City limit to the north, 51st Avenue South to the east, and I-5 to the south. This zone is supplied directly from supply station SS169, and feeds the 340 Lower Ryan Hill Zone. The 340 Lower Ryan Hill Zone is located directly west of the 465 Upper Ryan Hill Zone and is approximately bounded by I-5 to the west, the City limit to the north, 49th Avenue South to the east, and I-5 to the south.

4.5 EXISTING INFRASTRUCTURE

4.5.1 Supply Stations

The Tukwila water system consists of seven supply stations and two emergency supply interties from the City of Seattle's (Seattle) transmission mains through PRVs to decrease pressure from the mains. Four of the supply taps are off the Cedar River Pipeline (CRPL) No. 4, which runs through the southern portion of the City. Two supply taps are off the West Seattle Pipeline (WSPL) that branches off from CRPL 3 just east of the City and runs through the northern portion of the City. The remaining supply tap is off the CRPL 3. Table 4.2 presents the locations and sources of these supply stations, the meter size, the contractual flow, and the actual flow based on the existing infrastructure. The City previously also had a Supply Station (SS) 11 off the WSPL which was removed in 2009. The City acknowledges that the contractual flow shown in the Table is less than the maximum day demand. The City will work with Cascade to update the management agreement, Exhibit II, so that contractual flow is sufficient to meet the City's projected MDD.

Supply Station	Source	Location	Meter Size (inches)	Contractual Flow (gpm)	Actual Flow (gpm)⁽¹⁾
SS 169	CRPL 3	Beacon Avenue S. & S. Leo Street	8	70	1,300
SS 10	WSPL	E. Marginal Way & S. 112th Street	12	800	2,800
Oxbow (PRV 10a)	WSPL	10190 E. Marginal Way	12	Back-up ⁽²⁾	2,800
SS 13	CRPL 4	Southcenter Parkway & Tukwila Parkway	10	800	2,000
SS 14	CRPL 4	West Valley Highway & S. 158th Street	8	Back-Up ⁽²⁾	1,300

Supply Station	Source	Location	Meter Size (inches)	Contractual Flow (gpm)	Actual Flow (gpm) ⁽¹⁾
SS 15	CRPL 4	Christensen Rd. & Black Drive	8	440	2,000
SS 16	CRPL 4	S. 158th Street & 53rd Avenue S.	6	20	750
SEATTLE	CRPL 3	47th & Victor	6	Back-Up ⁽²⁾	750
PRV 8	CRPL 3	E. Marginal Way & Seattle City Limits	12	Back-Up ⁽²⁾	2,800

Notes:

- Actual Flow results in velocities of approximately eight feet per second.
- Back-up supply sources are not primary supply sources.

4.5.2 Piping System

According to the City's recently compiled data, the City has approximately 250 miles of pipelines in its water transmission and distribution system. Pipe diameters range from 2 to 18 inches, and the pipe materials include cast iron, ductile iron, PVC, and steel. Pipe age was not available. An inventory of the existing waterlines in the City's system, excluding private laterals, is provided in Table 4.3. As seen in the table, the majority of piping in the system is ductile iron and cast iron piping. Pipes with diameters between 6 and 12 inches comprise over 85 percent of the system.

4.5.3 Storage Reservoirs

The Tukwila water system currently operates 2 MG of storage at North Hill (15045 57th Avenue South), which is supplied by Supply Station 13 (SS 13) and Supply Station 15 (SS 15), which both tap off of CRPL 4. The reservoir is a partially buried concrete reservoir and is the sole storage facility for the City. Table 4.4 provides a summary of the North Hill Reservoir.

Diameter	Length, feet					Percentage (%)
	Cast Iron	Ductile Iron	PVC	Steel	Total	
2-inch	904	3,393			4,297	1.7%
4-inch		1,721			1,721	0.7%
6-inch	22,474	4,961		2,292	29,727	12.0%
8-inch	27,891	49,431			77,321	31.1%
10-inch	32,386	11,904			44,290	17.8%

Diameter	Length, feet					Percentage (%)
	Cast Iron	Ductile Iron	PVC	Steel	Total	
12-inch	37,535	25,558			63,093	25.4%
16-inch		7,643			7,643	3.1%
18-inch		14,292			14,292	5.8%
Unknown		5,404			5,404	2.2%
Total	121,190	124,307	700	2,292	248,489	100.0%
Percentage (%)	48.8%	50.0%	0.3%	0.9%	100.0%	

Notes:
1. Source: Data received as of 06/29/2010.

Description	Value
Capacity	2 MG
Type	Concrete
Year Constructed	1991
Diameter	115 feet
Height	23 feet
Base Elevation	226 feet
Overflow Elevation	249 feet
Ground Elevation	225 feet
Influent/Effluent Control Valves	Influent 6-inch ClaVal valve

4.5.4 Pump Stations

The City's water system has a single booster pump station located at the North Hill reservoir which was constructed in 1991. The station is configured with two sets of pumps designed to pump to two separate pressure zones, as well as a high-capacity fire flow pump. No emergency power is available at this location. Table 4.5 presents a summary of the existing pumping facilities.

North Hill Pump Station	Number	HP	Rated Capacity each, gpm	Total Capacity, gpm	Supply To
High Pumps	2	30	480	960	400 Zone
Low Pumps	2	50	1,050	2,150	360 Zone
Fire Flow Pumps	1	250	4,000	4,000	Fire flows to 400/360 zones

4.5.5 Pressure Reducing Valve and Check Valve Stations

The City uses PRVs and check valves to maintain adequate system pressures, direct flow in the system, and isolate the various pressure zones. PRVs are also used at interties. The City currently owns and operates 9 PRV stations and 13 check valves. The City's PRV stations are listed in Table 4.6. Table 4.7 lists the check valve inventory.

PRV Name	Elevation, ft	Size, in	Pressure Setpoint, psi	Location and Comments
320 Zone				
PRV # 10A	16	16	110	E. Marginal Way & S. Norfolk St.;
		4	120	Active Running
PRV # 8	18	14	118	E. Marginal Way at north City limit;
				Seattle Emergency Intertie
340 Zone				
PRV # 9	200	8	40	S. 107th St. & 49th Avenue S.;
		3	50	Active Running
		½	N/A	
Seattle Intertie	188	6	42	47th Avenue S. and Victor Street;
		2	N/A	Seattle Emergency Intertie

Table 4.6 Pressure Reducing Valves				
PRV Name	Elevation, ft	Size, in	Pressure Setpoint, psi	Location and Comments
360 Zone				
PRV # 10	18	16	140	E. Marginal Way & S. 112th Street; Active Supply from SS 10
		6	145	
		2	150	
PRV # 13	32	12	136	Southcenter Parkway & Tukwila Parkway; Active Supply from SS 13
		4	N/A	
PRV # 14	28	8	135	West Valley Highway & S. 158th St.; Active Supply from SS 14
		2	135	
PRV # 15	26	10	150	Christensen Rd. & Black Drive; Active Supply from SS 15
		3	N/A	
380 Zone				
PRV # 16	174	6	90	S. 160th St. & 53rd Ave. S.; Active Supply from SS 16
		2	110	
		½	N/A	

Table 4.7 Check Valve Inventory		
Location	Size, in	Zone
62nd/151st	8	400
55th	6	400
Sunwood/62nd	8	400
Sunwood/Behind	8	400
149th/60th	6	400
144th/59th	6	400
58th	6	400
57th/144th	10	400
144th/57th	6	400
56th/141st	6	400
144th East of 53rd	6	400
150th	8	400
152nd	6	400

HYDRAULIC MODEL UPDATE

This Chapter provides an overview of the procedures used in the update and calibration of the City's water system hydraulic model. The City provided its existing hydraulic computer model of the water distribution system to Carollo for use as part of the Comprehensive Water Plan update. The existing hydraulic model uses the WaterCAD modeling software platform, developed by Bentley.

5.1 MODEL UPDATES

Models frequently require updates to match changing conditions in the actual water system, such as new pipe diameters, PRV setpoint changes, and other operational changes. The model was updated by the following items to reflect the water system conditions in 2013:

- **Model Conversion:** The model was converted to WaterCAD version 8i.
- **Physical System Updates:** The model's 'Base-Physical' alternative was updated to reflect the 2013 physical conditions of the water system.

Spatial Adjustment:

- The entire model was shifted spatially to overlap with the City's GIS data layers. This provides the ability to view the model against the current streets, properties, pressure zones, etc.

Pump Station Updates:

- The North Hill Pump Station pump suction and discharge pipes were changed to reflect the actual pipe diameters per the pump station As-Builts. The existing model used a default diameter of 99 inches. New diameters are 8-inch for the High Pumps and 12-inch for the Low Pumps.
- The High Pumps were adjusted to be variable frequency drive (VFDs) maintaining a constant pressure head at the discharge node of 68 psi.
- The Low Pumps were relocated to discharge to the 360 Zone (existing model had them discharging to 400 Zone).

Reservoir Updates:

- The North Hill Reservoir elevation data was revised per data provided by City. Revised initial elevation is 248.00 ft and overflow elevation is 249.38 ft.

Supply Source Updates:

- Added KCWD Intertie at 131st Street per City.
- Made KCWD 125 Intertie at 52nd (Park and Ride) inactive per City.
- Made Supply Source (SS) 11 inactive per City.

Pipe Updates:

- Closed Pipe P-129 per City comments (thereby isolating Pressure Zone 380 from 360).

- Changed pipe configuration in Southcenter Way area per City mark-ups. Added Pipe P-570 (10-inch) to replace similar pipe connecting to Christiansen Way. Made Pipe P-560 inactive per City mark-ups.
- Revised pipes in Maule Avenue and 143rd St area per City As-Builts of 2005 Project.
- Changed pipe diameter of East Marginal Way S. (P-595) to 18 inches.
- Changed pipe diameter of S 114th St (P-317) to 6 inches.
- Made P-122 inactive.
- Changed pipe diameter of South Center Parkway (P-19 and P-20) to 12 inches.
- Added jumper pipe at 48th Ave S. Added P-265, J-316, and J-317.
- Added Foster Point pipe network. Added P-605 through P-609, J-290 through J-294.
- Modified Allentown pipe network per drawings. Modified elevations in Allentown to match drawings.
- Made pipes P-23 and P-24 inactive per City comments.
- Made pipe P-600 active with diameter of 12" per City comments.

PRV Station Update:

- Revised PRV elevation, size, and pressure settings per City data as provided in Chapter 4, Table 4.6.

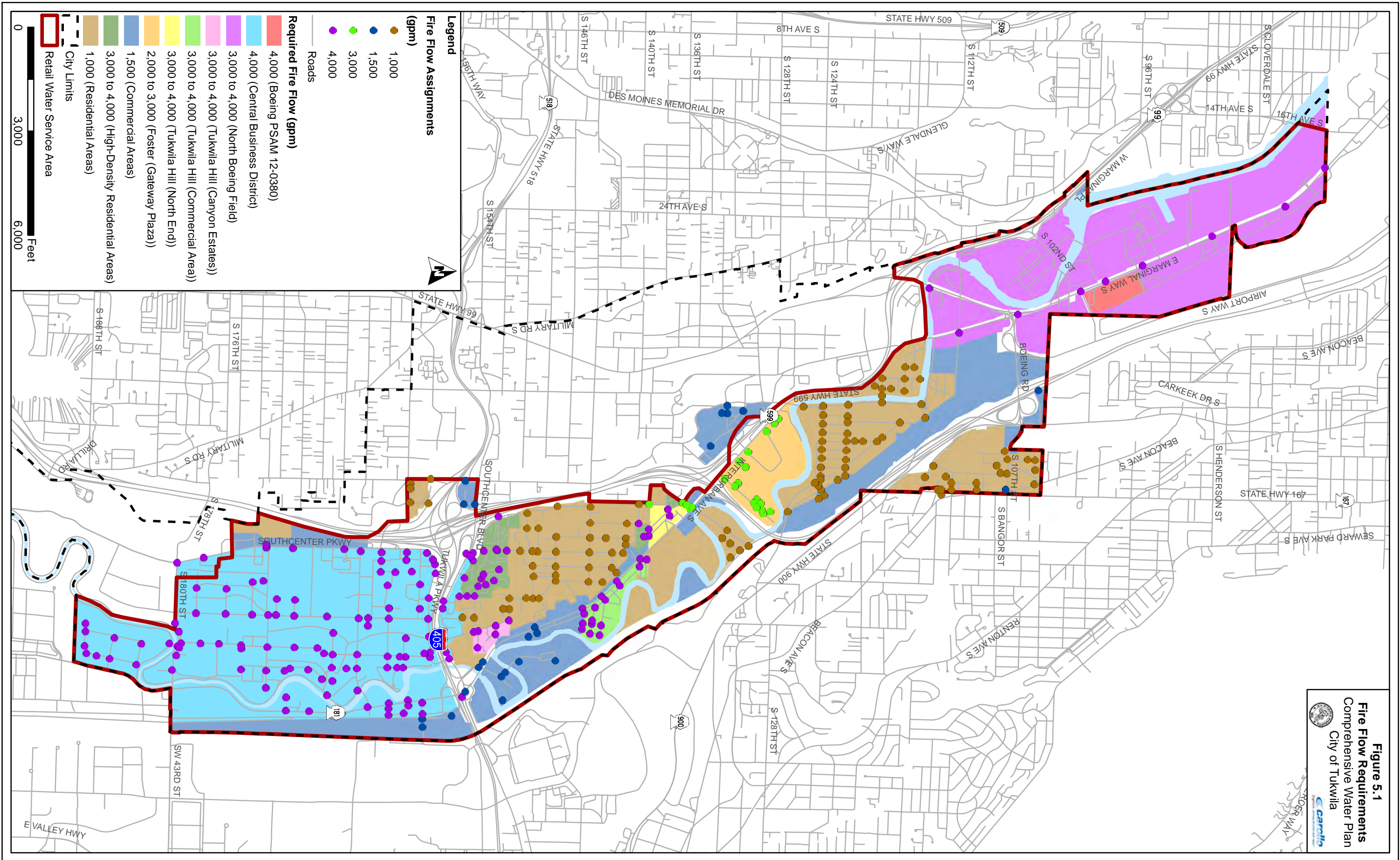
• Fire Flow Updates:

- Updated fire flow requirements of the 'Base-Fire Flow' alternative for each node per direction from City staff and fire chief. Figure 5.1 presents the required fire flow designations for each area.

• Demand Updates:

- Created new Demand Alternatives: 2016 ADD, 2016 MDD, 2030 ADD, 2030 MDD.
- Distributed 2016 and 2030 demands (per Chapter 2) to nodes in the model. Demands were developed for each pressure zone using the same methodology as outlined in Chapter 2. Distributed demands excluded the demands associated with the top ten water users.
- Identified the City's most current top ten water users, as shown in Table 5.1. Assigned the five-year average water demand to nodes representing the top ten users. Created two new nodes representing different Boeing accounts in order to assign high demands.

Account	Name	Address	5-Year Average Demand	Model Node
08-0790	SHASTA	1227 Andover East	44.8	Shasta
07-0002	WESTFIELD	2800 Southcenter Mall	34.8	268
12-0380	BOEING	9747 East Marginal Way S	34.7	521
12-0385	BOEING	9747 East Marginal Way S	24.5	521
07-0001	WESTFIELD	2800 Southcenter Mall	25.7	264
08-0214	CHA S/C	16500 Southcenter Parkway	25.4	438
12-0255	BOEING	7755 East Marginal Way S	23.9	1053
15-0585	EMBASSY	15420 East Valley Hwy	24.5	241
12-0360	BOEING	9407 East Marginal Way S	22.1	1056
12-0309	JORGENSEN	8531 East Marginal Way S	21.8	436



5.2 CALIBRATION

The purpose of the water system hydraulic model is to estimate, or predict, how the water system will respond under a given set of demand conditions. One way to test the accuracy of the hydraulic model is to create a set of known conditions in the water system and then compare the results observed in the field against the results of the hydraulic model simulation using the same conditions. Flow tests conducted in the field on the water system are a standard method to confirm the accuracy of the data used in the hydraulic model construction. Analysis of the flow test data also provides a greater understanding of how the water system operates.

Field testing can indicate errors in the data used to develop the hydraulic model, or show that a condition might exist in the field that is not otherwise known. For example, valves, which are reported as being open, might actually be closed (or vice versa), an obstruction could exist in a pipeline, or pressure settings for a PRV may be different than noted. Field testing can also correct erroneous model data such as incorrect pipe diameters or connections. Data obtained from the field tests can be used to determine appropriate roughness coefficients for mains, as the roughness coefficient can vary with age and pipe material.

5.2.1 Hydrant Flow Test Calibration

The main method of field-testing is to compare model results to field pressures measured during a series of hydrant flow tests. This process is used to develop a calibrated hydraulic model by closely matching model simulated pressures to field pressures under similar demand and system boundary conditions. The model parameter that is adjusted during this process is primarily the pipeline roughness coefficients, although other parameters can also be adjusted as calibration results are generated.

Hazen-Williams roughness coefficients, or C-factors, have industry accepted value ranges based on pipeline material, diameter, and age. Characteristics specific to the City's water distribution system such as water quality, temperature, construction methodologies, material suppliers, and other factors may result in roughness coefficients that differ from the average of the industry accepted ranges. Fire flow calibration refines the value of roughness coefficients that best indicate the conditions of the City's distribution system.

During average day flows, roughness coefficients have a relatively small effect on the operation of the distribution system. However, as the flows increase in the system on higher demand days or during fire flows, velocity within pipelines increase and roughness coefficients contribute more to overall system headloss. Fire flow tests artificially create high demand events to generate more headloss, allowing a better estimation of the pipeline roughness coefficients.

Fire flow tests stress the distribution system by creating a differential between the hydraulic grade line (HGL) at the point of hydrant flow and the HGL of water supply and/or reservoirs. This HGL differential increases the effect of the roughness coefficients on system losses and allows adjustments to the model to match model pressures to field pressures within an acceptable tolerance. As the model is adjusted to match system pressures, roughness coefficients should be adjusted only within a tolerance of industry accepted roughness coefficient ranges.

If a model is unable to match the calibration results without leaving the acceptable range of roughness coefficient values (C-values) for a given pipeline material and age, there may be cause for further investigation of a previously unknown field condition. Examples of such conditions, which typically arise during hydraulic model calibration, include closed valves, partially closed or malfunctioning valves, extreme corrosion within pipelines, connectivity and diameter errors, and diurnal patterns of large water users.

The City has performed and documented several hydrant flow tests over the last 15 years. Four additional tests were performed as part of this project so that the most current data available could be utilized to update the model. The sites were selected so that each of the City's pressure zones had at least one fire flow test and so that the locations were not near pump stations, valves, or storage facilities, if possible. Two tests performed in 2006 were also used to calibrate the model. Model conditions for these two tests used the configuration, demands, and controls established in the original model. The fire flow test locations are shown on Figure 5.2.

Each fire test was conducted at two adjacent hydrants; one hydrant was used as the "flowing" hydrant while pressure measurements were collected at the second "pressure" hydrant. Prior to the flow test, the static pressure was measured at the pressure hydrant. Next, the flowing hydrant was opened to release a large amount of flow and to cause a significant headloss and pressure drop. With the flowing hydrant open, the residual pressure was measured at the pressure hydrant. A pitot meter was used to measure pressure and flow at the flowing hydrant. Hydrant flow was estimated using a standard table of flows given nozzle diameter and pressure reading. The City also estimated flow using the standard "Q Formula" for hydrant tests.

The City also noted other operational data at the time of the hydrant tests, such as booster pumps running.

Two model simulations, or scenarios, were created in the hydraulic model for each fire flow test. The first scenario was called the "static" run, which simulated the water system just prior to each test. The second scenario, referred to as the "residual" run, simulated the system during the test while the hydrants were flowing. A total of six tests were performed on the system and therefore a total of 12 computer simulations were created to calibrate the model.

In both static and residual model scenarios, model demands were scaled up or down to represent the model demand during the fire flow test as reasonably as possible. In addition, the initial status of the City's booster pumps were modified so that they matched actual conditions (i.e., open or closed) recorded during the tests.

The residual model scenarios are identical to the appropriate static model scenarios, except that fire flow demands were added to the appropriate nodes.

5.2.2 Model Calibration Results

Numerous simulations were performed during the calibration phase. Adjustments were made to the model between runs to minimize the differences between the model and field results. A detailed summary of the calibration results is shown in Table 5.2. The table lists the results of each field test conducted and the corresponding hydraulic model results.

For the pressure hydrants, the results are considered acceptable if the model simulated pressures are within 10 psi or have a 10 percent difference to the field data. Model pressures within 5 psi or 5 percent of the field measurements are considered very good. As shown in Table 5.2, the model simulations of Tests 1, 2, and 5 resulted in residual pressure differences over 10 psi or 10 percent of the field measured pressures. For the majority of the tests, the model simulated residual pressures were low compared to the field measured pressures. This indicates that the model is predicting more headloss through the pipes than may actually be experienced in the field. The first calibration modification to the model was to increase the C-values of some pipes. All pipes with an existing C-value of 100 were revised to have a C-value of 110. Re-running the calibration tests with the higher C-values improved the results of all tests, except Test 5. The adjustments led to revised Test 1 and 2 results that meet the calibration criteria.

The model predicted much higher residual pressures for Test 5, which was performed in the Tukwila Hill area. The first assumption was that the check valves supplying flow from the 360 Zone to the 400 Zone during low pressure conditions were not properly functioning during the hydrant test. However, the City reports that it annually exercises these valves, so it is unlikely that they are inoperable.

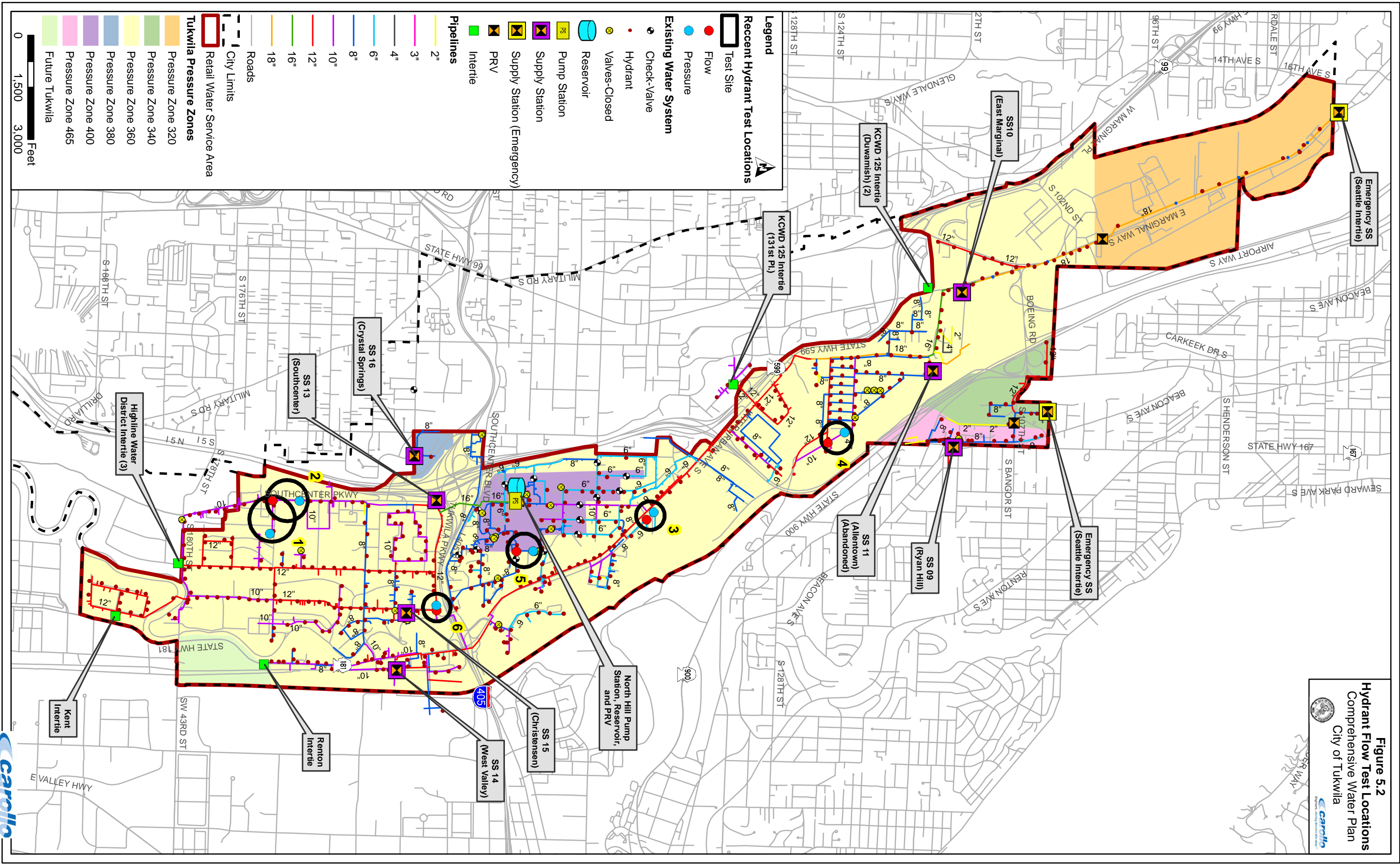
The City performed the hydrant test again, resulting in slightly higher residual pressures (74 psi). During the test, the two High Pumps flows and discharge pressure were also recorded. The City noted a drop in the discharge pressure from 68 psi to approximately 50 psi during the hydrant test, while the High Pumps were running at 550 gpm. The drop in discharge pressure indicates that the pumps are running at full speed and are unable to maintain the discharge pressure setting of 68 psi. Comparing these operation points to the pump curve indicates that the pumps are likely running below their pump curve, indicating pump wear. City staff indicate that this is a likely cause; the pumps were last repaired approximately 10 years ago (2001).

To reflect the worn pumps, the pump curve in the model was reduced by 15 percent. Re-running Test 5 results in a similar pressure drop at the discharge of the pumps, and a residual pressure of 80 psi at the Test 5 Pressure Hydrant. This brings the Test 5 calibration to within the 10 percent criterion.

Table 5.3 presents the model results after the adjustments were made. As seen in the table, all tests met the criteria after the model adjustments were made.

5.3 SUMMARY

The City's WaterCAD model was updated to reflect the most current conditions of the water system according to City staff. The model was then calibrated with six hydrant flow tests to identify any other necessary adjustments to improve the model's ability to accurately predict real world conditions. Based on the calibration results, small modifications to the model were made including adjusting roughness coefficient values of pipes and adjusting the performance of the High Pumps. The adjustments allow the model to match field conditions to within a standard criterion. Given the updates and calibration, the model is considered to be sufficient for representing the distribution system for the system analysis.



Test No.	Date	Site	Site Location	Model Junction Number	Flow Hydrant		Static				Residual				Static – Residual		
					Pitot Pressure, psi	Flow, gpm	Measured, psi	Modeled, psi	Diff, psi	Diff (%)	Measured, psi	Modeled, psi	Diff, psi	Diff (%)	Measured, psi	Modeled, psi	
1	8/12/2006	Flow Hydrant	Hydrant 165D South Side of Minkler	CBD-19	72	2,848											
		Pressure Hydrant	Hydrant 165E South Side of Minkler	CBD-324			150	149	-1	-1%	122	109	-13	-11%	28	40	
2	8/12/2006	Flow Hydrant	Hydrant 167; 17130 Southcenter Blvd	CBD-19	75	2,906											
		Pressure Hydrant	Hydrant 168; 17000	CBD-20			150	149	-1	-1%	130	115	-15	-11%	20	34	
3	5/25/2011	Flow Hydrant	Hydrant 17: George Long Shop - Maule Ave South	J-142	128	1,345											
		Pressure Hydrant	Hydrant 16:	J-139 ²			145	150	5	4%	140	138	-2	-2%	5	13	
4	5/25/2011	Flow Hydrant	Hydrant 294: Allentown BNSF 51st Place S	SF-229	130	1,356											
		Pressure Hydrant	Hydrant 295	SF-277 ²			149	148	-1	-1%	145	135	-10	-7%	4	13	
5	5/25/2011	Flow Hydrant	Hydrant 48: Tukwila Hill S 158th & 62nd Ave S	N-189	77	1,036											
		Pressure Hydrant	Hydrant 49	N-265 ³			98	102	4	4%	70	81	11	16%	28	21	
6	5/25/2011	Flow Hydrant	Hydrant 198D: CBD N end of Christensen Rd South I-405	CBD-72	120	1,303											
		Pressure Hydrant	Hydrant 203	CBD-79			142	145	3	2%	140	139	-1	-1%	2	6	

Test No.	Date	Site	Site Location	Model Junction Number	Flow Hydrant		Static				Residual				Static – Residual		
					Pitot Pressure, psi	Flow, gpm	Measured, psi	Modeled, psi	Diff, psi	Diff (%)	Measured, psi	Modeled, psi	Diff, psi	Diff (%)	Measured, psi	Modeled, psi	
1	8/12/2006	Flow Hydrant	Hydrant 165D South Side of Minkler	CBD-19	72	2,848											
		Pressure Hydrant	Hydrant 165E South Side of Minkler	CBD-324				150	149	-1	-1%	122	116	-6	-5%	28	40
2	8/12/2006	Flow Hydrant	Hydrant 167; 17130 Southcenter Blvd	CBD-19	75	2,906											
		Pressure Hydrant	Hydrant 168; 17000	CBD-20				150	149	-1	-1%	130	121	-9	-7%	20	34
3	5/25/2011	Flow Hydrant	Hydrant 17: George Long Shop - Maule Ave South	J-142	128	1,345											
		Pressure Hydrant	Hydrant 16:	J-139 ²				145	150	5	4%	140	139	-1	-1%	5	13
4	5/25/2011	Flow Hydrant	Hydrant 294: Allentown BNSF 51st Place S	SF-229	130	1,356											
		Pressure Hydrant	Hydrant 295	SF-277 ²				149	148	-1	-1%	145	136	-9	-6%	4	13
5	5/25/2011	Flow Hydrant	Hydrant 48: Tukwila Hill S 158th & 62nd Ave S	N-189	77	1,036											
		Pressure Hydrant	Hydrant 49	N-265 ³				98	102	4	4%	74	80	6	8%	28	21
6	5/25/2011	Flow Hydrant	Hydrant 198D: CBD N end of Christensen Rd South I-405	CBD-72	120	1,303											
		Pressure Hydrant	Hydrant 203	CBD-79				142	145	3	2%	140	139	-1	-1%	2	6

DISTRIBUTION SYSTEM ANALYSIS

6.1 INTRODUCTION

The purpose of this chapter is to summarize the City's water distribution system deficiencies by evaluating the storage facilities, pump stations, and pipelines against the selected criteria presented in Chapter 1. The evaluation focuses on ensuring adequate system capacity is available for future water demands in the City. The evaluation of the pipeline capacities was conducted using the City's WaterCAD hydraulic model. The storage and pump station capacity evaluations were conducted in Microsoft Excel. Improvements identified in this chapter are summarized in the CIP in Chapter 8.

6.2 EVALUATION SCENARIOS

The system was evaluated for both short-term (2016) and long-term (2030) capacity. For both scenarios, it was assumed that the Cascade Water Alliance (CWA) supply sources were on and were providing MDD flows. No other supply sources were assumed to be utilized for this evaluation. The following scenarios were evaluated:

- Short-term, 6-year (2016), MDD provided by CWA supply sources.
- Long-term, 20-year (2030), MDD provided by CWA supply sources.

The following sections summarize the evaluation of the storage, pump stations, and pipelines for these two scenarios.

6.3 STORAGE EVALUATION

The City currently operates a 2-MG storage tank at North Hill (15045 57th Avenue South). The reservoir is the sole storage facility for the City. For the purpose of the storage evaluation, the City's pressure zones were combined into three service levels, as shown in Figure 6.1. These are described as follows:

- 360 Service Level: This service level includes Pressure Zones 360, 320, and 400. This area is served by the North Hill Reservoir.
- 465 Service Level: This service level includes the Pressure Zones 465 and 340. This service level was previously served by the Seattle Public Utilities (SPU).
- 380 Service Level: This service level includes only Pressure Zone 380. This area was previously served by Highline Water District.

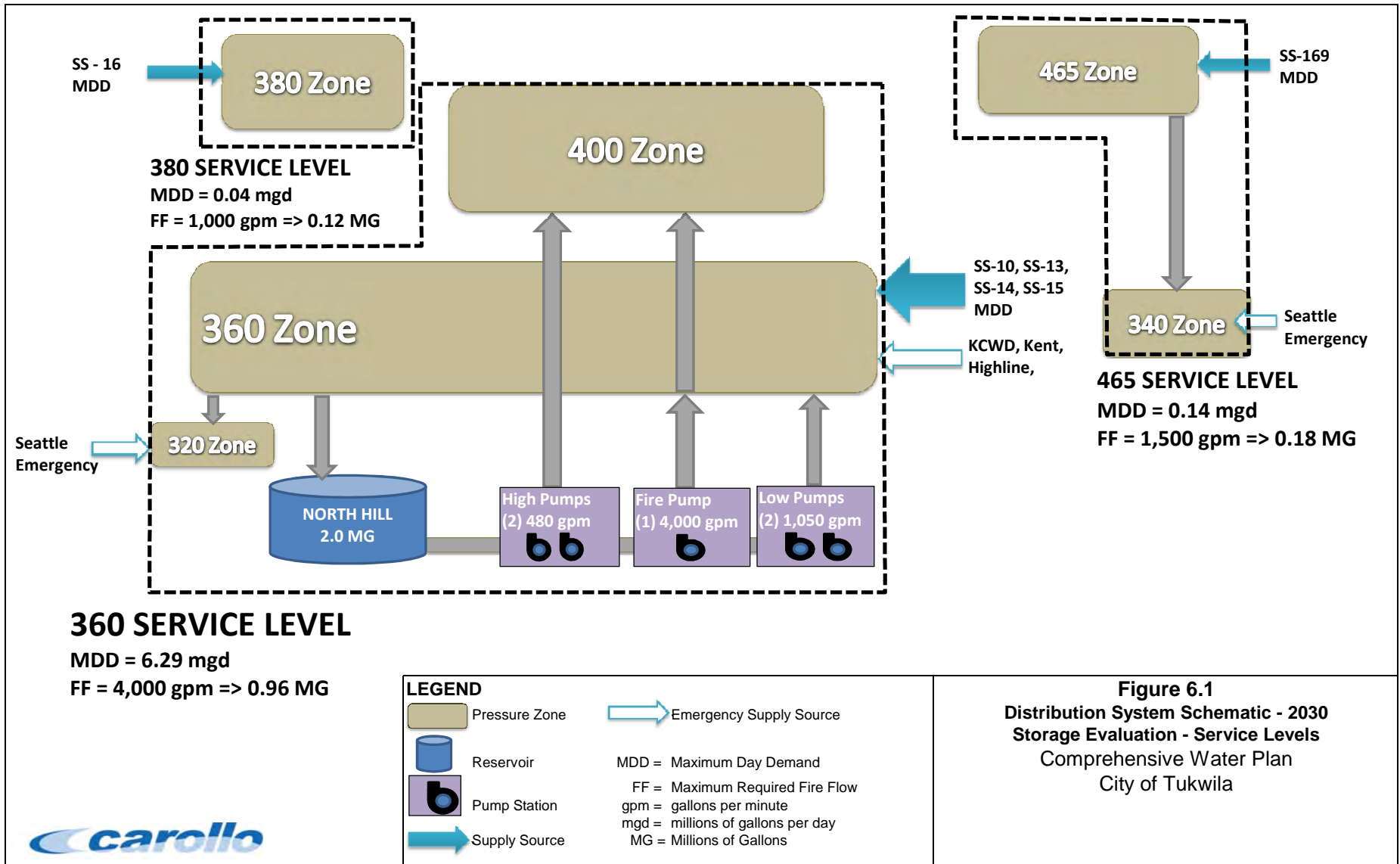


Figure 6.1
Distribution System Schematic - 2030
Storage Evaluation - Service Levels
 Comprehensive Water Plan
 City of Tukwila



6.3.1 Storage Requirements

Chapter 1 presented the distribution storage criteria, as summarized in Table 6.1 below. In addition, storage volume must be provided in conformance with the DOH storage requirements. Criterion 4.1 requires an alarm system at the reservoir. Criteria 4.2 and 4.3 relate to storage capacity. These criteria are addressed by the DOH standard storage requirements, as discussed below.

Table 6.1 Distribution Storage Criteria		
	Policy	Source
4.1	<i>Storage facilities will include an alarm system that notifies the operator(s) of overflows, or when the storage level drops below the point where the equalizing storage volume is depleted.</i>	<i>DOH Water System Design Manual 5.7.1</i>
4.2	<i>Storage is sufficient to ensure that fire suppression service will be available while not allowing pressure to drop below 20 psi at any service connection.</i>	<i>DOH Water System Design Manual 5.7.1</i>
4.3	A minimum standby volume of 200 gallons per residential equivalent residential unit (ERU) and 100 gallons per commercial ERU is provided regardless of the capacity of the sources available.	<i>DOH Water System Design Manual 5.7.1</i>

The DOH (WAC 246-290-235(3) and Water System Design Manual, Chapter 9) requires consideration of the following five components of storage for any water system:

1. Operational Storage
2. Equalizing Storage
3. Standby Storage
4. Fire Storage
5. Dead Storage

The five types of storage are shown in Figure 6.2. It is recommended that the City combine the requirements for Fire Storage and Standby Storage by nesting these required volumes (i.e., the same volume can be used for both fire and standby storage).

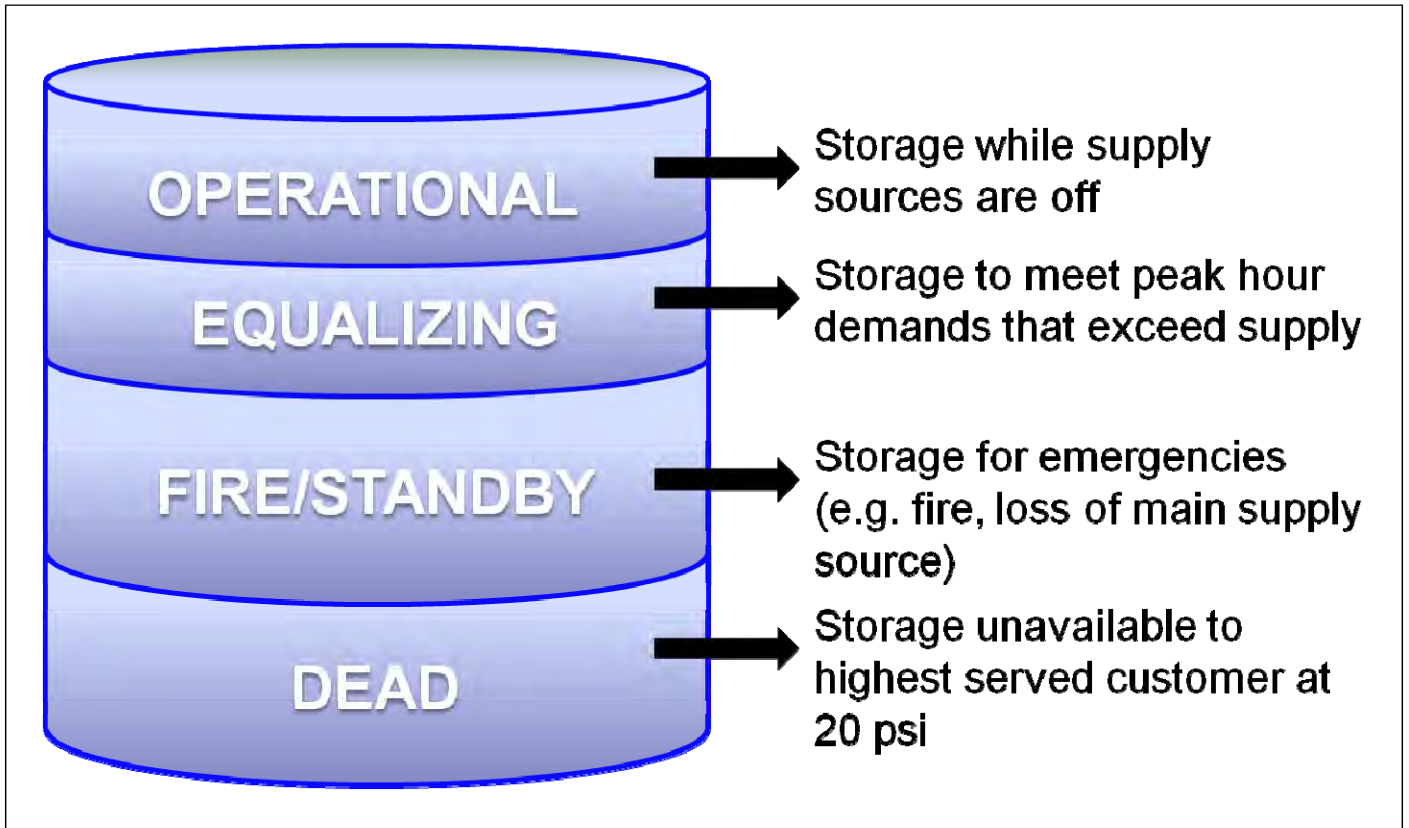


FIGURE 6.2
SUMMARY OF FIVE TYPES OF STORAGE
REQUIRED BY DEPARTMENT OF HEALTH
Comprehensive Water Plan
City of Tukwila

6.3.1.1 Operational Storage

Operational Storage is typically estimated based on the amount each reservoir drops prior to calling on the supply sources, and is measured as the volume of water stored between the pump call-off and pump call-on levels. This volume is dependent on the settings of the water level sensors controlling the well pumps and is designed to prevent excess cycling of pump motors.

For the City, all sources are operated continuously; sources are not “called” based on the tank level. Hence, no operational storage is required for the City.

6.3.1.2 Equalizing Storage

Equalizing Storage is the volume needed to satisfy the peak hour demand (PHD) that exceeds the capacity of the supply system. Equalizing volume requirements can be calculated using the following equation:

$$ES = (PHD - Q_s) * 150 \text{ minutes, but in no case less than zero.}$$

Where: ES = Equalizing storage component, in gallons.

PHD = Peak hourly demand, in gpm.

Q_s = Sum of all installed and active source of supply capacities, except emergency sources of supply, in gpm.

The Equalizing Storage requirements for each service level were calculated following this method. The supply commitment from Cascade specifically states that:

“The policy of Cascade is to supply wholesale water to its Members at the twenty-four hour average flow rate (Annual Average Demand [ADD] and Maximum Day Demand [MDD]). Members are expected to provide storage for peaking above such average flow rates”¹

The physical capacity of the City's water supply stations exceed the MDD, as shown in Table 4.2; therefore, the Cascade's policy was used to determine the available supply capacities. Therefore, Q_s was assumed to be the MDD in the above equation when calculating the equalizing storage.

For the storage analysis, PHD was calculated using the following equation from the DOH Water System Design Manual:

$$PHD = (MDD / 1440)(C * N + F) + 18$$

Where: MDD = Maximum Day Demand, gpd/ERU.

C = Coefficient Associated with Ranges of ERUs.

N = Number of ERUs.

F = Factor Associated with Ranges of ERUs.

¹ Draft Cascade Water Alliance Water Supply Commitment – October 2004, p. 3

Table 6.2 identifies the appropriate coefficients and factors for use with the above equation.

Table 6.2 Coefficients and Factors for PHD Equation		
Number of ERUs (M)	C	F
15-50	3.0	0
51-100	2.5	25
101-250	2.0	75
251-500	1.8	125
> 500	1.6	225

6.3.1.3 Standby Storage

Standby Storage is the volume of storage required to supply reasonable system demands during a system emergency, such as disruption of the water supply. Disruptions could be caused by transmission pipeline or equipment failure, power outage, valve failure, or other system interruptions. The computation of standby storage requirements includes consideration of reasonable system disruptions that can be expected to occur within normal planning contingencies, and does not consider major system emergencies, such as earthquakes. These types of emergencies should be covered under emergency system operation planning.

The multiple connections to the CWA system are considered to be multiple sources of supply. Standby Storage was calculated as:

$$SS = 200 * N_{Res} + 100 * N_{Comm}$$

Where: SS = Standby Storage.

N_{Res} = Number of Residential ERUs.

N_{Comm} = Number of Commercial ERUs.

6.3.1.4 Fire Suppression Storage

Fire Suppression Storage is the volume of storage required to deliver fire flows as prescribed by local fire protection authorities, while maintaining a minimum pressure of 20 psi throughout the rest of the system. Since a fire can occur at any time during the day, the fire storage must be in addition to the equalizing storage.

Fire flow demand is the quantity of water required for fire fighting as defined by applicable water system criteria and fire codes. Fighting fires often places the largest demands on a water system because a high volume of water must be supplied over a short time. Such demands require each system component to operate at its optimal condition.

Fire flows required by existing structures vary within the water service area. Figure 5.1 in Chapter 5 presents the required fire flows throughout the system. Table 6.3 summarizes the range of required fire flow in each pressure zone, and Table 6.4 presents the maximum fire

demand for the service levels evaluated for storage. The fire suppression storage volume, provided in the table, is the product of the fire flow rate and required duration.

Pressure Zone	Minimum Fire Flow, gpm	Maximum Fire Flow, gpm
320	3,000	4,000
340	1,000	1,500
360	1,000	4,000
380	1,000	1,000
400	1,000	4,000
465	1,000	1,500

Service Level	Maximum Fire Flow, gpm	Duration, hrs	Fire Volume, MG
360 Service Level	4,000	4	0.96
465 Service Level	1,500	2	0.18
380 Service level	1,000	2	0.12

6.3.1.5 Dead Storage

Dead Storage is the volume of water at the bottom of a storage tank that is unusable. Storage volume is considered dead if it is located below the outlet pipe and cannot be used because of system hydraulic limitations, or if it is located below the lowest water surface elevation that can provide 20 psi of pressure to the highest service connection in the service level.

For the City, dead storage in the North Hill tank is negligible since the pumps are able to draw the water out of the reservoir completely.

6.3.2 Summary of Required Storage

Table 6.5 summarizes the total storage requirements for each service level for the planning years. The results for the year 2030 are also presented on Figure 6.3. For all service areas, the total storage required is computed by using the maximum of the standby or fire suppression storage. This method reflects the ability of the system to nest fire and standby storage volumes.

The 360 Service Level is currently served by North Hill Reservoir, which has a capacity of 2.0 MG. As presented in Table 6.5, the current storage requirements exceed the total available reservoir volume. By year 2030, the deficit is approximately 1.3 MG (3.3 MG – 2.0 MG = 1.3 MG). The City does not currently provide storage for the 465 and 380 Service Levels. The City is currently in discussion with Highline Water District to lease a portion of Highline's existing

storage to serve the 380 Service Level; therefore, the future fire suppression storage volume were reported in Table 6.4.

City Criteria allows for fire flows to be served by fire suppression storage and/or source of supply (i.e. supply stations, emergency interties, PRVs from upper zones). Sources of supply without storage must be able to meet DOH criteria: MDD plus the Fire Flow during the PHD of the supplying zone. The 465 Service Level's projected 2030 MDD is 0.14 mgd or 98 gpm and a maximum fire flow of 1,500 gpm; therefore, 2030 supply requirements are 1,598 gpm. The 465 Service Level is served by SS – 169 and the Seattle Emergency Intertie, which have a combined supply of 2,050 gpm, as presented in Table 4.2. Therefore, no fire suppression storage was required for this zone.

Table 6.5 Required Storage						
Year	Equalizing Storage, MG	Standby Storage, MG	Fire Suppression Storage, MG	Total Required Storage, MG	Total Existing Storage, MG	Storage Surplus / (Deficit)
360 Service Level						
2010	0.20	1.30	0.96	1.50	2.00	0.50
2016	0.30	1.78	0.96	2.04	2.00	(0.04)
2030	0.40	2.90	0.96	3.30	2.00	(1.30)
380 Service Level						
2010	0.01	0.00	0.12	0.13	-	(0.13)
2016	0.01	0.01	0.12	0.13	-	(0.13)
2030	0.01	0.02	0.12	0.13	-	(0.13)

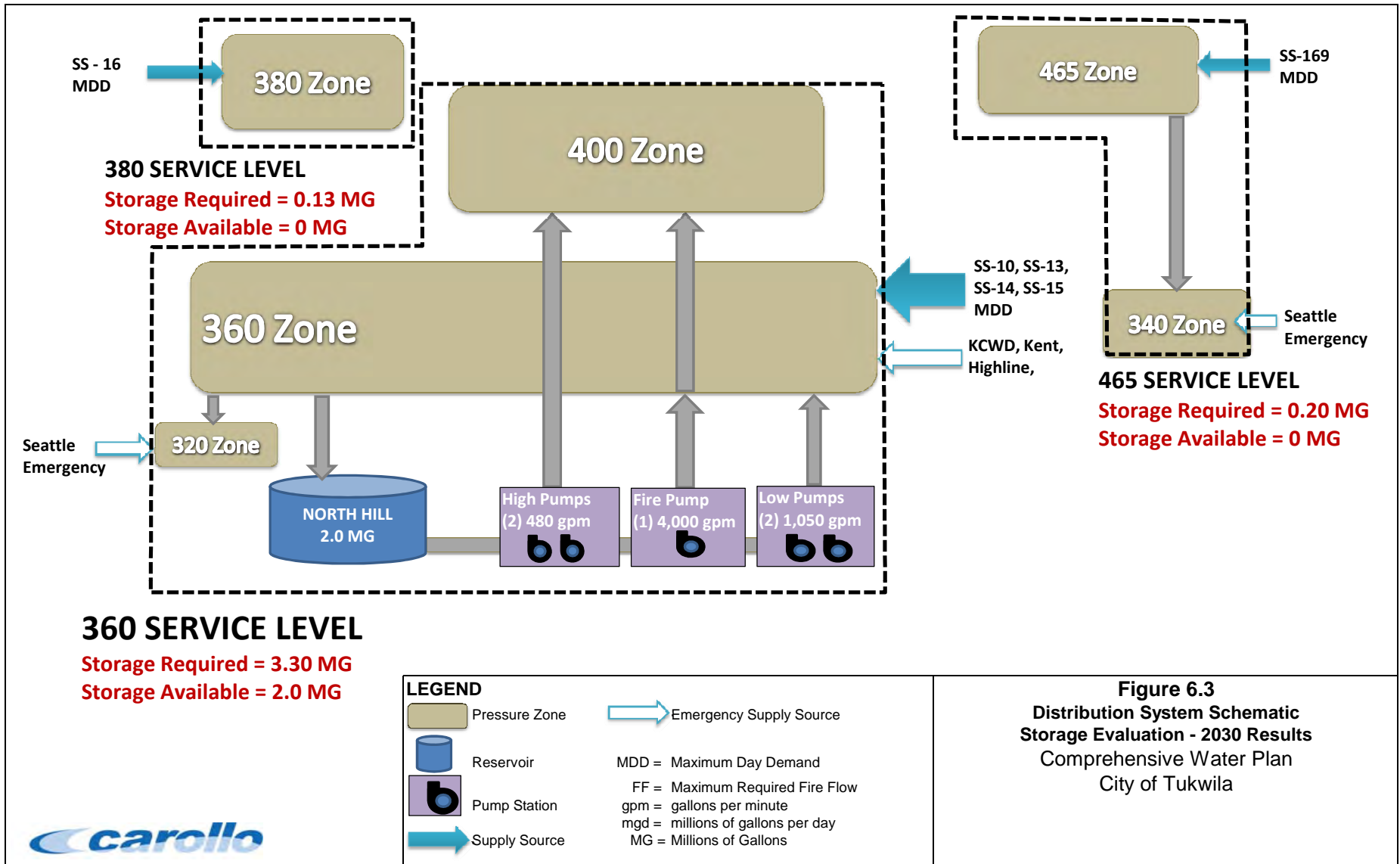


Figure 6.3
 Distribution System Schematic
 Storage Evaluation - 2030 Results
 Comprehensive Water Plan
 City of Tukwila

6.3.3 Storage Recommendations

Based on the results of the storage evaluation, the following actions are recommended to address the storage deficiencies identified in the storage evaluation:

- 360 Service Level:
 - Construct a new reservoir (1.3 MG); conduct a siting evaluation to confirm the location.
 - Contact neighboring agencies for excess storage available to reduce size of new reservoir.
 - Install an alarm system to monitor equalizing storage in the North Hill Reservoir.
- 465 Service Level:
 - No storage improvements are required.
- 380 Service Level:
 - Install a permanent connection from the Highline Water District.
 - Lease emergency and fire suppression storage storage from the Highline Water District.

6.4 PUMP STATION EVALUATION

The City currently has three pump stations that boost water from the North Hill Reservoir to the distribution system: the Low Pumps, High Pumps, and Fire Pump. Table 4.5 in Chapter 4 summarizes the pumps and capacities in each of these pump stations.

The pumps are used to serve different service levels, as shown in Figure 6.4. The High Pumps are used to meet all the demands of the 400 Service Level, as no other supply sources enter this service level. The Low Pumps are used to supplement demands in the 360 Service Level (which includes the 360 Zone and 320 Zone). This service level has several other supply sources, thus the pumps are supplemental. The fire pump can boost water to both the 400 and 360 Service Levels.

Table 6.6 summarizes the total, firm, and reliable pump capacities for each service level. The total capacity is the sum of the pumping capacity of each pump. The firm capacity is defined as the total pumping capacity minus the largest pump. The reliable capacity is defined as the total pumping capacity of pumps with back-up power. As seen in the table, no reliable capacity is available as none of the pumps have back-up power. The pump station evaluation uses the total capacity available.

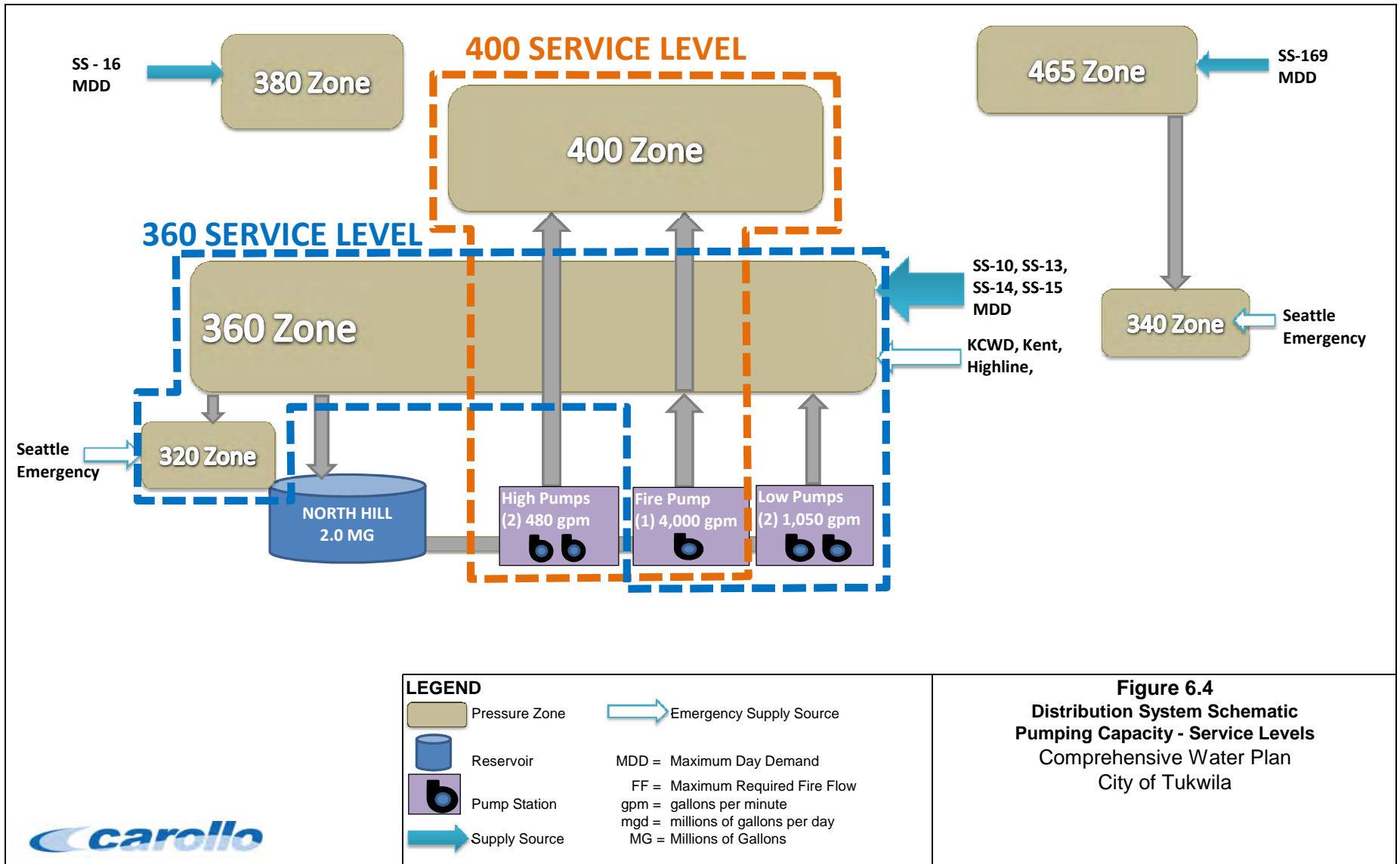


Figure 6.4
Distribution System Schematic
Pumping Capacity - Service Levels
 Comprehensive Water Plan
 City of Tukwila

Pump Capacity	Total Capacity, gpm	Firm Capacity, gpm	Reliable Capacity, gpm
400 Zone			
High Pumps	960	480	0
Fire Pump	4,000	0	0
Total 400 Zone	4,960	960	0
360 Zone			
Low Pumps	2,100	1,050	0
Fire Pump	4,000	0	0
Total 360 Zone	6,100	2,100	0

The following sections outline the pumping requirements, resulting deficiencies, and pump improvement recommendations.

6.4.1 Pumping Requirements

Chapter 1 presented three criteria for booster pump stations, as summarized in Table 6.7 below. Criteria 3.1 and 3.3 relate to back-up power and automatic shut-off equipment for pump stations. Criterion 3.2 relates to pump station capacity, as discussed below.

	Policy	Source
3.1	<i>Pump stations will have power connections to two independent primary public power sources, or either portable or in-place auxiliary power or pigging available, if the pumps provide fireflow or are pumping from ground-level storage.</i>	<i>DOH Water System Design Manual 5.7.1</i>
3.2	<i>System should provide a minimum of 20 psi at the intake of the pumps under peak hour demand (PHD) or fireflow-plus-MDD-rate conditions.</i>	<i>DOH Water System Design Manual 5.7.1</i>
3.3	<i>An automatic shut-off in place for when the intake pressure drops below 10 psi.</i>	<i>DOH Water System Design Manual 5.7.1</i>

As stated in Criterion 3.2, two criteria are used to evaluate pump station capacities. The first is to provide adequate flow to meet peak hour demands; the second is to provide adequate flow to meet fire flow demands during a maximum demand day. The required pumping in the 400 Service Level was evaluated against these two criteria.

For the 360 Service Level, the criteria were revised to reflect the fact that this area is largely served by external supply sources other than those required by the pump station. These supplies provide maximum day demands, thus the pumps serving this area are only required to provide PHD minus the MDD. This equates to providing the equalizing storage held in the North Hill Reservoir to meet peak hour demands.

The following summarizes the capacity evaluation criteria used:

400 Service Level (Closed Zone - No Storage/Supply):

1. Provide Peak Hour Demand (PHD)
2. Provide Max Day Demand (MDD) + Maximum Fire Flow (FF)

360 Service Level (Open Zone with Storage/Supply):

1. Provide Equalizing Storage (PHD – MDD)
2. Provide Equalizing Storage + Maximum Fire Flow (PHD – MDD + FF)

Table 6.8 presents a summary of the pumping requirements to meet these criteria for both service levels for the selected planning years. As seen in the table, the pump station capacity is adequate for meeting the pumping requirements for both the 400 Service Level and the 360 Service Level for both Criteria 1 and 2.

It is important to note that the pumping capacity evaluation for Criteria 2 used the total pump station capacity rather than the firm pump station capacity. The City may want to consider reviewing the system for redundancy, such as providing adequate peak flows when one pump is out of service.

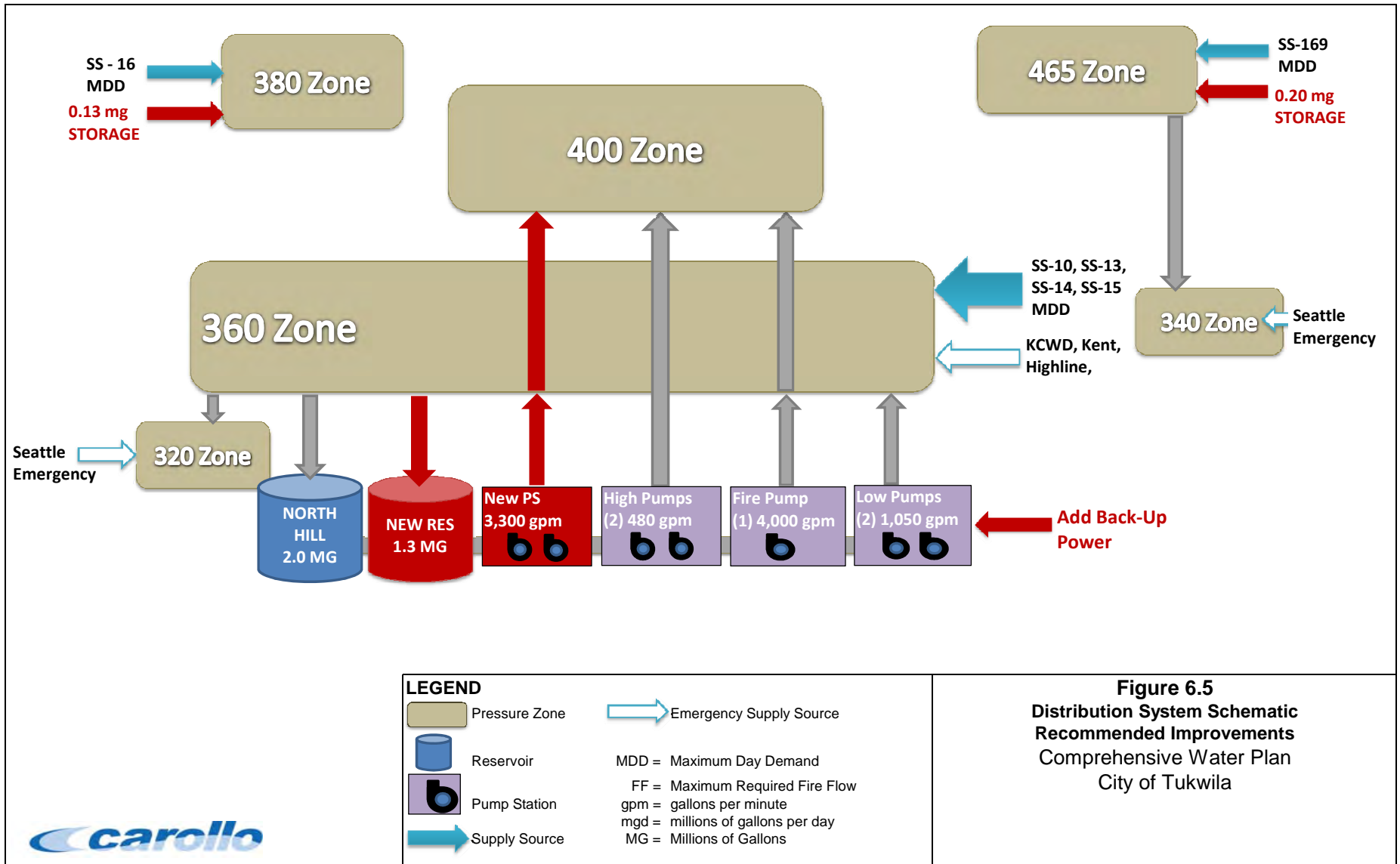
	Units	400 Service Level			360 Service Level		
		2016	2020	2030	2016	2020	2030
MDD	gpm	220	232	260	2,571	3,007	4,097
PHD ⁽¹⁾	gpm	280	294	330	3,265	3,819	5,203
PHD - MDD	gpm	59	63	70	694	812	1,106
Maximum Fire Flow	gpm	4,000	4,000	4,000	4,000	4,000	4,000
Criteria 1: PHD							
PHD	gpm	280	294	330	N/A	N/A	N/A
PHD - MDD	gpm	N/A	N/A	N/A	694	812	1,106
Pump Station Capacity ⁽²⁾	gpm	960	960	960	2,100	2,100	2,100
Excess (Deficiency)	gpm	680	666	630	1,406	1,288	994
Criteria 2: Max FF + Peak Demands							
MDD + Max FF	gpm	4,220	4,232	4,260	N/A	N/A	N/A
PHD - MDD + Max FF	gpm	N/A	N/A	N/A	4,694	4,812	5,106
Pump Station Capacity ⁽³⁾	gpm	4,960	4,960	4,960	6,100	6,100	6,100
Excess (Deficiency)	gpm	740	728	700	1,407	1,288	994
Notes:							
1. PHD is 1.27 x MDD							
2. Fire pump is not used to meet PHD; Total Pump Station Capacity is used.							
3. Total Pump Station Capacity is used.							

6.4.2 Pumping Recommendations

Based on the results of the pumping evaluation, the following actions are recommended to address the pumping deficiencies:

- General:
 - Add back-up power to all pump stations to improve reliability.
 - Add automatic shut-off for intake pressures below 10 psi.
- 400 Zone:
 - None.
- 360 Zone:
 - A new pump station will likely be required in conjunction with the recommended new 1.3-MG storage tank. A 3,300 gpm capacity pump station will provide enough firm pump capacity that adequate fire flows can be pumped to the 400 Service Level even with the largest pump out of service.

The pumping and storage recommendations are presented in Figure 6.5. These recommendations will be included in the Capital Improvements Plan for further evaluation.



6.5 PIPE EVALUATION

The City's pipes were evaluated for adequate capacity to provide peak demands and fire flows. Chapter 1 summarized the criteria used for evaluating the water system's distribution pipes. These criteria are repeated below in Table 6.9.

	Policy	Source
5.1	<i>Distribution mains should be looped whenever feasible.</i>	<i>DOH Water System Design Manual 5.7.1</i>
5.2	<i>Pipeline velocities will not be designed to exceed 8 feet per second under PHD conditions</i>	<i>DOH Water System Design Manual 5.7.1</i>
5.3	<i>All pipelines should be capable of being flushed at a flow velocity of at least 2.5 fps</i>	<i>DOH Water System Design Manual 5.7.1</i>
5.4	<i>All mains and distribution lines should be constructed with appropriate internal and external corrosion protection.</i>	<i>DOH Water System Design Manual 5.7.1</i>
5.5	<i>Any pipeline designed to provide fire flow must be at least six inches in diameter. In residential zones, water mains shall be 8-inches in diameter. In non-residential zones, water mains shall be at least 12-inches in diameter.</i>	<i>DOH Water System Design Manual 8.1.2; City of Tukwila Infrastructure Design and Construction Standards 7.2.1</i>
5.6	<i>Distribution pipelines must be able to sufficiently deliver water to meet PHD at 30 psi at every existing and proposed service connection.</i>	<i>DOH Water System Design Manual 8.1.3</i>

In addition, the City has the following criteria (stated in Chapter 1 Table 1.6) related to fire flows:

- *Fire flows are to be provided at MDD while maintaining a minimum system pressure of 20 psi.*

Criteria 5.2, 5.6 and the fire flow criteria above were used to evaluate pipe capacities. These criteria are summarized as follows:

1. Provide Peak Hour Demand:
 - a. Maintain 30 psi.
 - b. Maintain pipe velocities below 8 feet per second.
2. Provide required fire flow at each junction during MDD:
 - a. Maintain 20 psi pressure.

6.5.1 Pipe Capacity Evaluation Results

The City's calibrated hydraulic model was used to evaluate the pressures and velocities in the system for the different scenarios. The results are summarized below.

6.5.1.1 Peak Hour Demand

The model was run for the 2016 and 2030 demand scenarios for the peak hour. Due to the high system pressures, no pressure deficiencies were found during PHD for either planning year. For 2016, two adjacent pipes did not meet the velocity criterion, as shown in Figure 6.6. These pipes are just upstream and downstream of the PRV connected to Supply Source (SS) 15 and are shown as a 12-inch and 10-inch pipe in the hydraulic model. For 2030 these pipes are still the only pipes with velocities above 8 fps. The 12-inch pipe on Andover Park E just south of SS 15 has velocities over 5 fps.

6.5.1.2 Fire Flow Pressures

The system was then checked for adequate fire flow and residual pressures for the years 2016 and 2030. Figures 6.8 and 6.9 present the fire flow deficiencies for the years 2016 and 2030, respectively. Most fire flow deficiencies are the result of undersized pipes delivering high fire flows. In some cases, providing looping at dead end pipes remedies the fire flow deficiency. Generally replacing pipes with larger diameter pipes is required to correct fire flow deficiencies. One additional deficiency in the year 2030 related to higher system demands can be seen in Figure 6.9.

6.5.2 Piping Recommendations

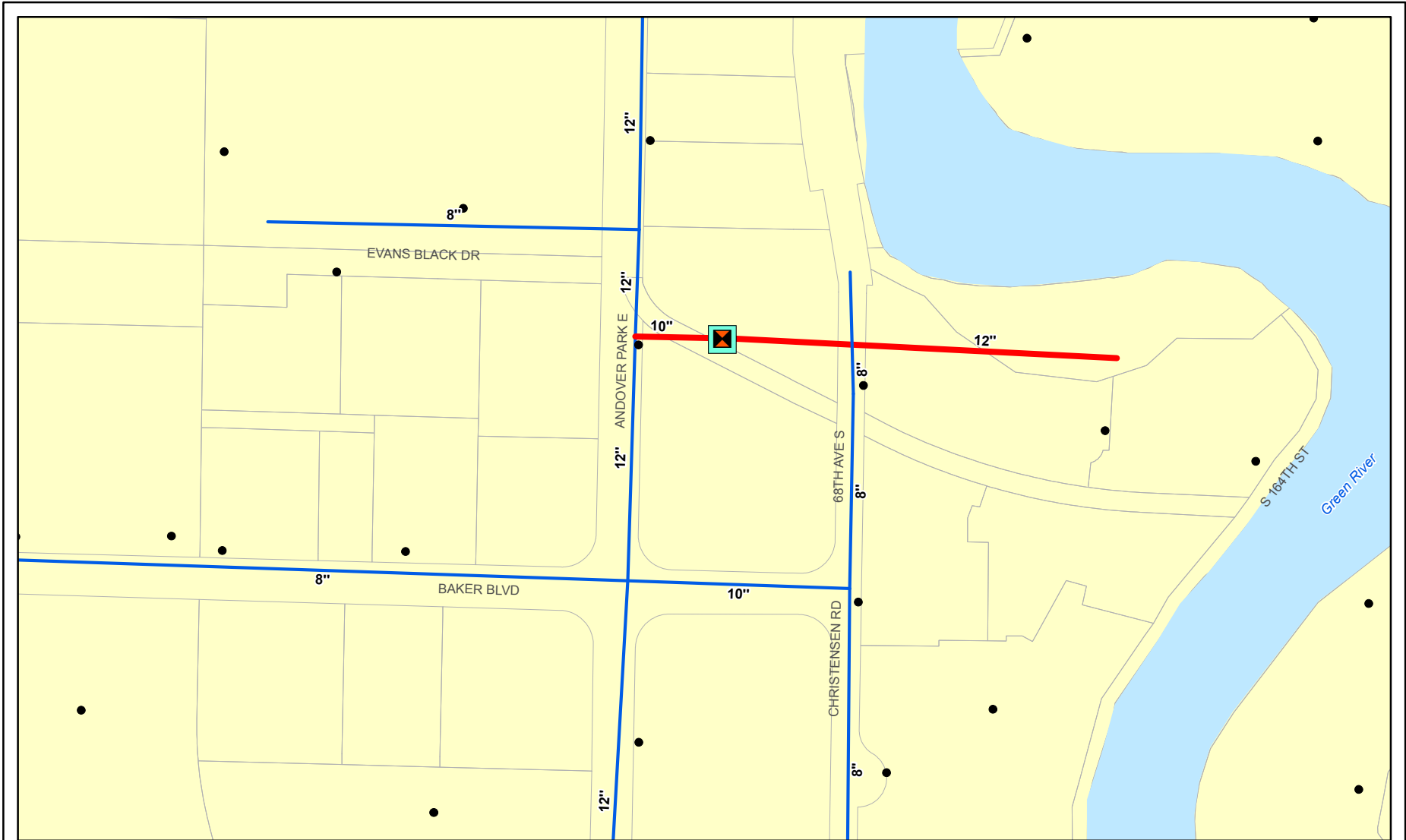
Several pipe improvement projects were identified to address the velocity and fire flow deficiencies identified above. Table 6.10 presents the pipe improvement projects recommended, including location, existing diameter, new diameter, and total length. The pipe projects are prioritized into high and low according to the following.

- High Priority: Highest priority projects are those that resolve fire flow deficiencies where the lowest range of fire flow is unavailable.
- Low Priority: Low priority projects are those that resolve fire flow deficiencies where the lowest range of fire flow is available, but the highest range is unavailable.

Figure 6.10 present the high-priority and low-priority recommended pipeline improvement projects. If all of the recommended pipeline improvement projects are implemented, the model predicts that adequate fire flow is available to all junctions as shown in Figure 6.11. The one node shown as yellow in Figure 6.11 has a fire flow requirement of 4,000 gpm and available fire flow of 3,953 gpm. This discrepancy is well within the uncertainty of the model.

No.	Priority	Street Name	From Street	To Street	Length, LF	Existing Pipe Diameter, in.	New Pipe Diameter, in.	Notes
P-1	H	52nd Ave S / 53rd Ave S	Interurban Ave	137th St	750	6	12	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-2	H	S 137th St / 53rd Ave S	S 137th St	S 139th St	635	None	12	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-3	H	53rd Ave S	S 139th St	S 140th St	300	6	12	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-4	H	140th St	53rd	55th	557	6	12	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-5	H	Starfire Sports Complex Park access road			1,775	6	8	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-6	H	57th Ave S	S 52nd St	S 150th Pl	660	6	8	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-7	H	S 152nd St.	Macadam Rd S	End of Pipe	1540	6	10	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-8	H	S 152nd Pl	End of Pipe	Sunwood Blvd	137	None	8	Connect end of 152nd Pl to pipe in Sunwood Blvd. Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-9	H	65th Ave S	Southcenter Blvd	S 151st St	1,985	8	12	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-10	H	S 153rd St	65th Ave S	End of Pipe	485	8	12	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.

No.	Priority	Street Name	From Street	To Street	Length, LF	Existing Pipe Diameter, in.	New Pipe Diameter, in.	Notes
P-11	H	Southcenter Blvd	Andover Pk E	62th Ave S	1,310	8	12	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-12	H	East of Andover Park E	South of Strander Blvd	Green River Trail Loop	580	None	8	Create loop in pipe network. Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-13	L	139th St	53rd Ave S	56th Pl S	913	6	10	Maximum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-14	L	Costco Dr	Andover Park E	To Costco	696	8	12	Private Water Main. Maximum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-15	L	SS 15	SS 15	Andover Park E	700	10/12	16	Maximum velocity is currently exceeded. Project will meet velocity criteria under 2030 conditions.



Legend

	Supply Station		Rivers/Streams/Creeks		Pressure Zone 340
	PRV		Parcels		Pressure Zone 360
	Hydrants		Retail Water Service Area		Pressure Zone 380
			Pressure Zones		Pressure Zone 400
			Pressure Zone 320		Pressure Zone 465
			Velocity		
			< 5 fps		
			> 5 to < 8 fps		
			=> 8 fps		

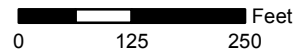
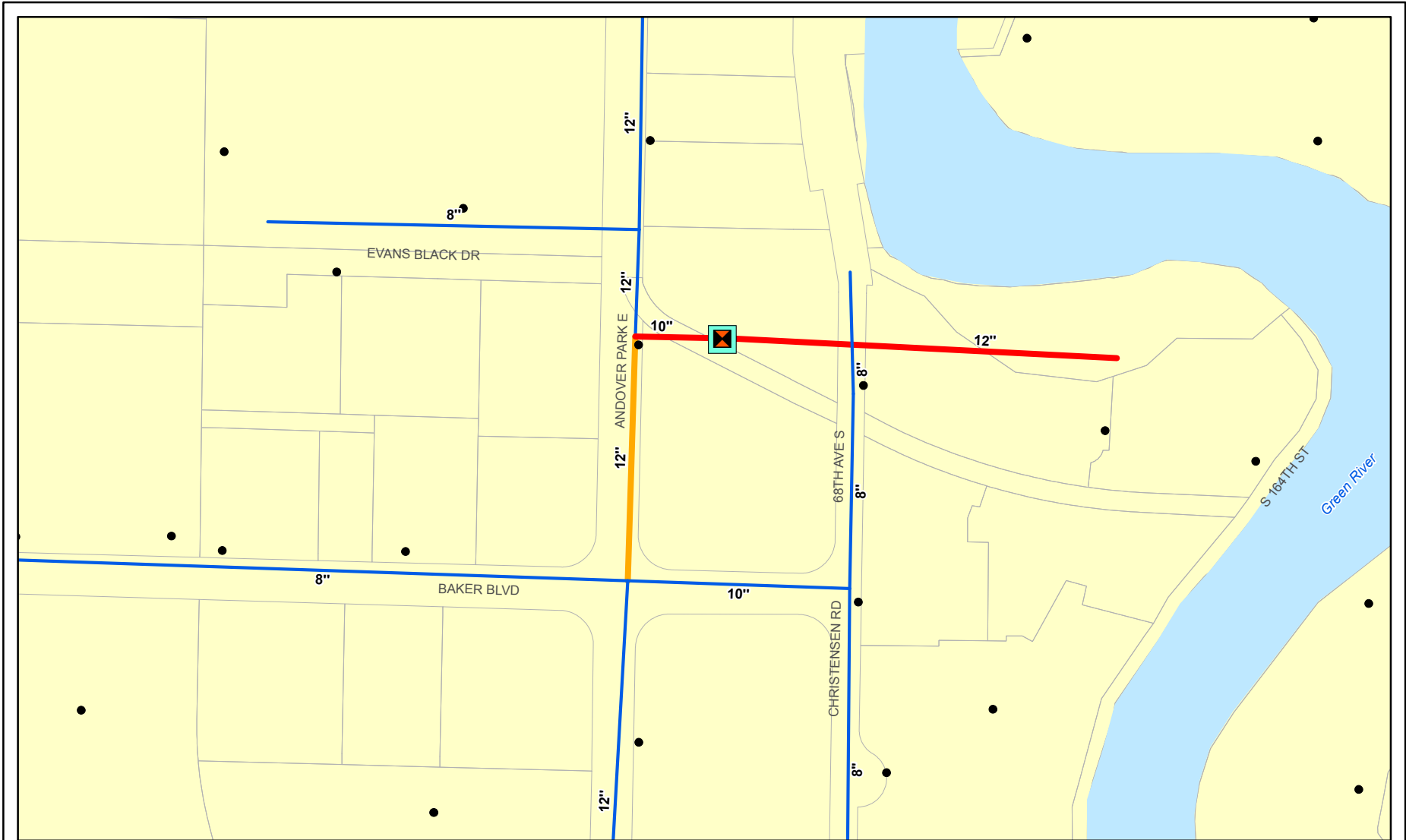


Figure 6.6
2016 Peak Hour Demand
Velocity Deficiencies
 Comprehensive Water Plan
 City of Tukwila





Legend

	Supply Station		Rivers/Streams/Creeks		Pressure Zone 340
	PRV		Parcels		Pressure Zone 360
	Hydrants		Retail Water Service Area		Pressure Zone 380
			Pressure Zones		Pressure Zone 400
			Pressure Zone 320		Pressure Zone 465
			Velocity		
			< 5 fps		
			> 5 to < 8 fps		
			=> 8 fps		

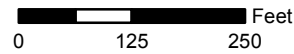


Figure 6.7
2030 Peak Hour Demand
Velocity Deficiencies
 Comprehensive Water Plan
 City of Tukwila



Figure 6.8
2016 Fire Flow Deficiencies
 Comprehensive Water Plan
 City of Tukwila


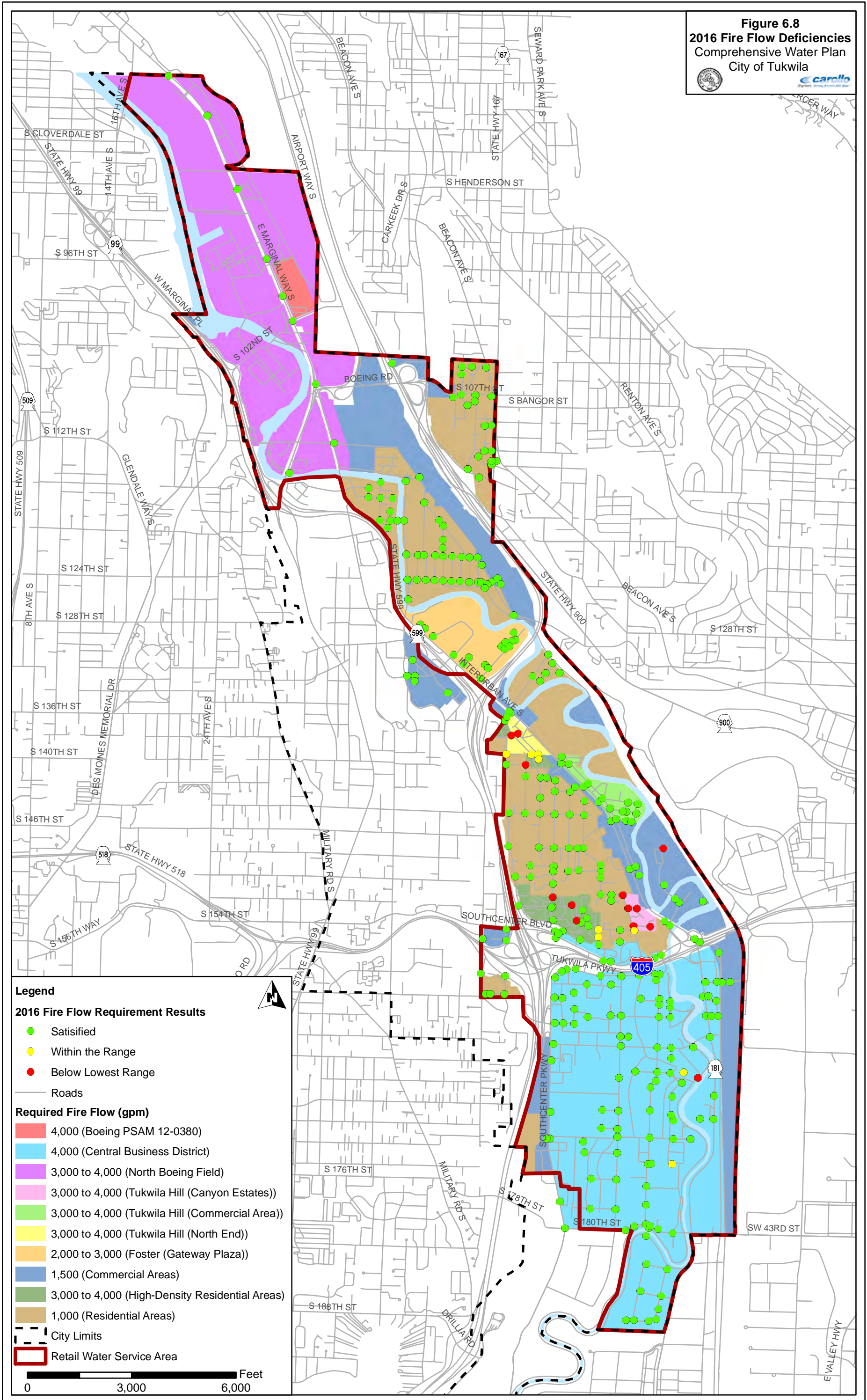



Figure 6.9
2030 Fire Flow Deficiencies
 Comprehensive Water Plan
 City of Tukwila


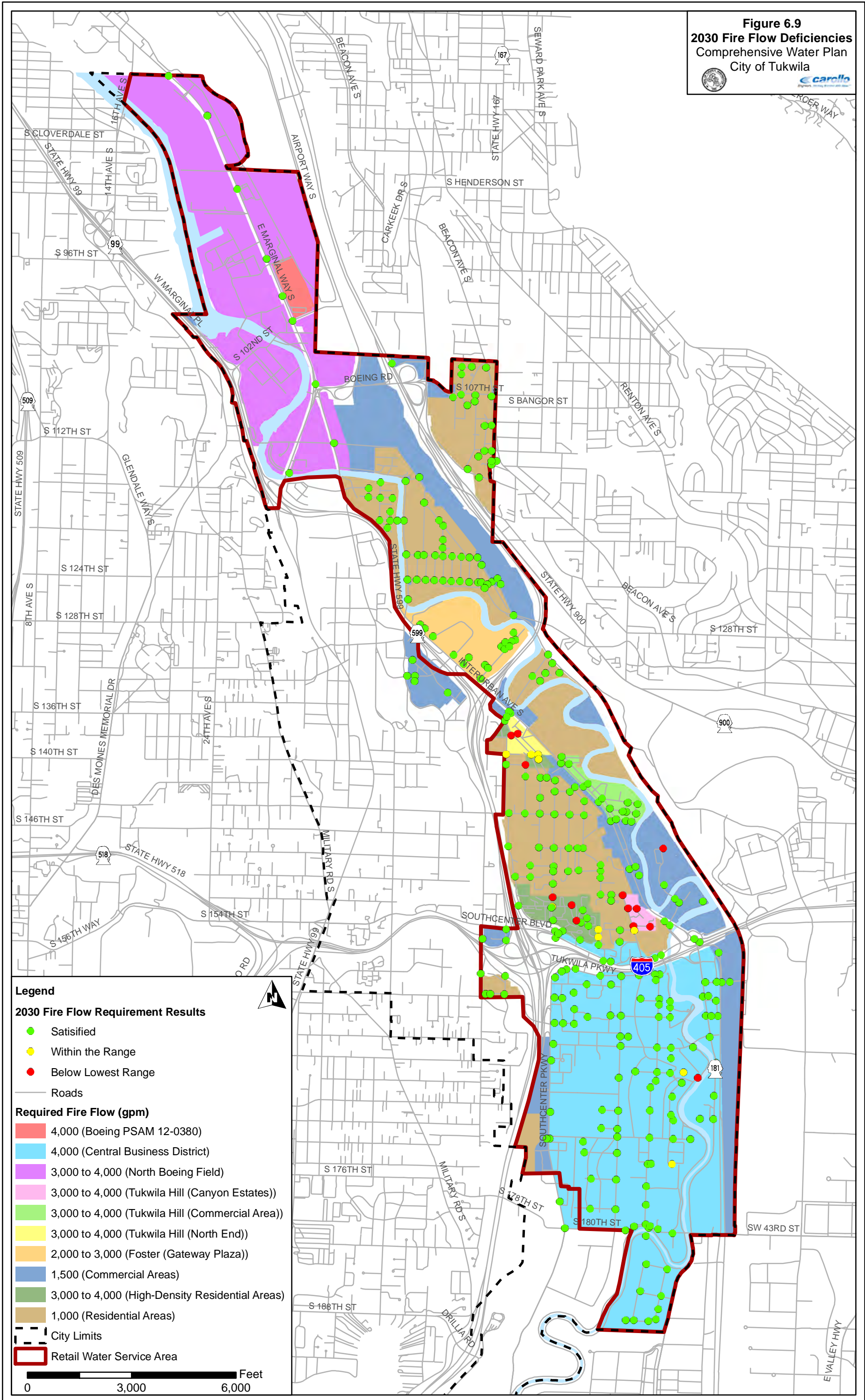



Figure 6.10
Pipeline Improvement Projects
Comprehensive Water Plan
City of Tukwila



carollo
Engineering, Planning, Architecture & Construction

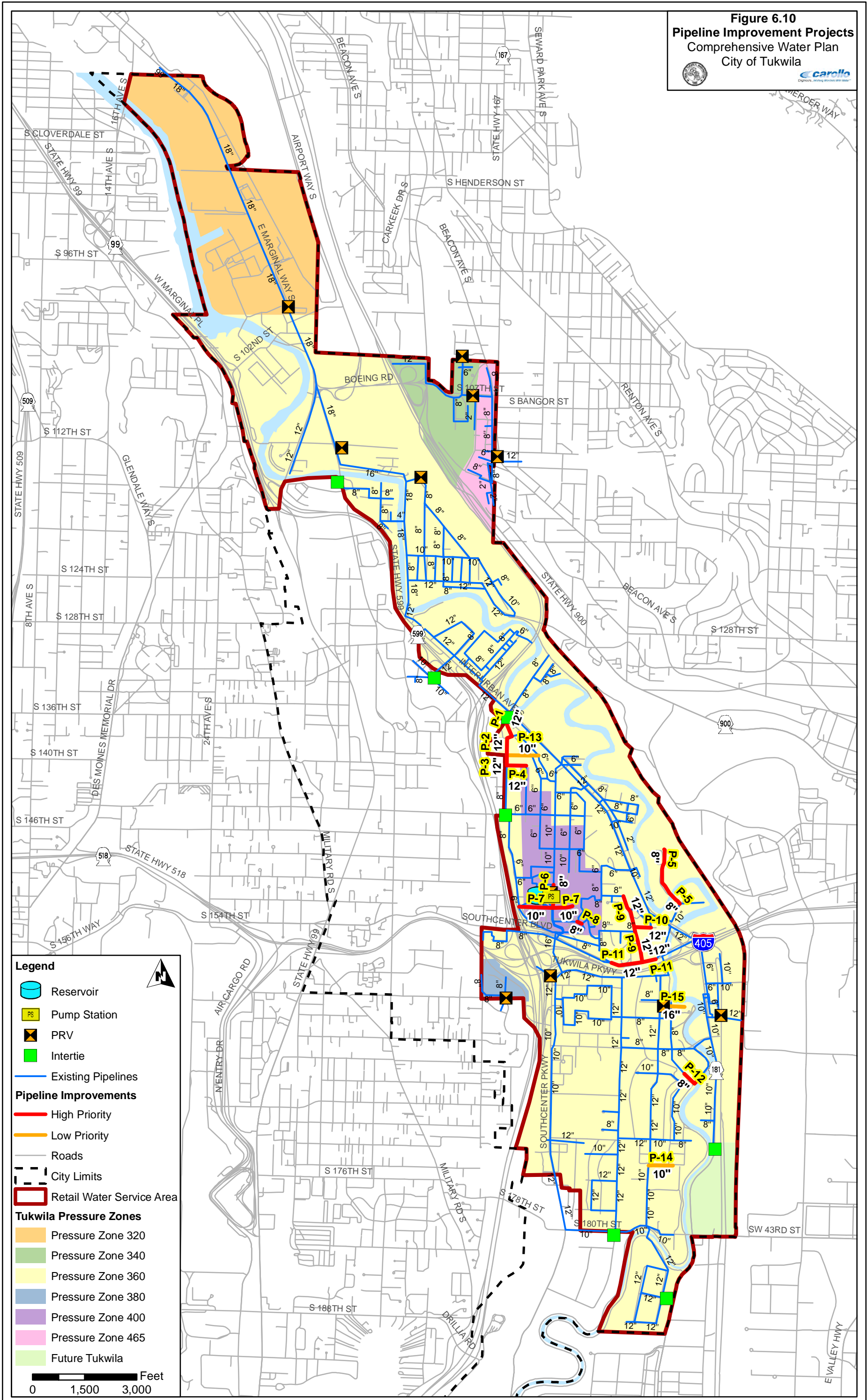

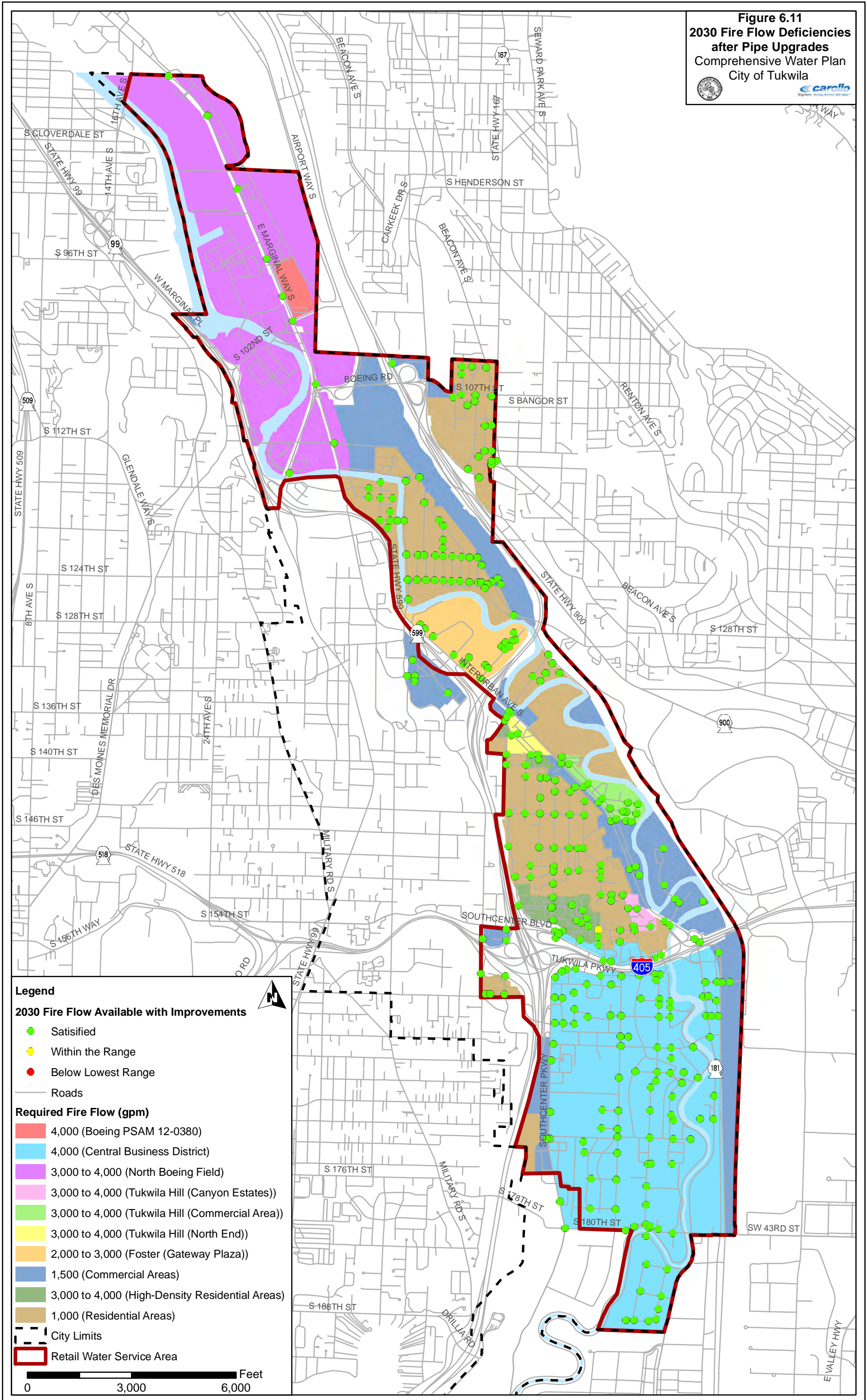


Figure 6.11
2030 Fire Flow Deficiencies
after Pipe Upgrades
 Comprehensive Water Plan
 City of Tukwila

6.6 SUMMARY OF RECOMMENDATIONS

The system analysis yielded a number of recommended improvements including pump station, reservoir, and pipeline improvements, as summarized below. Projects to address deficiencies found in the year 2016 are of higher priority than those to address deficiencies in the year 2030.

6.6.1 2016 Improvements

Storage Improvements

- 360 Service Level:
 - Construct a new reservoir (1.3-MG); conduct a siting evaluation to confirm the location.
 - Contact neighboring agencies for excess storage available to reduce size of new reservoir.
 - Install an alarm system that activates when equalizing storage in the North Hill Reservoir is depleted.
- 465 Service Level:
 - Discuss options with SPU for providing emergency and fire suppression storage to the 465/340 Zones.
- 380 Service Level:
 - Install a permanent connection from the Highline Water District.
 - Approach the Highline Water District about using existing available emergency and fire suppression storage.

Pump Station Improvements

- General:
 - Add back-up power to all pump stations to improve reliability.
 - Add automatic shut-off for intake pressures below 10 psi.
- 360 Zone:
 - Adding a new pump station will likely be required in conjunction with the recommended new 1.3-MG storage tank. A 3,300 gpm pump station is recommended in order to provide redundancy such that fire flows to the 400 Service Level can be pumped even with the largest pump out of service.

Pipeline Improvements

- Complete approximately 11,000 LF of high-priority pipeline improvements presented in Table 6.10 to address fire flow deficiencies.

6.6.2 2030 Improvements

Pump Station Improvements

- No additional improvements.

Storage Improvements

- No additional improvements.

Pipeline Improvements

- Complete approximately 2,300 LF of low-priority pipeline improvements presented in Table 6.10 to address fire flow and velocity deficiencies.

OPERATIONS AND MAINTENANCE

7.1 INTRODUCTION

This chapter provides an overview of the City's Water Utility organization and operation. The purpose of the chapter is to document existing procedures and to identify areas where improvements or changes could enhance system operation.

7.2 RESPONSIBILITY, AUTHORITY, AND ORGANIZATION STRUCTURE

7.2.1 Mission Statement

The mission statement of the City's Water Utility department is to provide for the efficient, environmentally sound, and safe management of the existing and future water system within Tukwila's service area.

7.2.2 Department Organization

The City's Public Works Department is responsible for water, sewer, drainage, construction, engineering, construction inspection, fleet and facilities, and street functions. Figure 7.1 shows the organizational structure for water operations. The Tukwila Water Utility operates under the direction of the Public Works Director. The Public Works Operations Manager oversees the supervisory responsibilities for the Water Utility's operation and maintenance as well as sewer and surface water. Day to day activities are conducted by the Water System Supervisor who reports to the Public Works Operations Manager. The Water Quality Specialist oversees water quality monitoring and cross-connection control. The Public Works Engineer covers budgeting, new or upgraded system design, operations analysis, and the construction of capital improvements as outlined in the Water Comprehensive Plan. Each position is described in further detail in the following sections.

7.2.3 Tasks and Responsibilities

The following sections describe the tasks and responsibilities of the operations and maintenance staff.

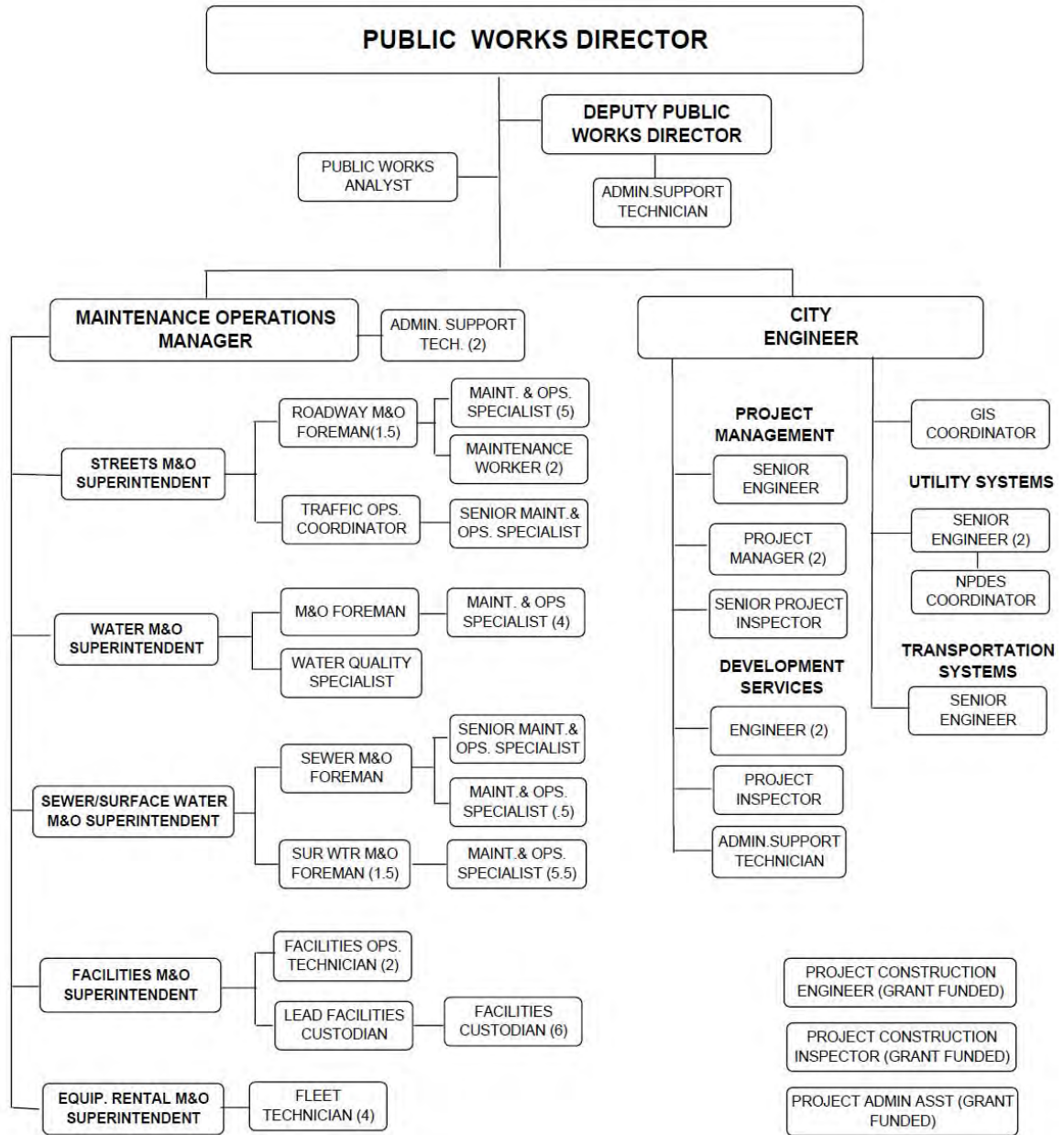
7.2.3.1 Director of Public Works

The Director of Public Works directs all activities and programs within the Public Works Department including the City's services for potable water.

7.2.3.2 City Engineer

The City Engineer plans, organizes, staffs, and manages the Engineering Division. Responsibilities involve development of the six-year capital improvement program for the water utilities. The City Engineer is also responsible for annual capital projects including development of scopes of work and consultant selection.

PUBLIC WORKS DEPARTMENT



ORGANIZATIONAL CHART

FIGURE 7.1

CITY OF TUKWILA
COMPREHENSIVE WATER PLAN



7.2.3.3 Senior Project Engineer

The Senior Project Engineer, under the direction of the City Engineer, is responsible for overseeing assigned annual capital projects. Tasks include development of project schedules, scopes of work, and consultant selection. The Project Engineer also tracks progress through the development of plans, specifications, and estimates (PS&E), coordinates bidding and contract execution, and is tasked with submittal review and approval, progress reports, pay estimates, construction management/inspection, and project closeout.

7.2.3.4 Maintenance Operations Manager

The Maintenance Operations Manager oversees maintenance activities within the public works department. For the water supply system, the Maintenance Operations Manager has budgetary responsibility and directs the Water Maintenance Superintendent in carrying out water system maintenance responsibilities.

7.2.3.5 Water Maintenance Superintendent

The Public Works Water Maintenance Superintendent is responsible for planning, organizing, staffing, and managing within the Operation and Maintenance Division. For the water supply system, responsibilities include repair and maintenance of the City's water system including transmission and distribution mains, storage facilities, and booster pump stations. The Superintendent oversees all annual maintenance programs including flushing, valve exercising, and source water quality and reservoir inspections. The Superintendent is also tasked with budget development for the Water Enterprise Fund.

7.2.3.6 Water Utility Foreman

The Water Utility Foreman is responsible for all operation and maintenance activities associated with water supply, distribution, pumping and storage systems including distribution main flushing, valve exercising, and well monitoring.

Responsibilities include construction throughout the distribution system including looping of dead-end lines, extension of water mains, valve installation, and hydrant replacement/installation. The Water Utility Foreman oversees emergency repairs of water main breaks and utility location. Responsibilities also include meter reading/repair, water quality monitoring, and record keeping.

The Water Utility Foreman also manages customer inquiries related to dirty water, pressure extremes and taste and odor. This position tracks and coordinates all inquiries with the Operations Manager until the problem is resolved.

7.2.3.7 Water Quality Specialist

The Water Quality Specialist administers, maintains, and develops the City's Cross Connection Control, Water Quality, and Conservation Plans.

7.2.3.8 Utility Maintenance Worker

Utility maintenance workers, along with the foreman, perform all field maintenance and operation functions for the City's water utility.

7.2.4 Communications System

The City maintains a communications system to contact Water Utility personnel during normal work hours and after hours. This system is necessary to respond to customer requests, routine maintenance, or emergency situations. Maintenance staff vehicles and other rolling stock are equipped with two-way radios and the personnel carry combination cellular phones and radio units. The Water Utility also has access to an inventory of portable emergency use radio units should they be required.

The City has a Standby Call-Out Program to ensure that coverage for after-hours response is assured. One staff member in Maintenance Operations always carries a dedicated, combination cell phone/radio during off hours. They are remunerated on an hourly basis for this duty. Emergency calls from the after-hours call-out number, 911, Police, or Fire Department, first go to the staff member on call, who determines which staff is required for call out. The initial call from the Standby Person is to the Water Maintenance Superintendent. If the initial call-out attempt is unsuccessful, the contact order is as follows: Water Utility Foreman, Water Quality Specialist, and lastly the Water Maintenance Workers. If all of the above contact attempts fail, the Standby Staff member then calls the Maintenance Operation Manager. Once City personnel arrive and assess the issue, they determine if more personnel are required. If it is determined that further staff are required, the Standby Person and other staff from the Maintenance Operations Departments may be called upon.

7.3 CERTIFICATION, EDUCATION AND TRAINING

The City of Tukwila is in full compliance with current laws and regulations regarding staff certification and training. Seven Tukwila Public Works employees possess Department of Health certifications. Table 7.1 is a summary of personnel certifications and experience in water system operations.

Employees are supported and encouraged to meet continuing education (CEU) requirements by attending work related classes, refresher courses, safety training, and regional conferences. To meet the staff educational needs, the City includes a budget line item in the annual O&M budget devoted to training.

Table 7.1 Water Utility Personnel Certifications

Position	Name	Certification
M&O Superintendent Water	Bryan Still	WDM4,CCS,WDS,WTPO-IT
M&O Foreman, Water	Scott Mitchell	WDM3,CCS,WDS,WTPO-IT
M&O Water Quality Specialist	Todd Reedy	WDM3,CCS
M&O Specialist, Water	Rod Langford	WDM2,CCS, WDS
M&O Specialist, Water	Joe McCain	WDM2,CCS, WDS
M&O Specialist, Water	Daniel Harris	WDM1
M&O Specialist, Water	Jason Bates	WDM1

7.4 SYSTEM OPERATION, MAINTENANCE AND CONTROL

The following sections summarize the routine maintenance of the water system.

7.4.1 Inspections, Preventive Maintenance, Repairs and Replacement

Routine operations involve the activities required to ensure that facilities are functioning efficiently and are meeting water quality and pressure requirements, as well as system demands. Routine maintenance items include making daily rounds to visually check system facilities, monitoring of flow and reservoir level recording devices on a regular basis, and responses to customer inquires. Additionally, preventive maintenance such as regularly servicing pumps and motors, exercising valves and hydrants, painting hydrants, and flushing pipelines is required for the City's routine and preventive maintenance schedule for primary system components.

The City's overall operations and maintenance program is described below.

7.4.2 Reservoir Maintenance

The North Hill Reservoir is inspected daily, quarterly, and on a five-year cycle employing an increasing degree of activity at each level. The objective of the daily visual inspections is to check for evidence of vandalism, forced entry, or damage and control functionality. On a quarterly basis, a detailed inspection of access manholes, vents, overflow piping and valve exercising is conducted. Approximately every five years the reservoir undergoes a comprehensive engineering inspection and evaluation. Future draining and cleaning work will be accomplished in conjunction with the program schedule.

7.4.3 Pressure Reducing Valve Stations and Check Valves

Check valves are located at specific locations in the 400 Pressure Zone (North Hill Residential Area) to isolate the north hill from the 360 pressure zone.

PRVs are located where the City connects to Seattle Public Utilities pipelines, and reduce the pressure of Seattle's major supply lines to the working pressures of the Tukwila water system.

Preventative maintenance for PRV and check valves is scheduled and conducted monthly as part of the Public Works work plan. The testing and maintenance performed includes pressure checks and adjustments, cleaning of strainers, and replacement of parts as necessary. PRV and check valves are typically rebuilt every three to five years.

7.4.4 Hydrant Inspection

The primary function of fire hydrants is for supply of water for fire protection; however, hydrants are often used for other purposes. The City has a Hydrant Inspection Program designed to maintain hydrants in proper working condition to provide available fire flow in the event of an emergency.

The maintenance program parallels the service area grid pattern used by the Tukwila Fire Department. This grid system divides the service area into distinct units. The maintenance procedure is to perform hydrant maintenance sequentially, one grid at a time. This sequential grid approach ensures every hydrant is checked and maintenance performed before moving to the next grid. Hydrant maintenance for one grid is completed each month. Thus, in one year maintenance is performed on all 12 grids. Upon completion of a grid, notice is sent to the Fire Department for their records. Any time a hydrant is off-line for any reason, notification is provided to the Fire Department.

The hydrant maintenance checklist includes the following:

- Removal of all grass, weeds, etc. in hydrant area.
- Hydrants are tested in an approved manner for proper operation.
- Each hydrant is recorded.
- Caps are checked for cracks/operability.
- Threads and chain races are cleaned and lubricated.
- Hydrants are painted as necessary.
- The street shutoff valve is checked for accessibility and ease of identification from water main valves.

7.4.5 Main Flushing

Tukwila conducts a distribution system flushing program three times per year (February, June, and October) or as required based on water quality complaints. Chlorine residuals are measured before and after flushing, and then documented.

The City is considering developing a uni-directional flushing program designed to systematically flush the distribution system. Such a program would reduce flushing water demands, improve flushing efficiency, reduce water quality complaints resulting from flushing activity, and possibly improve water quality.

7.4.6 Valve Exercising

The city conducts a formalized, scheduled valve maintenance program so that system control is available to staff when needed. Valve inspection and maintenance within each service area grid is combined with hydrant inspections. Thus, all valves are checked annually. Valve exercising is scheduled for completion annually, particularly for main line valves. The objective of the program is to detect malfunctioning valves and prevent valves from becoming inoperable due to freezing or build-up of rust or corrosion. The program also ensures that valve locations are documented correctly and that valves are accessible. Malfunctioning valves are reported and maintenance work orders issued for repair or replacement.

7.4.7 Leak Detection

The City monitors customer bills for unusual changes in amounts of water used as the first line of leak detection. The City also has leak detection equipment designed to listen for leaks and help pin point their location. Leak detection surveys are performed in conjunction with the annual hydrant and valve inspection cycle.

7.4.8 Meter Maintenance/Replacement

The City has one full-time Maintenance and Operations Specialist dedicated to meter reading and repair. The repair person has additional duties, but still allows approximately 3.5 weeks per month dedicated solely to meter repairs. Approximately twenty percent of his/her working hours are spent on meter reading, and the remaining eighty percent to meter maintenance activities. The Public Works Water crew makes repairs whenever heavy equipment is required or repairs are needed on larger meters in the distribution system. All commercial meters are tested every three years.

To identify meter maintenance projects in the field, meter readers code their handheld computer to a maintenance code whenever a malfunctioning meter is identified. A printed copy of the report is forwarded to the Utility Maintenance Supervisor. The supervisor is responsible for planning and coordinating the repair activity.

Currently the service area is 100 percent metered, with automated metering. Studies have been conducted to convert to a fixed auto read system in the future.

7.4.9 Utility Locating Service

Currently the services for water utility location are performed by a designated locator who is under the supervision of the Water Maintenance Superintendent. The locator is responsible for locating water facilities within the public right-of-way.

7.5 WATER QUALITY OPERATIONS

The City takes an aggressive approach to protecting the quality of distributed water. The City contracts with the City of Seattle, which conducts monitoring and testing of the distribution system to protect water quality from source to tap. Trained water quality employees from the City of Seattle conduct daily monitoring at four locations throughout the service area. Seattle

water quality personnel collect and transport all water samples in accordance with state and federal regulations, and DOH approved monitoring plans. Water samples are sent to the City of Seattle laboratory for testing by certified technicians. Records are kept of all water tests and on file for DOH inspection. A detailed description of monitoring requirements is provided in Chapter 3 – Supply Analysis.

If a water quality violation occurs, requiring customer notification, the City notifies the DOH in accordance with WAC 246-290-320 and the public notification process is employed. All radio, television, or printed public notification includes a clear explanation of the violation, discussion of potential health effects and the population at risk, a list of protective measures, and the city's address and phone number.

Annually, every household and business in the City's service area is sent a Consumer Confidence Report explaining the test results and any presence of regulated contaminants. The Consumer Confidence Report also notifies customers of any water quality violations in the past twelve months.

7.6 CROSS CONNECTION CONTROL PROGRAM

Under WAC 246-290-490, the City has the responsibility to protect the public water system from ill effects associated with contamination due to cross-connections and backflow events. The following is a summary of the activities the City would like to perform in meeting DOH requirements contained in WAC 246-290-490. The activities and procedures are contained in the City's Cross Connection Control Program (CCP).

- **Establishment of Local Authority.** The City's legal authority to implement and enforce a cross-connection control program is established by Tukwila Municipal Code Chapter 14.0431, Water Supply Cross-Connections.
- **Procedures for Evaluation of Service Connections Hazards.** Procedures and schedules for determining the degree of hazard posed by new and existing service connections are provided in the CCP. For new services, the City performs an initial cross-connection review prior to construction. For existing services, evaluations are performed on a schedule, with those posing the greatest potential hazard designated as having the highest priority. Evaluations of existing connections consist of meeting customers, reviewing facility drawings, and a physical survey of all exposed piping (if allowed by the customer). After the evaluation, the customer is notified if installation of a backflow prevention assembly is required. If, after 90 days, the customer has not installed a proper assembly, the City may install an assembly at the service connection. The City also reserves the right to disconnect the customer's service, in the event that immediate corrective action is required and is not taken by the customer.
- **Procedures for Eliminating or Controlling Cross-Connections.** The City requires that cross-connections be eliminated if possible. If they cannot be eliminated, cross-connections are to be controlled and prevented by backflow prevention assemblies appropriate for the given situation.
- **Utilize Qualified Cross-Connection Specialists.** The City's program is implemented by certified Cross-Connection Control Specialists (CCS). As of October 2004, the City has six employees holding state certifications as CCS.

- **Assembly Testing and Inspection Procedures.** The City does not test backflow prevention assemblies.
- **Quality Insurance Program for Testing.** The City's program requires that all backflow prevention assembly test reports submitted to the City document that the tester is on the City's list of certified testers and that the test kit used is in proper calibration.
- **Incident Response Procedures.** Select City personnel are trained to respond to reported backflow incidents. Procedures for such responses and notification of the Seattle/King County Health District and DOH are contained within the CCP.
- **Consumer Education.** The CCP incorporates information on cross-connection control into the City's existing consumer education program. The City provides all new water customers with a Customer Information Kit, which includes guidelines on installation, inspection, and testing procedures to ensure compliance with cross-connection control regulations.
- **Maintenance of Program Records.** The City utilizes a database for storing, organizing, and tracking CCP records, including an inventory of known backflow prevention assemblies. In 2011, the City's database contained information on 1455 backflow prevention assemblies at 365 different sites throughout the service area.

In 2009, the City filled this position with a full time staff person with the job title of "Water Quality Specialist".

7.7 EMERGENCY RESPONSE OPERATIONS

The City of Tukwila's objective is to provide and support effective planning, disaster management, and education services to enable citizens and employees of Tukwila to prepare for, respond to, and recover from an emergency.

The Public Works Department has in place an "Emergency Action Plan" that outlines procedures to protect the water supply and the City's infrastructure. The Emergency Action Plan identifies potential threats or hazards that may jeopardize the city's water supply. The Emergency Action Plan is available from the City and addresses:

- Drought Response
- Water Quality Emergencies
- Earthquake Response
- Emergency Power Requirements
- Outside Agency Coordination
- Specific Emergency SOPs
- Floods
- Terrorism
- Volcanic Eruption

7.8 DEPARTMENT COORDINATION

The Water Utility utilizes the services of other City departments, according to interdepartmental agreements, to augment the Water Utility's expertise. The Finance and Information Technology Departments are responsible for customer billing, payment collection, fund activity reporting, and basic computer needs. The Human Resource Department is responsible for employee records, labor negotiations, salary schedules, and union labor negotiations.

Within the Public Works Department, the Water Utility uses the services of the Engineering Department for plan review, permit issuance, inspection, project design, and management for Capital Improvement Projects.

7.9 RECORDS DOCUMENTS

The City of Tukwila utilizes an Information and Records Management system. By computer network tracking, the City's Public Works Department has developed a filing system that breaks down the reservoirs, distribution system, water meters, and other necessary components that make up a service area. The City also involves department heads and supervisors to maintain and track their areas of responsibility. On an annual basis, maintenance records are reviewed for the annual report. In addition, the City has contracted out the maintenance of the SCADA system within the service area. All telemetry maintenance is conducted by the contractor.

Records include, but are not limited to the following:

- Water quality
- MCL violations
- Water quality complaints
- Backflow prevention
- Maintenance and construction
- O&M manuals
- Personal records
- Flushing and distribution system

7.9.1 Telemetry

The water system's supervisory control and data acquisition (SCADA) system consists of remote telemetry units (RTUs) located at individual supply stations, linked to a master control computer at the City's Maintenance Facility on Minkler Boulevard. The telemetry control panel serves to display important system status information. This system monitors the reservoir water level, and controls the supply station valves at supply stations SS10, SS13 and SS15. A separate control system that is not linked to the master control system is installed at the reservoir pump station. This system monitors and responds to pressure variations in the distribution system and transmits analog signals back to the control panel at the City's Maintenance Facility.

Seasonally, certain supply stations are alternated from straight PRV to flow control mode. In straight PRV mode, flow from the Seattle system changes to meet demand in the City's system. In flow control mode, flow at these selected stations is controlled so as to not exceed a set maximum rate.

The RTUs at supply stations, North Hill Booster Pump Station, and North Hill Reservoir are the heart of the City's water SCADA system. These units perform the function of receiving input from and controlling the local equipment as well as communicating operational and alarm status back to the master computer. Each of the RTUs have battery backup.

Communication between the RTUs and the master control computer at the Minkler shops is via radio. To facilitate communications, a radio signal repeater station is located at the North Hill reservoir. This repeater does not have an uninterruptible power supply (battery backup). If a power failure were to occur, loss of the repeater station could limit the ability of the water utility (and all of public works) to communicate with other units of the system. Battery backup of critical SCADA and communications elements is a common and desirable feature of modern SCADA systems.

System alarms are communicated back to the master control panel at the operations center. The panel is monitored by utility staff. In response to an alarm, in most cases, a trip is initiated to the station reporting the alarm.

During evenings, and on weekends, an alarm triggers an auto dialer, which alerts water utility maintenance personnel of an alarm condition. There is the ability to look at the system status and assess the specifics of the alarm. There is computer access to the SCADA system from off-site, via the internet or direct dial-in. This feature provides supervisory staff with a more complete picture of the status of the system, reduces the need for unproductive trips to the operations center or remote sites, and promotes better operational control of the system. Staff with a laptop computer with an Air card and City virtual private network (VPN) can access the SCADA system in the field to check status of the water system status and alarm conditions.

7.9.2 Asset Management

The City does not own an asset management program.

7.10 STANDARD PLANS AND SPECIFICATIONS

In accordance with WAC 246-290-120, the City of Tukwila maintains standard plans and specifications on file with the State Department of Health to satisfy DOH approval requirements for: the installation of hydrants, valves, fittings and meters; repair or replacement of system components with similar components; or maintenance or painting of surfaces not contacting potable water. The standard plans and specifications also constitute a waiver from formal submittal and approval of specific distribution main improvements provided that construction of such projects are certified by a registered professional engineer as being in compliance with the standard specifications found in the DOH approved water system plan and provided that the District provides documentation to DOH of the pressure test results, disinfection procedures used and tests performed, and water quality sample results obtained prior to placing the distribution pipeline into service. All other water system improvement projects require submittal to and approval from the State Department of Health. A copy of the City of Tukwila's current standards is available at 6300 Southcenter Blvd., Suite 100.

7.11 FUTURE OPERATIONS AND MAINTENANCE NEEDS

Future improvement to the water system includes the installation of a fix-based auto-read meter system. The proposed auto read system would allow real time reading of meters so that bills for new accounts and account close-outs can be done at the counter, and meters can be turned on or off without staff traveling to the customer. The City is considering developing a uni-directional flushing program designed to systematically flush the distribution system. Such a program would reduce flushing water demands, improve flushing efficiency, reduce water quality complaints resulting from flushing activity, and possibly improve water quality.

CAPITAL IMPROVEMENTS PLAN

8.1 INTRODUCTION

This chapter presents a summary of all capital projects outlined in the previous chapters, and creates a cohesive Capital Improvements Plan (CIP) for the City to continue consistent, efficient water supply to its retail water service area. Programs listed in this chapter consider storage and pumping requirements, improvements to the hydraulic system, and general recommendations. System improvements were analyzed according to the policies and criteria described in Chapter 2. The recommended projects are presented for the Short-Term (2013-2018), and Long-Term (2019-2032).

8.2 ESTIMATED COSTS

Planning-level cost estimates were developed for each of the recommended projects for budgeting purposes. The costs provided herein are planning level estimates only and should be refined during pre-design of the projects. Cost estimates are presented as total project costs in March 2013 dollars. For future budgeting purposes, the latest engineering news record (ENR) Construction Cost Index (CCI) can be used to project current estimates to the year of implementation. The cost estimates for the Tukwila area used the national ENR 20-City CCI. The March 2013 CCI is 9,456.

Cost estimates were developed using a Class 3 budget estimate, as established by the American Association of Cost Estimators (AACE). This level of estimate is used for budgeting and feasibility studies and assumes a 10 percent to 40 percent level of project definition. The expected accuracy range is -30 percent to +50 percent, meaning the actual cost should fall in the range of 30 percent below the estimate to 50 percent above the estimate.

Construction costs apply the following mark-ups to the direct costs: 30 percent contingency, 10 percent general conditions, and 15 percent contractor overhead and profit. Project costs include an additional 20 percent for engineering, legal, and administration costs. Total project costs are used to develop the CIP to ensure adequate funds are available for engineering, legal, and administration costs in addition to construction costs. The CIP cost estimates should be periodically reevaluated to account for changes in inflation.

The costs for specific infrastructure categories were developed as follows:

- *Pipelines* – Estimated costs for all pipeline projects were based on a cost per linear foot, as summarized in Table 8.1. These unit costs assume open-trench construction in improved areas. Costs include pavement cutting, excavation, hauling, shoring, pipe materials and installation, backfill material and installation, and pavement replacement.
- *Pump Stations* – Estimated costs for all pump stations include site work, a structure, all mechanical and electrical equipment, and a back-up generator.

- *Storage Reservoirs* – Estimated costs for all storage reservoirs include site work, a structure, mechanical and electrical equipment, and piping to connect the reservoir to the system.

Acquisition of property, easements, and right-of-way (ROW) may be required for some of the recommended projects. However, for the purpose of this Plan, pipeline corridor or easements are assumed to be in public ROW, and therefore do not require land acquisition. For this reason, land acquisition is not included in the cost estimates.

Diameter	Estimated Cost per Linear Foot
6-inch	\$131
8-inch	\$139
10-inch	\$149
12-inch	\$159
14-inch	\$175
16-inch	\$192
20-inch	\$202

Notes:

1. Direct costs, not including contingencies.

8.3 CAPITAL PROJECTS

The capital projects identified can be categorized into storage (ST), pump stations (PS), piping (P), and general improvements (G). Specific projects are described in the sections below. The CIP projects have been assigned a project identification number (Project ID) and the locations of recommended piping projects are shown on Figure 8.1.

8.3.1 Storage

Recommended storage improvements were provided in Chapter 6 – Distribution System Analysis. These projects and their associated costs are summarized below. In the short-term, the City's highest priority for eliminating storage deficiencies is to work with Seattle Public Utilities (SPU) and the Highline Water District to find ways of providing emergency storage to the 465 and 380 service levels. However, these effort are not defined by any specific capital projects.

ST-1 New 1.3-MG Storage Tank

As presented in Chapter 6, by the end of the short-term planning period, the City will be deficient by 0.4 MG in meeting the storage criteria. In the long term, the City will require 1.3 MG of additional storage. Thus, to meet the short-term deficit, it is recommended that the full storage requirement of 1.3 MG be constructed within the short-term planning period. This project will allow the City to provide its own fire flow and emergency supply to the 360 service level (pressure zones 400, 360, 320) without relying on adjacent purveyors.

It is recommended that the City perform a siting study to identify an appropriate location for the new reservoir. A new siting study is estimated to cost \$30,000. Because of the small range in elevations in the City, it is likely that this reservoir will be a below-ground tank, constructed with a pump station. The pump station has been included in the CIP as a separate project. See project PS-1 below. A new 1.3-MG tank is estimated to have a design cost of \$493,000 and a construction cost of \$2,988,000. The siting study is scheduled to be performed in 2013. Due to fiscal limitations, reservoir design and construction is scheduled to occur in 2017 and 2018. This project cost does not include land acquisition for siting the reservoir and pump station.

8.3.2 Pump Stations

Recommended pump station improvements were provided in Chapter 6 – Distribution System Analysis. These projects and their associated costs are summarized below.

PS -1 New 3,300-gpm Pump Station

The City's new 1.3-MG reservoir (see project ST-1 above) will most likely be constructed as a below-ground tank, requiring an adjacent pump station. This new pump station will also provide the City with greater firm pumping capacity, allowing the City's maximum fire flow demand to be pumped from the reservoirs with the largest pump out-of-service. This project, along with the new reservoir, will allow the City to provide its own fire flow and emergency supply to the 400, 360, and 320 pressure zones without relying on adjacent purveyors.

A 3,300-gpm pump station was estimated to have a design cost of \$428,000 and a construction cost of \$2,142,000, with a total project cost of \$2,570,000. This project is scheduled to be completed in conjunction with project ST-1 by 2018.

PS-2 Back-up Power at North Hill Pump Station

To improve reliability, it is recommended that the North Hill Pump Station be equipped with a back-up generator. To support all five pumps for operation during an emergency, a 500-kW generator is recommended. Installation of a 500-kW generator, automatic transfer switch, and other electrical modifications is estimated to have a design cost of \$34,000 and construction cost of \$338,000, with a total project cost of \$372,000. This project is recommended for fiscal year (FY) 2013, as it will improve reliability of the pump station should the power supply be cut.

8.3.3 Pipelines

Several projects were identified in Chapter 6 – Distribution System Analysis to address capacity deficiencies in the distribution system, such as inadequate fire flows. These projects are repeated in Table 8.2, including their location, length, proposed diameter, estimated cost, and whether they were included in the previous water master plan.

Table 8.2 also presents the priority of projects for the pipelines. All projects are recommended for completion within the short-term CIP in order to resolve all fire flow deficiencies identified to likely occur by the end of the short-term planning period. However, in order to develop a more realistic implementation program over both the short- and long-term planning years, the projects have been prioritized between high and low.

- High Priority: Highest priority projects are those that resolve fire flow deficiencies where the lowest range of fire flow is unavailable. These projects are listed first for completion by FY 2018 and total 11,000 linear feet (LF) in length, and cost \$3,172,000.
- Low Priority: Low priority projects are those that resolve fire flow deficiencies where the lowest range of fire flow is available, but the highest range is unavailable. Low priority projects are listed for completion by FY 2032 and total 2,300 LF in length, and \$828,000 in cost.

Table 8.2 includes comments for each project. It is recommended that prior to design, all projects be reviewed closely to ensure the assigned fire flow is actually required at that specific location, or to review if an alternative is more feasible.

8.3.4 General Utility Projects

The City has very few additional projects for its water system, as programs for operation and maintenance are very well maintained. The following projects are recommended for the general utility.

G-1 Pipeline Asset Management Study

It is recommended that the City perform an asset management study to review the remaining useful life and potential risk of the City's pipes. The recommended study is not a full Asset Management Program, but will help the City develop a program for maintaining its pipeline assets and prioritize replacement projects. This study is estimated to cost \$15,000 and is recommended in FY 2013.

G-2 Annual Pipeline Replacement Program

It is recommended that the City continue its annual pipeline replacement program. This program would replace pipes based on pipe condition determined by the Asset Management Study. Replacement of the City's entire pipe network over a period of 50 years is estimated to cost \$56 million. An Annual cost for this program of approximately \$1,038,000 was determined by subtracting the total cost of the pipe improvement projects identified in Table 8.2 (\$4 million) from the total 50-year pipeline replacement program cost (\$56 million) and then spreading the cost out evenly over 50 years.

G-3 Comprehensive Water Plan Updates

The DOH requires that the Comprehensive Water Master Plan be updated every six years. Chapter 6 – Distribution System Analysis recommended regular updates to the City's hydraulic model, and customer demands evaluation. It is recommended that these updates be included as part of the Comprehensive Water Master Plan updates. An estimated cost of \$200,000 is allocated for each update to be completed for FY 2019, 2025, and 2031.

8.4 CIP SUMMARY

Table 8.3 summarizes the Short- and Long-Term CIP elements starting in FY 2013. All costs shown in the table are March 2013 dollars.

The high priority pipeline projects have been distributed over the next six fiscal years such that each year the expenditure is fairly even. The remaining pipe projects are included in FY 2019 to 2032.

Adding up the Short- and Long-Term costs results in total storage project costs of \$3,511,000, total Pump Station project costs of \$2,942,000, total pipeline project costs of \$4,000,000, and total general water system project costs of \$21,525,000.

8.5 OTHER RECOMMENDATIONS

The following recommendations were identified in the previous chapters that are not categorized as capital projects.

Source of Supply (Chapter 3)

- The City is in compliance with all current regulatory requirements, including monitoring and reporting requirements. It is recommended to monitor the future total coliform rule and update their coliform monitoring plan per the new rules to maintain future compliance.
- Continue the current Water Use Efficiency Program.

Storage (Chapter 6)

- It is recommended that the City coordinate with SPU and the Highline Water District to provide emergency storage to the 465 and 380 service levels.

Operations & Maintenance (Chapter 7)

- Install a fix-based auto-read meter system. The proposed auto read system would allow real time reading of meters so that bills for new accounts and account close-outs can be done at the counter, and meters can be turned on or off without staff travelling to the customer.
- The City is considering developing a uni-directional flushing program designed to systematically flush the distribution system. Such a program would reduce flushing water demands, improve flushing efficiency, reduce water quality complaints resulting from flushing activity, and possibly improve water quality.

Table 8.2 Pipe Capacity Projects									
No.	Street Name	From Street	To Street	Length, LF	Existing Pipe Size, in.	New Pipe Size, in.	Estimated Cost	Priority¹	Notes
P-1	52nd Ave S / 53rd Ave S	Interurban Ave	137th St	750	6	12	\$233,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-2	S 137th St / 53rd Ave S	S 137th St	S 139th St	635	None	12	\$197,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-3	53rd Ave S	S 139th St	S 140th St	300	6	12	\$94,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-4	140th St	53rd	55th	557	6	12	\$173,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-5	Starfire Sports Complex Park access road			1,775	6	8	\$481,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-6	57th Ave S	S 52nd St	S 150th Pl	660	6	8	\$179,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-7	S 152nd St.	Macadam Rd S	End of Pipe	1540	6	10	\$449,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-8	S 152nd Pl	End of Pipe	Sunwood Blvd	137	None	8	\$37,000	H	Connect end of 152nd Pl to pipe in Sunwood Blvd. Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-9	65th Ave S	Southcenter Blvd	S 151st St	1,985	8	12	\$616,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-10	S 153rd St	65th Ave S	End of Pipe	485	8	12	\$150,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-11	Southcenter Blvd	Andover Pk E	62th Ave S	1,310	8	12	\$406,000	H	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-12	East of Andover Park E	South of Strander Blvd	Green River Trail Loop	580	None	8	\$157,000	H	Create loop in pipe network. Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
Total High Priority				10,714			\$3,172,000		

Table 8.2 Pipe Capacity Projects									
No.	Street Name	From Street	To Street	Length, LF	Existing Pipe Size, in.	New Pipe Size, in.	Estimated Cost	Priority¹	Notes
P-13	139th St	53rd Ave S	56th Pl S	913	6	10	\$265,000	L	Maximum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-14	Costco Dr	Andover Park E	To Costco	696	8	12	\$300,000	L	Private Water Main. Maximum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
P-15	SS 15	SS 15	Andover Park E	700	10/12	16	\$263,000	L	Maximum velocity is currently exceeded. Project will meet velocity criteria under 2030 conditions.
Total Low Priority				2,582			\$828,000		
Notes									
1. H = High Priority; L = Low Priority									

Table 8.3 Capital Improvements Plan												
	ID	NAME	COST	YEAR	SHORT-TERM							LONG-TERM
					FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2013 - 2018 Total	FY 2019 - 2032 Total
General												
	G-1	Pipeline Asset Management Study	\$ 15,000	2013	\$ 15,000							\$ 15,000
	G-2	Annual Pipeline Replacement Program	\$ 20,760,000	Annual	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 1,038,000	\$ 6,228,000
	G-3	Comprehensive Water Master Plan Updates	\$200,000 EACH	Every 5 Years						\$ 200,000		\$ 200,000
	G-4	Interurban Water Reuse	\$ 150,000		\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 150,000
		Subtotal	\$ 21,525,000		\$ 1,078,000	\$ 1,063,000	\$ 1,063,000	\$ 1,063,000	\$ 1,063,000	\$ 1,063,000	\$ 1,263,000	\$ 6,593,000
Storage												
	ST-1	1.3-MG Buried Reservoir	\$ 3,511,000	2013-2018	\$ 30,000				\$ 493,000	\$ 2,988,000	\$ 3,511,000	
		Subtotal	\$ 3,511,000		\$ 30,000	\$ -	\$ -	\$ -	\$ 493,000	\$ 2,988,000	\$ 3,511,000	
Pump Stations												
	PS-1	1,000-gpm Pump Station at New Reservoir	\$ 2,570,000	2017-2018					\$ 428,000	\$ 2,142,000	\$ 2,570,000	
	PS-2	Back-up Power at North Hill BPS	\$ 372,000	2013	\$ 372,000						\$ 372,000	
		Subtotal	\$ 2,942,000		\$ 372,000	\$ -	\$ -	\$ -	\$ 428,000	\$ 2,142,000	\$ 2,942,000	
Pipes		Street										
	P-1	52nd Ave S/53rd Ave S	\$ 233,000	2013	\$ 233,000						\$ 233,000	
	P-2	157th St/53rd Ave S	\$ 197,000	2013	\$ 197,000						\$ 197,000	
	P-3	53rd Ave	\$ 94,000	2013	\$ 94,000						\$ 94,000	
	P-4	140th St	\$ 173,000	2014		\$ 173,000					\$ 173,000	
	P-5	Starfire Sports Complex park access road	\$ 481,000	2014		\$ 481,000					\$ 481,000	
	P-6	57th Ave S	\$ 179,000	2015			\$ 179,000				\$ 179,000	
	P-7	S 152nd St	\$ 449,000	2015			\$ 449,000				\$ 449,000	
	P-8	S 152nd Pl	\$ 37,000	2016				\$ 37,000			\$ 37,000	
	P-9	65th Ave S	\$ 616,000	2016				\$ 616,000			\$ 616,000	
	P-10	S 153rd St	\$ 150,000	2017					\$ 150,000		\$ 150,000	
	P-11	Southcenter Blvd	\$ 406,000	2017					\$ 406,000		\$ 406,000	
	P-12	East of Andover Park E	\$ 157,000	2018						\$ 157,000	\$ 157,000	
	P-13	139th St	\$ 265,000	Long-Term							\$ -	\$ 265,000
	P-14	Costco Dr	\$ 300,000	Long-Term							\$ -	\$ 300,000
	P-15	SS 15	\$ 263,000	Long-Term							\$ -	\$ 263,000
		Subtotal	\$ 4,000,000		\$ 524,000	\$ 654,000	\$ 628,000	\$ 653,000	\$ 556,000	\$ 157,000	\$ 3,172,000	\$ 828,000
TOTAL			\$ 31,978,000		\$ 2,004,000	\$ 1,717,000	\$ 1,691,000	\$ 1,716,000	\$ 2,540,000	\$ 6,550,000	\$ 16,218,000	\$ 15,760,000

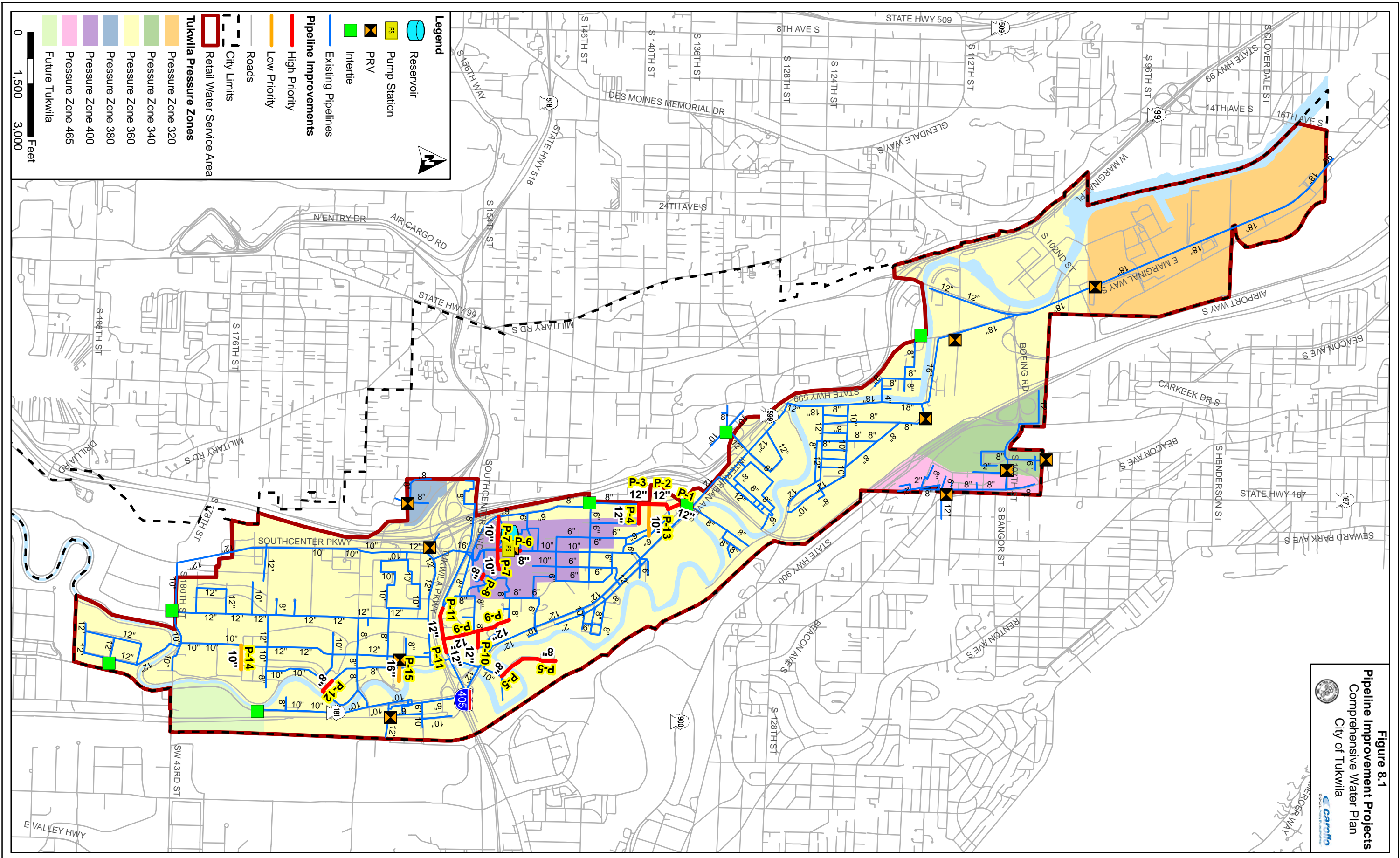


Figure 8.1
Pipeline Improvement Projects
Comprehensive Water Plan
City of Tukwila



FINANCIAL ANALYSIS

9.1 INTRODUCTION

This chapter presents the financial program, including financial history, outstanding debt, fees and charges, and capital improvement funding. A six-year plan is presented to fund the capital improvements recommended in Chapter 8 - Capital Improvements Plan. This chapter has been prepared by Katy Isaksen & Associates for inclusion in the Comprehensive Water Plan.

9.2 FINANCIAL HISTORY

The City owns and operates the water utility. The City also owns and operates the sewer utility that allows for joint utility billing. The water utility is accounted for separately and operated in a self-sufficient manner. The Public Works Department manages the system, the Finance Department manages the billing, collection and accounting services, and the two departments jointly prepare and monitor the annual budget.

Table 9.1 summarizes the financial history of the water utility in the recent years, 2009 through 2012.

The water utility has been meeting the operating expenses and debt repayment in each year and has been maintaining a level of reserves for emergency and future replacement. The capital program has been paid for with a combination of grants, contributions from partners on joint projects (Highline Water District), rates and reserves.

The key line of Table 9.1 is near the bottom, Annual Increase/(Use) of Reserves. This indicates whether the utility reserves are being increased or used in each year to balance the level of expenditure. It is good practice to invest in capital replacement on an annual basis, either by funding replacement projects or increasing reserves for future capital replacement. A continual use of reserves is not a sustainable utility practice. However, occasional or planned use of reserves for capital replacement is consistent with the purpose of reserves.

The water service charges have increased from \$4.5 million in 2009 to \$4.9 million in 2012. This increase is primarily due to rate increases passed along from Cascade. Customer growth and consumption have been relatively flat as overall consumption is reduced from conservation.

The City is a member of Cascade Water Alliance (Cascade) and purchases all of its water from Cascade for sale and distribution to the utility customers. The Cascade members have agreed to jointly promote water conservation among its customers as required by State law. Cascade works to secure long-term contracts for water supply and is currently obtaining water from the City of Seattle. Cascade rate increases are 6.2 percent for 2013 and 5.7 percent for 2014. The purchased water costs are the largest category of on-going expense for the water utility, about a third of the total. It is likely that wholesale water rates will continue to increase in years to come.

Water Fund	2009	2010	2011	2012
Water Revenue				
Monthly Service Charges	\$4,522,000	\$4,403,000	\$4,747,000	\$5,153,000
Miscellaneous Revenue	126,000	334,000	215,000	193,000
Interlocal Agreement (HWD)/Grant	455,000	314,000	1,888,000	4,000
Water Connection Fees	97,000	30,000	10,000	4,000
Total Water Revenues	\$5,200,000	\$5,081,000	\$6,860,000	\$5,354,000
Water Expenditures				
Operations & Maintenance	\$3,854,000	\$3,243,000	\$3,284,000	\$3,914,000
Engineering Labor	72,000	67,000	70,000	62,000
Interfund Utility Tax	676,000	502,000	475,000	518,000
Debt Service	554,033	554,216	553,538	528,000
Capital CIP Program	-	529,000	1,982,000	191,000
Total Water Expenditures	\$5,156,033	\$4,895,216	\$6,364,538	\$5,213,000
Annual Increase/(Use) of Reserves	43,967	185,784	495,462	141,000
Ending Water Fund Balance				\$5,240,443

A new utility tax was established in 2009 at 15 percent on the City's gross utility revenues for water, sewer and stormwater. In 2010, Ordinance 2298 reduced the tax to 10 percent through December 31, 2015.

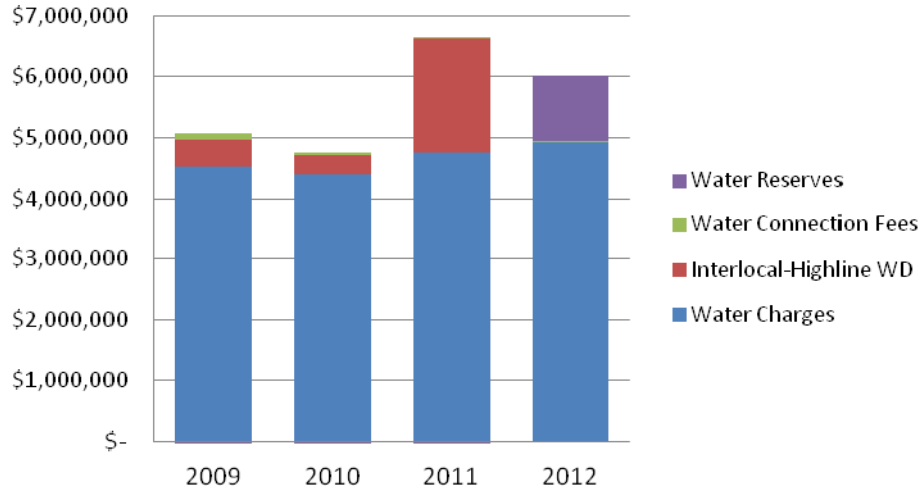
The 2012 ending water fund balance was estimated to be \$5,240,000. Of this, approximately \$990,000 is set aside for the Working Capital Reserve (20 percent of the prior year's operating revenues) and \$4,250,000 is available for future capital improvements. The reserve policy was updated in 2012 in Resolution No. 1774 Working Capital Reserve.

Monthly water charges are the primary funding source for the water utility. The service charges are used to pay for the O&M, debt service, utility tax and the engineering labor for developing capital improvements. The remainder is available for current year capital improvements, future capital replacement or reserves.

For additional revenue, there are water connection fees from new connections in the Allentown/Foster Point and Duwamish areas. With the recession and the building industry's downturn, only \$4,000 of the budgeted \$10,000 was received in 2012. Miscellaneous revenue of \$193,000 is available for funding reserves or capital improvements. Thus for 2012, approximately \$201,000 was available for capital improvements from current revenue.

Figure 9.1 illustrates four year history of the water program funding and expense during 2009 to 2012 (budget). The increases in purchased water costs have driven the increases in water service charges. This is expected to continue.

Water Program Funding



Water Program Expense

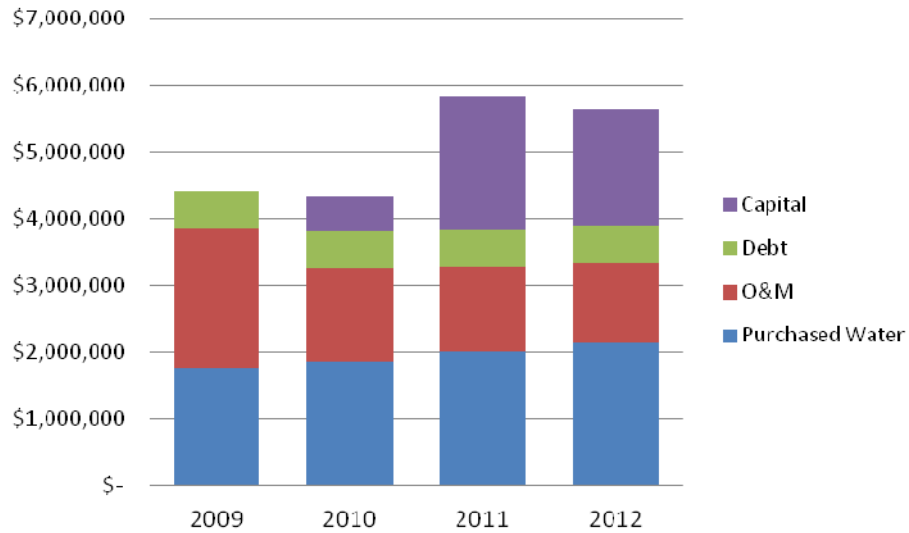


FIGURE 9.1
WATER PROGRAM FUNDING & EXPENSE
2009-2012
 Comprehensive Water Plan
 City of Tukwila



9.3 OUTSTANDING DEBT

The City has used a combination of revenue bonds and low-interest Public Works Trust Fund (PWTF) loans to fund capital improvements when borrowing is necessary. The City has also successfully combined funding for joint projects to provide savings to the ratepayers. Currently, the City has four outstanding debt issues that water is paying a share of the debt service: revenue bonds from 1995 and 2006, and PWTF loans from 2001 and 2004. The 1995 bonds provided funding for improvements in the East Marginal area and the 2001 loan was for the Val Vue Duwamish area. The 2004 and 2006 issues were joint projects related to extending water and sewer services to the Allentown and Foster Point neighborhoods. The water utility is paying 26 percent of the annual debt payments for those two issues.

Overall, the water utility will pay debt service (principal and interest) of \$553,000 in 2013. The interest rates range from 0.5 percent to 6.625 percent interest over 20 years. The largest debt payment is for the 1995 bonds that will end in 2015. Due to the high interest on the bonds, the Finance Department evaluated whether it was possible to pay them off early and determined it was not possible.

Table 9.2 shows the outstanding water debt principal at the end of 2012, the interest rate, the year the debt will retire and the 2013 principal and interest payments. In addition, the water utility has been listed for a new PWTF loan that is pending approval in the legislature for the Andover Park East water main replacement project for up to \$1,800,000. It is estimated that the debt repayment will begin in 2015 for approximately \$113,000 annually and would be paid off in 2033. The final debt schedule for this new loan will depend on when the funds are borrowed.

Debt Service Issue	Principal as of 12/31/2012	Interest Rate	Year Debt Ends	2013 P+I Payment
1995 Rev Bond: E Marginal	\$1,060,000	5.4-6.625%	2015	\$389,294
2001 PWTF: Val Vue Duwamish	\$130,089	0.5%	2021	\$15,105
2004 PWTF: Allentown/FP (26%)	\$967,000	0.5%	2024	\$85,463
2006 Rev Bond: Allentown/FP (26%)	\$644,800	4-4.5%	2026	\$63,375
Total Existing Debt Service	\$2,801,889			\$553,237
<i>Pending approval by legislature</i>				<i>Begin=2015</i>
2013 PWTF: Andover Pk E Main Replacement	\$1,800,000	1.0%	2033	\$112,737

Revenue bonds come with a promise that the utility will generate enough revenue each year to pay for operations and maintenance, revenue bond payments plus a little extra. The extra is known as coverage. The PWTF loan program, operated by the State of Washington, has been designed to provide loans that are subordinate to revenue bonds and does not have a coverage requirement. Coverage is not only an issue for existing debt, it is also important to keep in mind as a strong coverage ratio results in better rates and terms for future bond sales.

Figure 9.2 shows a map of the debt payments, including the pending new 2013 PWTF loan. The purpose of mapping the debt payments is to plan ahead and seek opportunities to fund other improvements when existing debt issues end. The end of the 1995 bond payment provides an opportunity for the water utility to choose between incurring additional debt for other necessary improvements or to increase the out-of-pocket investment in main replacement without impacting the monthly rates. The pending new loan would only use a portion of the amount, leaving an additional \$276,000 available annually.

9.4 CURRENT RATES AND CHARGES

9.4.1 Monthly Water Rates

There are two components to the water rates – a minimum monthly charge based on the number of units or size of the water meter and a consumption charge for the metered water used. The rates vary by customer class, including single family residential, low-income senior/disabled, multi-family residential, and commercial/industrial. The minimum charge depends on the number of residential units or size of the water meter. The consumption charges include a non-peak or winter rate (October to May) and a peak or summer rate (June to September). In addition, the customers with fire sprinkler systems are charged a minimum rate per month for each fire sprinkler service connection. The 2013 water rate schedule is shown in Table 9.3.

A typical single family residence using 1,000 cubic feet of water (equal to 10 ccf or 7,480 gallons) pays \$42.00 per month during the winter, \$53.00 per month during the summer, for an average of \$47.50 per month for water service. The cost for each residence will vary by season and by the amount of metered water usage. A 50 percent discount is available for low-income senior and low-income disabled customers. Multi-family customers are charged by the number of units and water usage. Commercial/Industrial customers are charged by meter size and water usage.

Tukwila Water Existing Debt

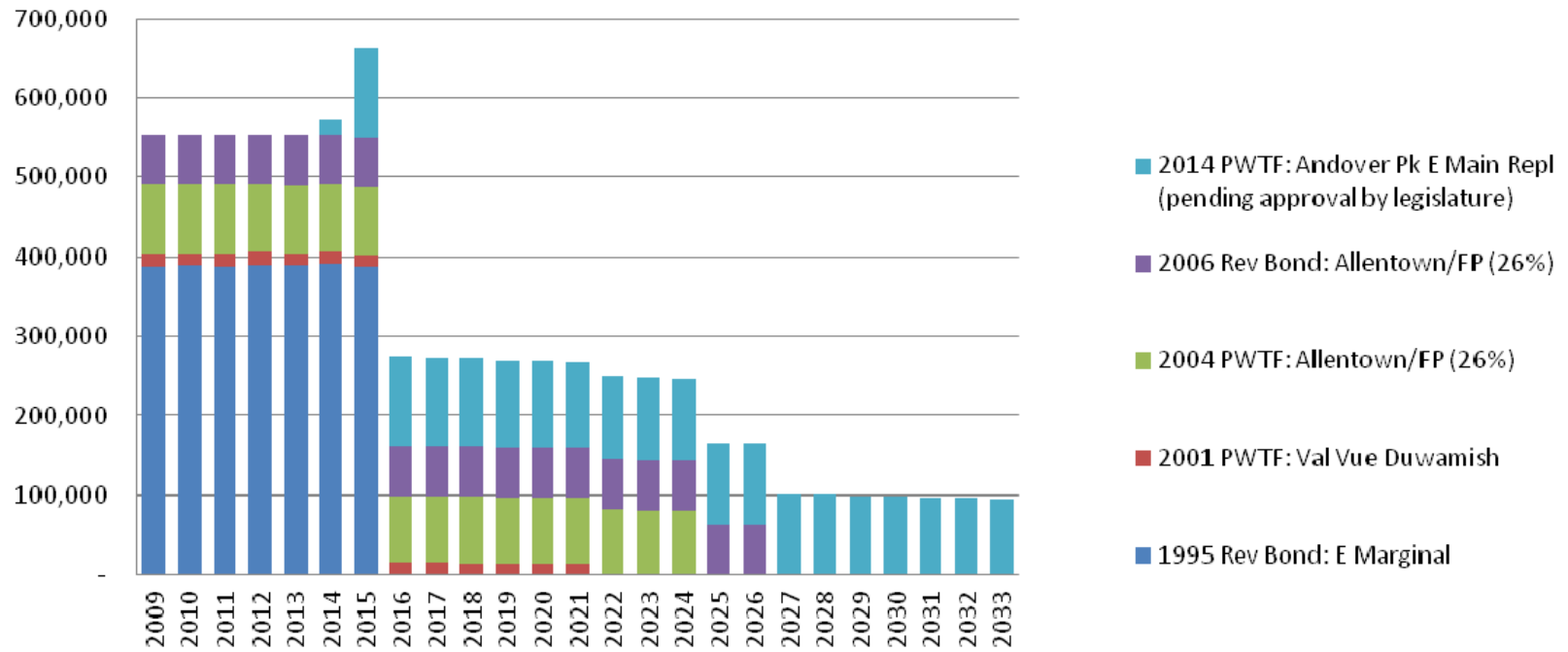


FIGURE 9.2
WATER DEBT REPAYMENT SCHEDULE
 Comprehensive Water Plan
 City of Tukwila



Table 9.3 Water Rate Schedule (Effective January 2013)		
Monthly Rates by Customer Class = Minimum Charge + Consumption Charge	Minimum Charge Per Month	Consumption Charge per 1ccf⁽¹⁾
Single Family Residential per Unit	\$14.00	
Consumption: October - May		\$2.80
Consumption: June - September		\$3.90
Low Income Senior & Low Income Disabled per Unit	\$7.00	
Consumption: October - May		\$1.40
Consumption: June - September		\$1.95
Multi-family Residential per Unit	\$14.00	
Consumption: October - May		\$2.92
Consumption: June - September		\$4.08
Commercial/Industrial per Meter		
3/4" Service	\$40.00	
1" Service	\$50.00	
1 1/2" Service	\$75.00	
2" Service	\$100.00	
3" Service	\$145.00	
4" Service	\$195.00	
6" Service	\$290.00	
8" Service	\$385.00	
10" Service	\$480.00	
12" Service	\$575.00	
Consumption: October - May		\$3.98
Consumption: June - September		\$5.46
Fire Line Charges per Service		
2" Service	\$9.00	
3" Service	\$20.00	
4" Service	\$35.00	
6" Service	\$80.00	
8" Service	\$120.00	
10" Service	\$200.00	
12" Service	\$260.00	

Table 9.3 Water Rate Schedule (Effective January 2013)

Monthly Rates by Customer Class = Minimum Charge + Consumption Charge	Minimum Charge Per Month	Consumption Charge per 1ccf⁽¹⁾
<u>Notes:</u>		
1 Conversion: 1 ccf = 100 cubic feet or 748 gallons.		

The water rates for customers outside of the city limits are the same as the rates shown above. Different rates can be applied to water sold to water districts and all meters measuring water to outside city customers must be within the city limits or easements, franchises or rights-of-way belonging to the City.

Water rates are reviewed annually and adjusted as necessary. In particular, adjustments to the cost of purchased water are passed along to the water customers.

The City's water utility provides water to the majority of City residents. In addition, King County Water District 125 and Highline Water District provide water supply to a portion of City residents. Each water district sets its own rates and charges independent of the City.

9.4.2 Connection Charges

A regular connection fee is paid by all new connections to ensure that property owners bear an equitable share of the cost of the full and complete water system. The water meters must be installed by the City water utility and a water meter installation fee must be paid at time of application of the connection. The fee includes the cost of labor, materials and overhead.

A special connection fee is paid by new connections into the water mains or laterals that have not already contributed their equitable share of the cost of such mains and laterals. The options for contributing include constructing the water line, a local improvement district, developer extension or latecomer's agreement. In essence, each customer is responsible for an equitable share of the water mains. If a property owner constructs the water mains and transfers ownership to the City, there will typically not be a special connection fee. However, if the property owner connects into an existing water main, a special connection fee will be required and will need to be calculated. Public Works maintains the records and maps that document the special connection fee areas.

A regional capital facilities charge is charged to all new connections in addition to the water installation fee and any special connection fee. The regional capital facilities fee is paid by all new connections after 2003 for regional capital costs associated with new supply and transmission of water. The Cascade Water Alliance determines this fee and is passed through to new growth by all Cascade member communities.

9.4.3 Affordability

The affordability measure for water systems in Washington State is generally based on the ratio of monthly water charges compared to the median household income (MHI) for area served. The Department of Health defines their affordability index at 1.5 percent of MHI and the Public Works Trust Fund program uses 2.0 percent of MHI. If water service charges are greater than 1.5 to 2.0 percent depending on the funding program, a community may be eligible for higher grants,

lower interest rates and/or longer repayment terms. These programs are typically targeted toward residential customers.

The American Community Survey that was completed with the current census indicates the MHI for the City of Tukwila to be \$43,887. To qualify for hardship with P WTF, 2.0 percent of the MHI would be \$878, or \$73.15 per month. With DOH's affordability index of 1.5 percent, the MHI would be \$658, or \$54.86 per month. By this measure, the current average monthly residential rate of \$47.50 is affordable. This measure should be updated in the future as necessary when applying for grants/loans from state and federal programs.

Another measure of affordability is what residents in other jurisdictions are paying. Table 9.4 compares current 2013 single-family monthly rates for jurisdictions in the south King County area. Because the consumption charges are applied differently in each jurisdiction, a single family residence using 1,000 cubic feet of water (7,480 gallons) is compared. Figure 9.3 charts the comparison in a graphic.

Table 9.4 Single-Family Monthly Water Rates	
Water Provider	Using 10 ccf of Water
Skyway WSD	\$60.31
Tukwila-Summer	\$53.00
Highline WD-Summer	\$52.10
Highline WD-Winter	\$48.90
Tukwila-Average	\$47.50
KCWD20	\$46.85
KCWD125-Summer	\$45.50
Renton	\$45.06
KCWD125-Winter	\$44.40
Tukwila-Winter	\$42.00
Auburn	\$41.04
Soos Creek WSD	\$38.75
Notes:	
1 Conversion: 1 ccf = 100 cubic feet or 748 gallons; 10 ccf = 1,000 cubic feet	

Residential Monthly Water Rates @ 10 ccf

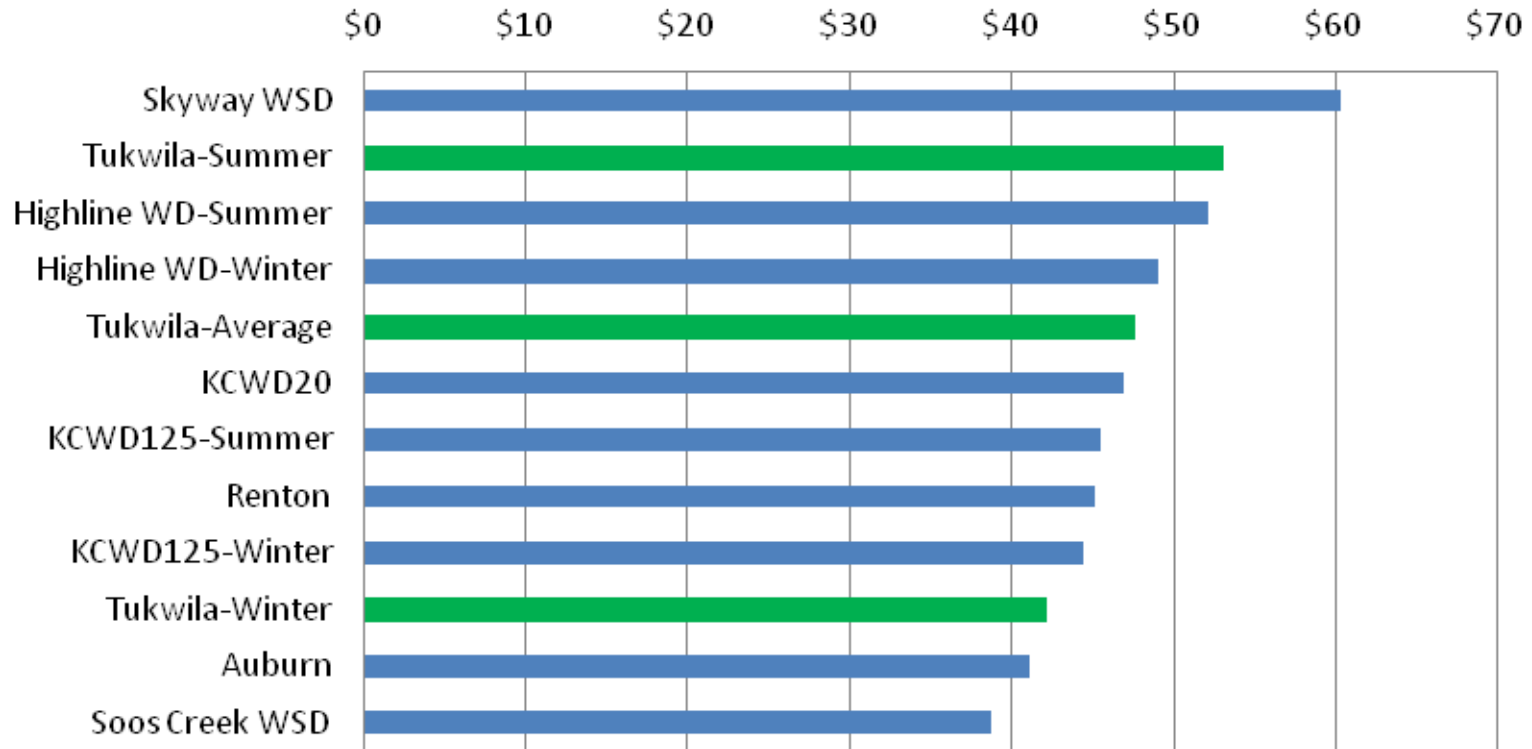


FIGURE 9.3
COMPARING RESIDENTIAL MONTHLY
WATER RATES
 Comprehensive Water Plan
 City of Tukwila



9.5 CAPITAL IMPROVEMENT FUNDING SOURCES

The City has been successful at using a variety of capital funding sources, including grants from various sources, contributions for joint projects with neighboring water providers, combined water/sewer revenue bonds, PWTF loans, local improvement districts, water reserves and repaying debt with monthly water rates.

For the City, the recommended capital improvements relate to the water storage and distribution system and not the Cascade side of water supply and transmission.

Typical funding sources for capital improvements can be described in several categories:

1. Grant or low-interest loan programs are offered by state, federal and local agencies to assist in funding infrastructure projects. Each program will have its own requirements, eligibility, application cycle and method of doing business. In tough economic times, program changes are common and should be reviewed before seeking funding.
2. Bond sales are a common funding method where the City has the authority to sell bonds to fund the improvements and will be repaid over a number of years. This helps the utility lock in current interest rates to complete projects over a maximum three-year period. Revenue bonds are most common for water utilities, where the repayment is promised from the reliable stream of service charge revenue. General obligation bonds can also be used where the City pledges the overall revenue of the City.
3. Contributions from joint partners, developer extensions and local improvement districts are another category where specific owners, developers or partners pay for a portion of all of the improvements. This category also includes city projects that involve more than one utility or city function, such as street overlay, stormwater and sewer projects.
4. Other sources include state or federal appropriations, such as an earmark outside of funding assistance programs, one-time legislative programs or local regional programs.
5. Users include system development fees paid by new connections, monthly water rates to pay for projects or debt resulting from projects, and water reserves saved for future capital improvements.

The primary grant and loan programs for water storage and distribution projects are described below.

9.5.1 State Of Washington Department Of Commerce

State of Washington Department of Commerce manages several programs targeted toward infrastructure along with community, economic and job development. These include the Community Economic Revitalization Board (CERB) programs to assist in attracting and retaining private investment and resulting in jobs and increased tax revenue to the community. These may be a portion grant combined with a loan. A fairly new program has been added, Energy Efficiency Grants for Higher Education and Local Governments. The maximum grant under this program has been \$500,000 for local governments and would be available for rehabilitating existing pump stations.

The Public Works Trust Fund (PWTF): The PWTF has had several programs, including construction, pre-construction, emergency and planning. Due to the State budget issues, the

construction program and the emergency program are the two active programs. The construction program offers low-interest loans up to \$10 million with an average loan over 20 years at 1.0 percent interest. There are incentives available to reduce the interest rate for less than 20-year repayment and completing the project on time. The City has successfully used this program in the past. The emergency program carries a higher interest rate but can be instrumental when unforeseen emergent needs arise that require substantial investment.

The PWTF construction program requires projects to be ready to proceed and thus the loans must be drawn within 36 to 48 months of approval. This is a competitive program with an annual application cycle in January to May of each year, and funds being available the following year. It is anticipated that the Public Works Board may open an application cycle in June 2013 depending on the outcome of the current legislative session.

It is possible that the pre-construction loan program may return. This loan program assisted jurisdictions with funding for engineering design, environmental, archeological, etc. requirements prior to construction.

Community Development Block Grant (CDBG) Program is also housed within the Department of Commerce. A city such as Tukwila would need to go through King County to apply for CDBG funds to assist in a low-income neighborhood.

9.5.2 State Of Washington Department Of Health

Drinking Water State Revolving Fund (DWSRF) Program: This state and federal partnership program provides low-interest loans for drinking water projects that increase public health protection. It is jointly administered by Department of Health and the PWTF. Existing water quality issues rank highest and the program is not geared toward growth. Federal requirements (Davis Bacon wages, National environmental, etc.) apply to the projects funded by this program.

The Department of Health has an annual cycle with applications typically accepted from January to March 1 of each year. Low-interest loans are offered at 1.0 to 1.5 percent interest, and limited grants are available for hardship communities. The standard loan is for 20 years. Investment grade efficiency audits, environmental and cultural reviews are required for all projects.

The draft offer list is generally out in August or September. Work must be completed within 36 months.

The program has also been offering principal forgiveness for eligible "green" projects. The current eligibility parameters should be considered to determine whether the project may qualify.

9.5.3 US Economic Development Administration (USEDA)

Another source of potential capital funding is through the economic development path. The United States Department of Commerce Economic Development Administration has a Public Works and Economic Development Program to help support public infrastructure that is necessary to generate or retain private sector jobs and investments, attract private sector capital and promote regional competitiveness. The typical maximum is \$1 million and all federal regulations would apply.

There are county, state and federal programs available to assist local governments in providing the necessary infrastructure to attract and retain private sector investment and jobs. These programs may or may not have funding available on a regular basis, so it is important to check websites and speak with program administrators before pursuing. With the current economy, there are new programs being established, either as a one-time offer or ongoing program.

9.5.4 Other

Congressional or State Appropriations can be acquired by working with federal or state elected representatives to gain their support and request an appropriation specific to your project. In this budget climate, it is extremely difficult to obtain federal appropriations. State appropriations are also difficult, however each year the state capital budget seems to include a number of appropriations.

The State of Washington has had several pilot or ongoing Local Infrastructure Financing Tool Programs. The successful applicant is approved to retain a portion of the increased taxes from an area resulting from the targeted investment in infrastructure. Given the State budget issues, these programs may or may not be available and are typically subject to legislative approval.

There is an infrastructure funding program database that is provided by the Infrastructure Assistance Coordinating Council (IACC). This can be accessed on the web directly at www.infracfunding.wa.gov. This database is very helpful in determining which funding assistance programs may be available at the time the City is considering each project.

9.6 WATER CAPITAL IMPROVEMENTS

The recommended water capital improvements were presented in Chapter 8. The projects were identified as either short term, 2013 through 2018 or long term, 2019 through 2032. The cost estimates were prepared using the March 2013 Engineering News Record costs. It is reasonable to assume that the project cost will change based on the construction costs for the year scheduled. Table 9.5 summarizes the short-term project cost of \$16,218,000 and shows that this may be \$17,894,000 when escalated to the year of construction at 3 percent escalation per year.

Period	Estimated Cost (\$2013)	Escalated to Year of Construction
Short-Term (2013-2018)	\$16,218,000	\$17,894,000
Long-Term (2019-2032)	\$15,760,000	\$22,470,000
Totals	\$31,978,000	\$40,364,000

The long-term projects are estimated to cost \$15,760,000, which is equivalent to \$22,470,000 when escalated to the year of construction. The total estimated cost for short- and long-term projects is \$31,978,000, and may reach over \$40 million when escalated.

Completion of the recommended capital improvements will require a combination of rates, reserves, rate increases and borrowing. Grants would reduce the impact on ratepayers.

9.6.1 Six-Year Water Capital Improvements

Table 9.6 summarizes the recommended six-year capital improvements in four project categories: general, storage, pump stations and pipes. A proposed pipeline replacement program is included to replace pipelines that have reached the end of their useful life. The total six-year costs are estimated to be \$16,218,000, and would be \$17,894,000 if escalated to the year of planned construction at 3 percent per year.

Table 9.6 Six-Year Water Capital Improvements (2013-2018)						
Project	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
General						
Asset Management Study	\$15,000					
Proposed Pipeline Replacement Program	\$1,038,000	\$1,038,000	\$1,038,000	\$1,038,000	\$1,038,000	\$1,038,000
Comp Water Plan Updates						\$200,000
Interurban Water Reuse	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Storage						
5.1-MG Buried Reservoir	\$30,000				\$493,000	\$2,988,000
Pump Stations						
PS at New Reservoir					\$428,000	\$2,142,000
Back-up Power, North Hill	\$372,000					
Pipes						
52nd Ave S/53rd Ave S	\$233,000					
157th St/53rd Ave S	\$197,000					
53rd Ave	\$94,000					
140th St		\$173,000				
Starfire access road		\$481,000				
57th Ave S			\$179,000			
S 152nd St			\$449,000			
S 152nd Pl				\$37,000		
65th Ave S				\$616,000		
S 153rd St					\$150,000	
Southcenter Blvd					\$406,000	
E of Andover Park E						\$157,000
Total Six-Year Costs	\$2,004,000	\$1,717,000	\$1,691,000	\$1,716,000	\$2,540,000	\$6,550,000
Total Escalated Costs	\$2,004,000	\$1,768,510	\$1,793,982	\$1,875,120	\$2,858,792	\$7,593,245

The recommended six-year CIP averages \$2.7 million per year compared to the City's 2013 plan that averages \$1.2 million per year. The timing for the new reservoir (\$3.5 million) and associated pump station (\$2.6 million) are now recommended within the six-year planning horizon. An annual average for the proposed pipeline replacement program (\$1.04 million) assumes the pipes will be replaced over a 50-year period. The pipe capacity projects (\$3.2 million) were taken into account when determining the 50-year average. And back-up power at North Hills Booster Pump Station has been added.

The City has prioritized two large main replacement projects (Andover Park W/Strander, \$1.4 million and Andover Park E, \$1.8 million) for 2013 and 2014, and has applied for a PWTF loan of \$1.8 million to fund the latter. With the proposed pipeline replacement program, the City would use the average amount (\$1,038,000) as a target and prioritize the projects to fit the target.

9.6.2 Six-Year Capital Improvement Funding Plan

The funding plan for the six-year improvements is summarized in Table 9.7 and includes the 2013 PWTF loan, future revenue bonds for the new reservoir and pump station and the remainder of the CIP, including main replacement, to be funded by water rates and/or reserves.

Funding Source	2013	2014	2015	2016	2017	2018
2013 PWTF	\$762,000	\$1,038,000				
Future Revenue Bonds					\$921,000	\$5,130,000
Rates/Reserves	\$1,242,000	\$679,000	\$1,691,000	\$1,716,000	\$1,619,000	\$1,420,000
Annual Total	\$2,004,000	\$1,717,000	\$1,691,000	\$1,716,000	\$2,540,000	\$6,550,000

9.6.3 Alternative Six-Year Capital Improvement Funding Plan

Table 9.8 presents an alternative funding plan that includes a PWTF loan (1.0 percent interest) instead of revenue bonds for the new reservoir and pump station. The City would need to plan the timing of the application and compete for funding and has been successful on several occasions in the past, including the 2013 list currently awaiting approval by the state legislature.

Funding Source	2013	2014	2015	2016	2017	2018
2013 PWTF Loan	\$762,000	\$1,038,000				
Future PWTF Loan					\$921,000	\$5,130,000
Rates/Reserves	\$1,242,000	\$679,000	\$1,691,000	\$1,716,000	\$1,619,000	\$1,420,000
Annual Total	\$2,004,000	\$1,717,000	\$1,691,000	\$1,716,000	\$2,540,000	\$6,550,000

The annual debt payment for 20-year revenue bonds at 4.0% interest is estimated to be \$445,000, or approximately \$4.00 extra for residential monthly rates. The City would control the

timing of the bond sale to work best with the project and to take advantage of low interest rates when possible. The actual interest rate would be based on the bond market and would be set at the time of bond sale. Bond proceeds must be spent within 3 years of a bond sale.

Alternatively, a PWTF low-interest loan could be pursued for a lower interest rate at 1.0 percent over 20 years. The estimated annual payment would be \$335,000 or approximately \$3.00 extra for residential monthly rates. The lower interest could result in a savings of approximately \$1.00 per month.

A sustainable utility would fund the on-going main replacement program with water rates and/or reserves already set aside. In the case of large projects, such as and Andover Park projects, it is appropriate to obtain low-interest loans. However, over the long run, it is best to build up capacity in the water rates to fund the on-going main replacement program. In order to avoid drastic impacts on rates, the City would adjust the program to allow the rates to step up to the necessary level.

Other recommendations in Section 8.5 are assumed to be funded within the operations and maintenance program.

9.7 SIX-YEAR WATER FINANCIAL PLAN

The City of Tukwila has a six-year financial planning model and capital improvement program that is updated annually. Beginning 2015, the City will update the CIP every other year and continue updating the rate model annually. The six-year outlook allows the City to plan ahead to avoid drastic impacts on ratepayers and meets the State's requirement for a six-year financing plan. The most recent 2013 to 2018 plan was reviewed and is compared in developing this financial chapter.

Figure 9.4 presents the Water Program Expenditures. The purchased water costs are the largest category of on-going expense for the water utility and account for 31 percent of the 2013 water program expenditures. The City purchases all of its water from Cascade for sale and distribution to the utility customers. Cascade rate increases are 6.2 percent for 2013 and 5.7 percent for 2014 and are expected to continue to increase in years to come. These increases directly impact Tukwila water rates as they are passed through to the water utility customers.

The City's current financial plan anticipates rate increases of 10 percent in 2013 through 2018.

The rate revenue does not appear to be sufficient to fund the estimated water program including the purchased water increases and the average main replacement program level. The City will continue to monitor the water program and consider further adjusting rates to ramp up to meet the average main replacement program.

The City's financial plan includes the continuation of the interfund utility tax beyond 2015 at over \$600,000 per year. If the utility tax were to sunset, those funds would be immediately available for the annual capital replacement program without impacting monthly rates.

The detailed six-year water financial plan shown in Table 9.9 includes an additional rate increase of 2.5 percent per year 2014 through 2018 for CIP, positive cash flow and to rebuild the reserves.

Six-Year Financial Outlook⁽¹⁾	Budget 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Total 6-Yr 2013-18
WATER REVENUE							
Operating Revenue							
Water Charges: Cascade ⁽²⁾	\$2,186,000	\$2,310,000	\$2,402,000	\$2,498,000	\$2,623,000	\$2,755,000	\$14,774,000
Water Charges: City Water ⁽²⁾	\$3,026,000	\$3,207,000	\$3,464,000	\$3,706,000	\$3,965,000	\$4,243,000	\$21,611,000
Rate Increase for CIP ⁽³⁾		\$130,300	\$268,225	\$414,875	\$569,975	\$734,675	\$2,118,050
Miscellaneous Revenue	\$130,000	\$130,000	\$150,000	\$170,000	\$200,000	\$220,000	\$1,000,000
Subtotal Operating Revenue	\$5,342,000	\$5,777,300	\$6,284,225	\$6,788,875	\$7,357,975	\$7,952,675	\$39,503,050
Capital Improvement Revenue							
Grants/Bonds/PWTF	\$762,000	\$1,038,000	\$0	\$0	\$921,000	\$5,130,000	\$7,851,000
Water Connection Fees	\$50,000	\$50,000	\$25,000	\$25,000	\$25,000	\$10,000	\$185,000
Subtotal Capital Revenue	\$812,000	\$1,088,000	\$25,000	\$25,000	\$946,000	\$5,140,000	\$8,036,000
Total Water Revenue	\$6,154,000	\$6,865,300	\$6,309,225	\$6,813,875	\$8,303,975	\$13,092,675	\$47,539,050
WATER EXPENDITURES							
Operating Expense							
Purchased Water: Cascade	\$2,186,000	\$2,310,000	\$2,402,000	\$2,498,000	\$2,623,000	\$2,755,000	\$14,774,000
Operations & Maintenance	\$1,786,000	\$1,827,000	\$1,881,000	\$1,928,000	\$2,005,000	\$2,086,000	\$11,513,000
Engineering Labor	\$74,000	\$76,000	\$78,000	\$80,000	\$83,000	\$85,000	\$476,000
Interfund Utility Tax	\$534,000	\$565,000	\$602,000	\$637,000	\$679,000	\$722,000	\$3,739,000
Subtotal Operating	\$4,580,000	\$4,778,000	\$4,963,000	\$5,143,000	\$5,390,000	\$5,648,000	\$30,502,000
Debt Service							
Revenue Bonds (existing)	\$452,669	\$454,874	\$450,537	\$62,907	\$62,647	\$63,434	\$1,547,068
PWTF Loans (existing)	\$100,568	\$100,091	\$99,616	\$99,141	\$98,666	\$98,190	\$596,272
PWTF Loan (pending 2013)	\$0	\$18,000	\$112,737	\$111,789	\$110,842	\$109,895	\$463,263
New PWTF for CIP						\$335,318	\$335,318
Subtotal Debt Service	\$553,237	\$572,965	\$662,890	\$273,837	\$272,155	\$606,837	\$2,941,921
Subtotal Operation & Debt	\$5,133,237	\$5,350,965	\$5,625,890	\$5,416,837	\$5,662,155	\$6,254,837	\$33,443,921
Capital - CIP Program	\$2,004,000	\$1,717,000	\$1,691,000	\$1,716,000	\$2,540,000	\$6,550,000	\$16,218,000
Total Water Expenditures	\$7,137,237	\$7,067,965	\$7,316,890	\$7,132,837	\$8,202,155	\$12,804,837	\$49,661,921
Annual Increase(Use) of Reserves	(\$983,237)	(\$202,665)	(\$1,007,665)	(\$318,962)	\$101,820	\$287,838	(\$2,122,871)
Notes:							
1 Prepared by Katy Isaksen & Associates based on 2013 City of Tukwila Financial Planning Model & CIP funding plan (Draft 6/7/2013).							
2 Water Charges for Cascade and City Water are increased 10% per year in the 2013 Financial Planning Model.							
3 This scenario includes an additional rate increase of 2.5% per year for CIP, positive cash flow and to rebuild the reserves.							

2013 Water Program, \$7,137,000

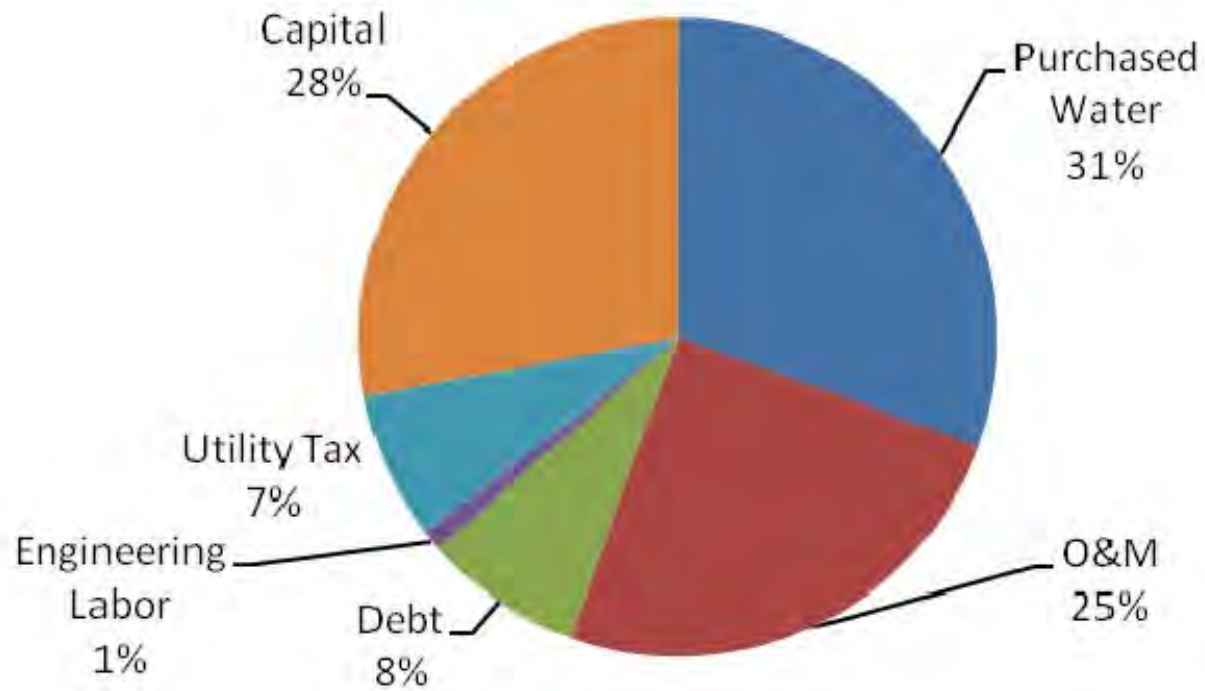


FIGURE 9.4
2013 WATER PROGRAM
EXPENDITURES
Comprehensive Water Plan
City of Tukwila



The scenario shown in Table 9.9 includes an additional average 2.5 percent per year rate increase in 2014 to 2018 to pay for the CIP program (including debt repayment for the new reservoir and pump station in 2018), to reach positive annual cash flow in 2017 and to rebuild the reserves used in 2013 through 2016. Of course, the utility will continue to review the revenue and expenditure forecasts each year and update the financial plan to maintain a balanced and financially healthy utility.

Table 9.10 shows the estimated impact on the water fund balance along with the working capital components. While the reserves are being drawn down in each of the early years, the target minimum fund balance is maintained. Then in 2017, the reserves begin building again. The net change in reserves from 2013 to 2018 is a negative \$2.1 million. The working capital reserve fund policy for the water fund (an enterprise fund) states that the unrestricted fund balance shall equal or exceed 20 percent of the previous year's revenue, exclusive of significant non-operating, non-recurring revenues.

	2013	2014	2015	2016	2017	2018
Beginning Balance	\$5,240,443	\$4,257,206	\$4,054,541	\$3,046,876	\$2,727,914	\$2,829,734
Annual Increase/(Use) of Reserves	(\$983,237)	(\$202,665)	(\$1,007,665)	(\$318,962)	\$101,820	\$287,838
Ending Balance Water	\$4,257,206	\$4,054,541	\$3,046,876	\$2,727,914	\$2,829,734	\$3,117,572
<u>Working Capital Components</u>						
Target Minimum Reserve (20%)	\$1,028,000	\$1,078,000	\$1,139,000	\$1,208,000	\$1,280,000	\$1,363,000
Unreserved Balance	\$3,229,206	\$2,976,541	\$1,907,876	\$1,519,914	\$1,549,734	\$1,754,572
Ending Balance Water	\$4,257,206	\$4,054,541	\$3,046,876	\$2,727,914	\$2,829,734	\$3,117,572
<i>Meets Target Minimum?</i>	<i>ok</i>	<i>ok</i>	<i>ok</i>	<i>ok</i>	<i>ok</i>	<i>ok</i>
Notes:						
1 Prepared by Katy Isaksen & Assoc. based on 2013 City of Tukwila Financial Planning Model & CIP funding plan.						

**STATE ENVIRONMENTAL POLICY ACT CHECKLIST AND
DETERMINATION OF NON-SIGNIFICANCE**



17967

CITY OF TUKWILA

Department of Community Development

6300 Southcenter Boulevard, Tukwila, WA 98188

Telephone: (206) 431-3670 FAX: (206) 431-3665

E-mail: planning@TukwilaWA.gov

SEPA ENVIRONMENTAL REVIEW

INFORMATION

The [State Environmental Policy Act](#) (SEPA) requires all agencies to consider the environmental impacts of a development before making decisions (43.21C RCW). The purpose of environmental review is to identify a proposal's significant adverse impacts, measures to minimize or avoid such impacts, and allow wide public review for a wide range of projects.

REQUIREMENTS: SEPA review is required for any action associated with the following types of decisions:

1. Developing 10 or more dwelling units.
2. Developing agricultural structures over 10,000 s.f.
3. Developing office, school, commercial, recreational, service or storage buildings over 12,000 s.f. and 40 parking spaces (certain utility lines, personal wireless communication facilities, and normal maintenance/replacement activities are fully exempt).
4. Developing parking lots with over 40 spaces.
5. Landfills and excavations over 500 cubic yards.
6. Installation of impervious underground tanks with a capacity over 10,000 gallons.

The accompanying application must be completed for any new SEPA application or request to issue an addendum to any previous SEPA determination. If a question does not apply, "Does not apply" or "NA" may be entered. Complete answers to the checklist may avoid unnecessary delays later. City staff may also be able to help about governmental designations (e.g., zoning, shoreline, and landmark status).

PROCEDURES: At the time you submit your application you must have all of the items listed on the attached "Complete Application Checklist" as well as the submittal for the underlying action (building permit, subdivision etc.). You may request a waiver from items on the checklist that are not applicable to your project. Please discuss this waiver request with City staff either at a pre-application meeting or at the time of application submittal. Within 28 days of receiving your application, City staff will determine if it is complete based on the attached checklist. If not complete City staff will mail to you a letter outlining what additional information is needed. If you do not submit requested materials within 90 days from the City's request for additional information the City may cancel your application.

Once the application is "complete," substantive review will begin and a "Notice of Application" must be posted/mailed to begin a public comment period. After completing the environmental analysis and considering public comments, the Director will issue a determination for the project. A Determination of Non-Significance (DNS) says that the project as proposed will not have probable, significant, negative environmental impacts. A mitigated DNS will be issued if the project must be modified to mitigate its negative impacts. An Environmental Impact Statement (EIS) must be prepared if the probable negative impacts are unavoidable.

COMPLETE APPLICATION CHECKLIST

The materials listed below must be submitted with your application unless specifically waived in writing by the Public Works Department and the Department of Community Development. Please contact each Department if you feel that certain items are not applicable to your project and should be waived. Application review will not begin until it is determined to be complete. **ADDITIONAL MATERIALS MAY BE REQUIRED.**

The initial application materials allow project review to begin and vest the applicant's rights. However, the City may require additional information as needed to establish consistency with development standards.

City staff are available to answer questions about application materials at 206-431-3670 (Department of Community Development) and 206-433-0179 (Department of Public Works).

Check items submitted with application	Information Required. <i>May be waived in unusual cases, upon approval of both Public Works and Planning</i>						
APPLICATION MATERIALS:							
	1. Application Checklist (1 copy) indicating items submitted with application.						
	2. Completed ESA Screening Checklist, SEPA Environmental Checklist and drawings (5 copies).						
	3. One set of all plans reduced to 8 1/2" x 11" or 11" x 17".						
	4. Application Fee: See Land Use Fee Schedule .						
	5. Underlying permit application that triggers SEPA review.						
PUBLIC NOTICE MATERIALS:							
	6. Payment of a \$365 notice board fee to FastSigns Tukwila OR provide a 4' x 4' public notice board on site within 14 days of the Department determining that a complete application has been received (see Public Notice Sign Specifications Handout).						
	7. Pay the fee as established by the Land Use Fee Schedule for generating mailing labels; OR provide an excel spreadsheet of mailing labels for all <i>property owners</i> and <i>tenants</i> (residents and businesses) within 500 feet of the subject property. Each unit in multiple family buildings e.g. apartments, condos, trailer parks--must be included. Once your project is assigned to a planner, you will be required to provide an electronic copy of the mailing label spreadsheet in the following format: Name, Street Address, City St Zip, with each of these fields as an individual column:						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Name</th> <th style="width: 33%;">Street Address</th> <th style="width: 33%;">City, St, Zip</th> </tr> </thead> <tbody> <tr> <td>Mr. Smith</td> <td>1234 Park Ave S</td> <td>Tukwila WA 98188</td> </tr> </tbody> </table>	Name	Street Address	City, St, Zip	Mr. Smith	1234 Park Ave S	Tukwila WA 98188
Name	Street Address	City, St, Zip					
Mr. Smith	1234 Park Ave S	Tukwila WA 98188					
	PLEASE NOTE: Regardless of whether you pay the City to generate the mailing labels or you provide them, there is an additional fee for postage and material as listed under Public Notice Mailing Fee on the Land Use Fee Schedule . Payment of this fee is due prior to issuance of the decision and you will receive a separate bill for this fee.						
	8. <u>If providing own labels</u> , include King County Assessor's map(s) which shows the location of each property within 500 ft. of the subject lot.						

Check items submitted with application	Information Required. <i>May be waived in unusual cases, upon approval of both Public Works and Planning</i>
PROJECT DESCRIPTION AND ANALYSIS:	
	9. Vicinity Map with site location.
	10. Provide four (4) copies of any sensitive area studies such as wetland or geotechnical reports if needed per Tukwila's Sensitive Areas Ordinance (TMC 18.45). See the Geotechnical Report Guidelines and Sensitive Area Special Study Guidelines for additional information.
	11. Any drawings needed to describe the proposal other than those submitted with the underlying permit. Maximum size 24" x 36".



CITY OF TUKWILA

Department of Community Development
 6300 Southcenter Boulevard, Tukwila, WA 98188
 Telephone: (206) 431-3670 FAX: (206) 431-3665
 E-mail: planning@TukwilaWA.gov

SEPA ENVIRONMENTAL REVIEW

APPLICATION

FOR STAFF USE ONLY Permits Plus TYPE: P-SEPA

Planner:	File Number:
Application Complete Date:	Project File Number:
Application Incomplete Date:	Other File Numbers:

NAME OF PROJECT/DEVELOPMENT: 2012 TUKWILA WATER SYSTEM PLAN UPDATE

LOCATION OF PROJECT/DEVELOPMENT: Give street address or, if vacant, indicate lot(s), block and subdivision, access street, and nearest intersection.

LIST ALL TAX LOT NUMBERS (this information may be found on your tax statement).

Citywide for the Tukwila Water System

DEVELOPMENT COORDINATOR :

The individual who:

- has decision making authority on behalf of the owner/applicant in meetings with City staff,
- has full responsibility for identifying and satisfying all relevant and sometimes overlapping development standards, and
- is the primary contact with the City to whom all notices and reports will be sent.

Name: Michael P. Cusick

Address: 6300 Southcenter Blvd., Suite 100, Tukwila WA 98168

Phone: (206) 431-2441

FAX: (206) 431-3665

E-mail: michael.cusick@tukwilawa.gov

Signature:

Date:

5/13/14
APPLIED 5/15/2013



CITY OF TUKWILA

Department of Community Development

6300 Southcenter Boulevard, Tukwila, WA 98188

Telephone: (206) 431-3670 FAX: (206) 431-3665

E-mail: planning@TukwilaWA.gov

AFFIDAVIT OF OWNERSHIP AND HOLD HARMLESS PERMISSION TO ENTER PROPERTY

STATE OF WASHINGTON

ss

COUNTY OF KING

The undersigned being duly sworn and upon oath states as follows:

1. I am the current owner of the property which is the subject of this application.
2. All statements contained in the applications have been prepared by me or my agents and are true and correct to the best of my knowledge.
3. The application is being submitted with my knowledge and consent.
4. Owner grants the City, its employees, agents, engineers, contractors or other representatives the right to enter upon Owner's real property, located at _____ for the purpose of application review, for the limited time necessary to complete that purpose.
5. Owner agrees to hold the City harmless for any loss or damage to persons or property occurring on the private property during the City's entry upon the property, unless the loss or damage is the result of the sole negligence of the City.
6. Non-responsiveness to a City information request for ninety (90) or more days, shall be cause to cancel the application(s) without refund of fees.

EXECUTED at _____ (city), _____ (state), on _____, 20_____

(Print Name)

(Address)

(Phone Number)

(Signature)

On this day personally appeared before me _____ to me known to be the individual who executed the foregoing instrument and acknowledged that he/she signed the same as his/her voluntary act and deed for the uses and purposes mentioned therein.

SUBSCRIBED AND SWORN TO BEFORE ME ON THIS _____ DAY OF _____, 20_____

NOTARY PUBLIC in and for the State of Washington
residing at _____

My Commission expires on _____

City of Tukwila Endangered Species Act Screening Checklist

Date: _____

Applicant Name: _____

Street Address: _____

City, State, Zip: _____

Telephone: _____

DIRECTIONS:

This Screening Checklist has been designed to evaluate the potential for your project to result in potential “take” of Chinook salmon, Coho salmon, or Cutthroat trout as defined by Section 9 of the Endangered Species Act. The checklist includes a series of “Yes” or “No” questions about your project, organized into four parts. Starting with Part A on Page 2, read each question carefully, mark the appropriate “Yes” or “No,” and **proceed to the next question as directed by the checklist**. To answer these questions, you may need to refer to site plans, grading and drainage plans, critical areas studies, or other documents you have prepared for your project. The City will evaluate your responses to determine if “take” is indicated.

Part A: Please review and answer each question carefully. Consider all phases of your project including, but not limited to, construction, normal operation, potential emergency operation, and ongoing and scheduled maintenance. Continue to the next question as directed for each No or Yes answer.

<p>1-0</p>	<p>Will the project require any form of grading? Grading is defined as any excavating, filling, clearing, or creation of impervious surface, or any combination thereof, which alters the existing ground surface of the earth (TMC 18.06.370). Please mark the appropriate response.</p> <p>NO - Continue to Question 2-0</p> <p>YES - Continue to Question 1-1 (Page 3)</p>
<p>2-0</p>	<p>Will the project require any form of clearing? Clearing means the removal or causing to be removed, through either direct or indirect actions, any vegetation from a site (18.06.145). Please mark the appropriate response.</p> <p>NO - Continue to Question 3-0</p> <p>YES - Continue to Question 2-1 (Page 4)</p>
<p>3-0</p>	<p>Will the project require work, during any time of the project, below the ordinary high water mark of a watercourse or the Green/Duwamish or Black Rivers or in wetlands? Ordinary high water mark is the mark that is found by examining the bed and banks of a stream and ascertaining where the presence and action of waters are so common and usual as to distinctly mark the soil from that of the abutting upland, in respect to vegetation (see TMC Chapter 18.06, Page 18-15). Please mark the appropriate response.</p> <p>NO - Continue to Question 4-0</p> <p>YES - Continue to Question 3-1 (Page 5)</p>
<p>4-0</p>	<p>Will the project result in the processing or handling, storage, or treatment of hazardous substances? This does not include the proper use of fuel stored in a vehicle's fuel tank. Hazardous substances are any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits the characteristics or criteria of hazardous waste as defined by Washington Administrative Code 173-303 (TMC 18.06.385). This includes fuel or other chemicals stored on-site during construction. Please mark the appropriate response.</p> <p>NO - Continue to Question 5-0</p> <p>YES - Continue to Question 5-0</p>
<p>5-0</p>	<p>Will the project result in the withdrawal, injection, or interception of groundwater? Examples of projects that may affect groundwater include, but are not limited to: construction of a new well, change in water withdrawals from an existing well, projects involving prolonged construction dewatering, projects installing French drains or interceptor trenches, and sewer lines. For the purpose of this analysis, projects that require a geotechnical report pursuant to the requirements of TMC 18.45.060 or would require a geotechnical report if not exempt should answer Yes. Please mark the appropriate response.</p> <p>NO - Continue to Question 6-0</p> <p>YES - Continue to Question 6-0</p>
<p>6-0</p>	<p>Will the project involve landscaping or re-occurring outdoor maintenance that includes the regular use of fertilizers, pesticides, or herbicides? This does not include the one-time use of transplant fertilizers. Landscaping means natural vegetation such as trees, shrubs, groundcover, and other landscape materials arranged in a manner to produce an aesthetic effect appropriate for the use of the land (TMC 18.06.490). For the purpose of this analysis, this includes the establishment of new lawn or grass. Please mark the appropriate response.</p> <p>NO – Checklist Complete</p> <p>YES – Checklist Complete</p>

Part B: Please answer each question below for projects that include grading. Review each question carefully, considering all phases of your project including, but not limited to construction, normal operation, potential emergency operation, and ongoing and scheduled maintenance. Continue to the next question as directed for each No or Yes answer.

1-1 Will the project involve the modification of a watercourse bank or bank of the Green/Duwamish or Black Rivers between the ordinary high water mark and top of bank? This includes any projects that will require grading on any slope leading to a river or stream, but will not require work below the ordinary high water mark. Work below the ordinary high water mark is covered in Part C. **Please mark the appropriate response.**

NO - Continue to Question 1-2

YES - Continue to Question 1-2

1-2 Could the construction, operation, or maintenance of the project result in sediment transport off site or increased rates of erosion and/or sedimentation in watercourses, the Green/Duwamish rivers, or the Black River? Most projects that involve grading have the potential to result in increased erosion and/or sedimentation as a result of disturbances to the soil or earth. If your project involves grading and you have not prepared a Temporary Erosion and Sedimentation Control Plan specifically designed to retain 100 percent of the runoff (including during construction) from impervious surface or disturbed soils, answer Yes to this question. If your project is normally exempt under the Tukwila Municipal Code and would not require the preparation of a Temporary Erosion and Sedimentation Control Plan, BUT may still result in erosion or sediment transport off site or beyond the work area, answer Yes to this question. **Please mark the appropriate response.**

NO - Continue to Question 1-3

YES - Continue to Question 1-3

1-3 Will the project result in the construction of new impervious surfaces? Impervious surfaces include those hard surfaces which prevent or restrict the entry of water into the soil in the manner that such water entered the soils under natural conditions prior to development; or a hard surface area that causes water to run off the surface in greater quantity or at an increased rate of flow from the flow presented under natural conditions prior to development. Such areas include, but are not limited to, rooftops, asphalt or concrete paving, compacted surfaces, or other surfaces that similarly affect the natural infiltration or runoff patterns existing prior to development (TMC 18.06.445). **Please mark the appropriate response.**

NO - Continue to Question 2-0 (Page 2)

YES - Continue to Question 1-4

1-4 Will your project generate stormwater from the creation of impervious surfaces that will not be infiltrated on site? For the purpose of this analysis, infiltration includes the use of a stormwater treatment and management system intended to contain all stormwater on site by allowing it to seep into pervious surface or through other means to be introduced into the ground. If your project involves the construction of impervious surface and does not include the design of a stormwater management system specifically designed to infiltrate stormwater, answer Yes to this question. **Please mark the appropriate response.**

NO - Continue to Question 2-0 (Page 2)

YES - Continue to Question 2-0 (Page 2)

Part C: Please review each question below for projects that include clearing. Review each question carefully, considering all phases of your project including, but not limited to construction, normal operation, potential emergency operation, and ongoing and scheduled maintenance. Continue to the next question as directed for each No or Yes answer.

2-1	<p>Will the project involve clearing within 200 feet of the ordinary high water mark of a watercourse or the Green/Duwamish or Black Rivers? Please mark the appropriate response.</p> <p>NO - Continue to Question 3-0 (Page 2)</p> <p>YES - Continue to Question 2-2</p>
2-2	<p>Will the project involve clearing of any trees within 200 feet of the ordinary high water mark of a watercourse or the Green/Duwamish or Black Rivers? A tree is defined by TMC 18.06.845 as any self-supporting woody plant, characterized by one main trunk, with a potential diameter-breast-height of 2 inches or more and potential minimum height of 10 feet. Please mark the appropriate response.</p> <p>NO - Continue to Question 2-3</p> <p>YES - Continue to Question 2-3</p>
2-3	<p>Will the project involve clearing of any evergreen trees from within 200 feet of the ordinary high water mark of a watercourse or the Green/Duwamish or Black Rivers? For the purpose of this analysis evergreen means any tree that does not regularly lose all its leaves or needles in the fall. Please mark the appropriate response.</p> <p>NO - Continue to Question 2-4</p> <p>YES - Continue to Question 2-4</p>
2-4	<p>Will the project involve clearing within 100 feet of the ordinary high water mark of a watercourse or the Green/Duwamish or Black Rivers? Please mark the appropriate response.</p> <p>NO - Continue to Question 3-0 (Page 2)</p> <p>YES - Continue to Question 2-5</p>
2-5	<p>Will the project involve clearing within 40 feet of the ordinary high water mark of a watercourse or the Green/Duwamish or Black Rivers? Please mark the appropriate response.</p> <p>NO - Continue to Question 3-0 (Page 2)</p> <p>YES - Continue to Question 3-0 (Page 2)</p>

Part D: Please review each question below for projects that include work below the ordinary high water mark of watercourses or the Duwamish/Green or Black Rivers or in wetlands. Review each question carefully, considering all phases of your project including, but not limited to, construction, normal operation, potential emergency operation, and ongoing and scheduled maintenance. Continue to the next question as directed for each No or Yes answer.

<p>3-1</p>	<p>Will the project involve the direct alteration of the channel or bed of a watercourse, the Green/Duwamish rivers, or Black River? For the purpose of this analysis, channel means the area between the ordinary high water mark of both banks of a stream, and bed means the stream bottom substrates, typically within the normal wetted-width of a stream. This includes both temporary and permanent modifications. Please mark the appropriate response.</p> <p>NO - Continue to Question 3-2</p> <p>YES - Continue to Question 3-2</p>
<p>3-2</p>	<p>Will the project involve any physical alteration to a watercourse or wetland connected to the Green/Duwamish River? For the purpose of this analysis, "connected to the river means" flowing into via a surface connection or culvert, or having other physical characteristics that allow for access by salmonids. This includes impacts to areas such as sloughs, side channels, remnant oxbows, ditches formed from channelized portions of natural watercourses or any area that may provide off channel rearing habitat for juvenile fish from the Duwamish River. This includes both temporary construction alterations and permanent modifications. Watercourses or wetlands draining to the Green/Duwamish River that have a hanging culvert, culvert with a flap gate, diversion, or any entirely man-made or artificial structure that precludes fish access should answer Yes to this question. Please mark the appropriate response.</p> <p>NO - Continue to Question 3-3</p> <p>YES - Continue to Question 3-3</p>
<p>3-3</p>	<p>Will the project result in the construction of a new structure or hydraulic condition that could be a barrier to salmonid passage within the watercourse or the Green/Duwamish or Black Rivers? For the purpose of this analysis, a barrier means any artificial or human modified structure or hydraulic condition that inhibits the natural upstream or downstream movement of salmonids, including both juveniles and adults. Please mark the appropriate response.</p> <p>NO - Continue to Question 3-4</p> <p>YES - Continue to Question 3-4</p>
<p>3-4</p>	<p>Will the project involve a temporary or permanent change in the cross-sectional area of a watercourse or the Green/Duwamish or Black Rivers? For the purpose of this analysis, the cross-sectional area is defined as a profile taken from the ordinary high water mark on the right bank to the ordinary high water mark on the left bank. Please mark the appropriate response.</p> <p>NO - Continue to Question 3-5</p> <p>YES - Continue to Question 3-5</p>
<p>3-5</p>	<p>Will the project require the removal of debris from within the ordinary high water mark of a watercourse or the Green/Duwamish or Black Rivers? For the purpose of this analysis, debris includes, but is not limited to fallen trees, logs, shrubs, rocks, piles, rip-rap, submerged metal, and broken concrete or other building materials. Projects that would require debris removal from a watercourse or the Green/Duwamish or Black Rivers as part of a maintenance activity should answer Yes to this question. Please mark the appropriate response.</p> <p>NO - Continue to Question 3-6</p> <p>YES - Continue to Question 3-6</p>

Part D (continued)

3-6	<p>Will the project result in impacts to watercourses or wetlands that have a surface connection to another watercourse or the Green/Duwamish or Black Rivers but do not contain habitat conditions that support salmonid use? Such areas may include, but not be limited to hillside seeps and wetlands isolated from the watercourse or river that have a surface water connection to the watercourse or river but are not assessable, nor would be assessable to salmonids under natural conditions. Wetlands with a "functions and values" rating for baseflow/groundwater support of 9 and above (or moderate) as described in Cooke (1996) should be included. Please mark the appropriate response.</p>
<p>NO - Continue to Question 3-7</p>	
<p>YES - Continue to Question 3-7</p>	
3-7	<p>Will the project include the construction of artificial waterways or wetlands connected to a watercourse containing salmonids? For the purpose of this analysis, the construction of artificial waterways or wetlands includes wetlands, channels, sloughs, or other habitat feature created to enhance wildlife use, particularly waterfowl use, or may be attractive to wildlife, particularly waterfowl. Please mark the appropriate response.</p>
<p>NO - Continue to Question 3-8</p>	
<p>YES - Continue to Question 3-8</p>	
3-8	<p>Will the project include bank stabilization? For the purpose of this analysis, bank stabilization includes, but is not limited to, rip-rap, rock, log, soil, or vegetated revetments, concrete structures, or similar structures. Please mark the appropriate response.</p>
<p>NO - Continue to Question 4-0 (Page 2)</p>	
<p>YES - Continue to Question 4-0 (Page 2)</p>	

STATE ENVIRONMENTAL POLICY ACT CHECKLIST

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

A. BACKGROUND

1. Name of proposed project, if applicable:

2. Name of Applicant:

3. Date checklist prepared:

4. Agency requesting checklist:

City of Tukwila

5. Proposed timing or schedule (including phasing, if applicable):

6. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

7. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

8. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

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

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

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

2. Air

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

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

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

3. Water

- a. Surface:

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

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

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

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

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

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

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

2. Describe waste materials that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve:
-
- c. Water Runoff (including storm water):
 1. Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow? Will this water flow into other waters? If so, describe.
 2. Could waste materials enter ground or surface waters? If so, generally describe.

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

4. Plants

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

	Deciduous tree: alder, maple, aspen, other
	Evergreen tree: fir, cedar, pine, other
	Shrubs
	Grass
	Pasture
	Crop or grain
	Wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
	Water plants: water lily, eelgrass, milfoil, other
	Other types of vegetation

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

c. List threatened or endangered species known to be on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

5. Animals

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

Birds:	Hawk, heron, eagle, songbirds, other:
Mammals:	Deer, bear, elk, beaver, other:
Fish:	Bass, salmon, trout, herring, shellfish, other:
Other:	

- b. List any threatened or endangered species known to be on or near the site.

- c. Is the site part of a migration route? If so, explain.

- d. Proposed measures to preserve or enhance wildlife, if any:

6. Energy and Natural Resources

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

7. Environmental Health

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

1. Describe special emergency services that might be required.

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

b. Noise

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

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

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

8. Land and Shoreline Use

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

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

- c. Describe any structures on the site.

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

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

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

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

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

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

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

- k. Proposed measures to avoid or reduce displacement impacts, if any:

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

9. Housing

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

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

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

10. Aesthetics

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

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

12. Recreation

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

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

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

13. Historic and Cultural Preservation

- a. Are there any places or objects listed on, or proposed for, National, State, or Local preservation registers known to be on or next to the site? If so, generally describe.

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

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

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

14. Transportation

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

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

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).
- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.
- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.
- g. Proposed measures to reduce or control transportation impacts, if any:

15. Public Services

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

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

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

16. Utilities

- a. Circle utilities currently available at the site:

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system

other: _____

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

(NON-PROJECT PROPOSALS (E.G., SUBURBAN PLANS AND ZONING CODE TEXT CHANGES) MUST COMPLETE THE FOLLOWING PAGES).

C. SUPPLEMENTAL SHEET FOR NON-PROJECT PROPOSALS

(do not use this sheet for project actions)

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

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

1. How would the proposals be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitats, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Please respond to all questions. Use separate sheets as necessary.

Applicant Responses:

Agency Comments

Proposed measures to avoid or reduce shoreline and land use impacts are:

The Plan would not result in direct or indirect adverse impacts on shoreline and land uses. Therefore, measures to avoid or reduce shoreline and land use impacts are not proposed.

- 6. How would the proposal be likely to increase demands on transportation or public service and utilities?

See attached sheet.

Proposed measures to reduce or respond to such demand(s) are:

The Plan would not result in long-term, adverse impacts on transportation, public services, and utilities. Therefore, measures to reduce or respond to such demand are not proposed.

- 7. Identify, if possible, whether the proposal may conflict with Local, State, or Federal laws or requirements for the protection of the environment.

The Plan would be consistent with and support all local, state, and federal laws or requirements for the protection of the environment. In implementing the Plan, the City of Tukwila would comply with all applicable local, state, and federal laws and regulations.

D. SIGNATURE

Under the penalty of perjury the above answers under ESA Screening Checklist and State Environmental Policy Act Checklist are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Date Submitted: _____

5/13/13

A. BACKGROUND

5. Proposed timing or schedule (including phasing, if applicable):

The City of Tukwila Water System Plan Update (WSP) discusses planning considerations, existing system condition, operation and maintenance standards for the City, and recommended improvements to meet future water demands in Tukwila's water service area.

The six-year and twenty-year Capital Improvement Plan (CIP) presented in the WSP consist mainly of physical system improvement projects. The physical projects outlined improve the City's ability to provide a sufficient quantity of water at optimum quality. Projects are defined by time period projected with the projected, estimated costs associated with each project. However, CIP projects listed in the WSP should not be viewed as a commitment by the City to implement each project as it is planned with the rate and schedule shown. Actual project implementation will be based on environmental review, permits and approvals, available funding, and scheduling requirements. This WSP is a non-project action. A separate Washington State Environmental Policy Act (SEPA) review will be completed prior to actual implementation and construction of each specific project. Certain categorical exemptions from the SEPA review process may apply to specific projects, in accordance with WAC 197-11-800 under part nine of the SEPA rules.

6. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain:

A new WSP update will be required in six years. At that time, projects that are beyond the six-year planning horizon will be updated. As noted above, projects scheduled in the CIP in the next 6 years will have a SEPA review conducted as part of each individual project.

C. SUPPLEMENTAL SHEET FOR NON-PROJECT PROPOSALS

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

The Plan is a long-range water system plan that would not result directly in the implementation of specific projects. Therefore, the Plan would be unlikely to directly use or affect environmentally sensitive areas or areas designated for government protection. The Plan also would be unlikely to adversely affect threatened and endangered species habitat.

The Plan includes goals for the City of Tukwila's water conservation programs, which may benefit instream flows. Maintaining instream flows would directly benefit habitat for endangered salmonids, along with aquatic and riparian habitat used by other listed species such as the bald eagle. Benefits to sensitive areas from water conservation would occur at a lower level if the Plan were not implemented.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

The Plan is a non-project plan of future actions that would not directly affect land and shoreline use in the planning area. The Plan itself would not change land and shoreline uses or designations. The Plan includes the City of Tukwila's new water conservation goals, which could benefit instream flows and shoreline uses.

The Plan is consistent with the requirements of the Growth Management Act and local and regional land use plans. Any City of Tukwila actions themselves would not encourage land or shoreline uses that are incompatible with existing plans. Future land and shoreline uses would be determined by local land use plans, zoning codes, and development regulations, not by the City of Tukwila activities.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

The Plan is a long-range water system plan that would not result directly in the implementation of specific projects. Therefore, the Plan would be unlikely to directly increase demand on transportation, public services, or utilities. The Plan itself would not have any effects on transportation, public services, or non-water utilities. In planning to meet future water demand, it is necessary to coordinate with other planning efforts to ensure consistency. These include the coordinated water system plans with Cascade Water Alliance, City of Seattle and neighboring water purveyors and King County's Regional Wastewater Services Plan.



City of Tukwila

Department of Community Development

Jim Haggerton, Mayor

Jack Pace, Director

DETERMINATION OF NON-SIGNIFICANCE (DNS)

File Number: E13-014
Applied: July 9, 2013
Issue Date: November 22, 2013
Status: Approved

Applicant: **City of Tukwila, Public Works Department**
6300 Southcenter Blvd, Ste. 100
Tukwila, WA 98188
(206) 4313-0179

Lead Agency: **City of Tukwila**

Description of Proposal:

The City of Tukwila is proposing to adopt the 2013 Tukwila Water System Plan Update (WSP). The WSP discusses planning, considerations, existing system condition, operation and maintenance standards for the City, and recommended improvements to meet future water demands in Tukwila's water service area.


The six-year and twenty year Capital Improvement Plan (CIP) presented in the WSP consists of physical system improvement projects. The physical projects outlined improve the City's ability to provide a sufficient quantity of water at optimum quality. However, CIP projects listed in the WSP should not be viewed as a commitment by the City to implement each project. Completion of individual projects is based on a variety of factors including, but not limited to, funding and environmental review. Please note: This current SEPA application is not completing the environmental review for any of the proposed construction projects contained in the WSP. Individual construction projects will be reviewed on a case by case basis at a future date.

Location of Proposal:

Address: Citywide
Parcel Number: Citywide

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

This DNS is issued under WAC 197-11-340(2). Comments must be submitted by December 6, 2013. The lead agency will not act on this proposal for 14 days from the date below.



Jack Pace, Responsible Official
City of Tukwila
6300 Southcenter Blvd
Tukwila, WA 98188
(206)431-3670



Date

Any appeal shall be linked to a specific governmental action. The State Environmental Policy Act is not intended to create a cause of action unrelated to a specific governmental action. Appeals of environmental determinations shall be commenced within the time period to appeal the governmental action that is subject to environmental review. (RCW 43.21C.075)



City of Tukwila

Department of Community Development

Jim Haggerton, Mayor

Jack Pace, Director

MEMORANDUM

To: Jack Pace, Director

From: Brandon Miles, Senior Planner

Date: November 21, 2013

Re: SEPA Review for adoption of Tukwila Water System Plan Update
Non-Project SEPA
E13-014

Project Description:

The City of Tukwila is proposing to adopt the 2013 Tukwila Water System Plan Update (WSP). The WSP discusses planning, considerations, existing system condition, operation and maintenance standards for the City, and recommended improvements to meet future water demands in Tukwila's water service area.

The six-year and twenty year Capital Improvement Plan (CIP) presented in the WSP consists of physical system improvement projects. The physical projects outlined improve the City's ability to provide a sufficient quantity of water at optimum quality. However, CIP projects listed in the WSP should not be viewed as a commitment by the City to implement each project. Completion of individual projects is based on a variety of factors including, but not limited to, funding and environmental review. Please note: This current SEPA application is not completing the environmental review for any of the proposed construction projects contained in the WSP. Individual construction projects will be reviewed on a case by case basis at a future date.

Agencies with Jurisdiction:

City of Tukwila
Washington State Department of Ecology.

Notification:

On October 7, 2013 a Notice of Application was published in the Seattle Times. Additionally, potentially impacted agencies were provided notification, by mail, of this non-project SEPA on October 7, 2013.

Other Required Permits:

None.

Documents Adopted by Reference:

- None

Summary of Primary Impacts:

- **Earth**

Concur with checklist.

- **Air**

Concur with checklist.

- **Water**

Concur with checklist.

- **Plants**

Concur with checklist.

- **Animals**

Concur with checklist.

- **Energy/Natural Resources**

Concur with checklist.

- **Environmental Health**

Concur with checklist.

Land/Shoreline Use

Concur with checklist.

- **Housing**

Concur with checklist.

- **Aesthetics**

Concur with checklist.

- **Light and Glare**

Concur with checklist

- **Recreation**

Concur with checklist.

- **Historic and Cultural Preservation**

Concur with checklist

- **Transportation**

Concur with checklist.

- **Public Services**

Concur with checklist. The WSP lays a framework to improve the City's ability to provide water to the City's utility customers.

- **Utilities**

Concur with checklist. The WSP will assist in improving the City's water system utility.

Comments

No comments were received.

Recommendation:

Determination of Non-Significance.

AGENCY COMMENT LETTERS AND RESPONSES



City of Seattle
Seattle Public Utilities

October 22, 2013

Mr. Pat Brodin
Tukwila Water Department
600 Minkler Boulevard
Tukwila, WA 98188

Subject: Comments to City of Tukwila's Draft 2013 Comprehensive Water Plan

Dear Mr. Brodin:

Thank you for the opportunity to review and comment on the City of Tukwila's Draft 2013 Comprehensive Water Plan, July 2013, as well as sharing with us the September 20, 2013, comment letter from the Washington State Department of Health (WSDOH). Since the City of Tukwila is a member of Cascade Water Alliance and receives water and conservation services through Cascade, Seattle Public Utilities (SPU) did not review the portions of the Plan covering the City's demand forecast and Water Use Efficiency program since that is more appropriate for Cascade. We did, however, review other portions relevant to SPU's roles and responsibilities, and have a few comments as stated below.

1. The draft plan contains the 50-year Declining Block Water Supply Agreement Between the City of Seattle and Cascade Water Alliance signed in 2003. In 2013, the contract went through a second amendment and restatement. As allowed by management agreement, Exhibit II, Cascade Points of Delivery, of that contract is currently being amended. Exhibit II includes maximum flow rates at each point of delivery, which are intended to reflect maximum day demands. Tukwila should work with Cascade so that any changes needed at Tukwila's supply stations can be addressed through the current revisions to Exhibit II.
2. Section 6.3.3 recommends that Tukwila discuss options with SPU for providing emergency and fire suppression storage to the 465/340 Service Levels. SPU is not interested in providing this storage from its existing facilities. The draft plan also indicates in section 4.5.1 that supply station SS-169 serving these areas is off of CRPL3 only. However, SS-169 can be supplied from either CRPL1 or CRPL3 through check valves, depending on the hydraulic grade lines (HGL). Also, the emergency intertie with SPU at 47th and Victor serving the 340 Service Level is connected to the SPU grid, and as such, can also be fed from both CRPLs and at the same HGL as SS-169. Thus, there is redundant service to these areas that does not appear to be considered in the draft plan.

Ray Hoffman, Director
Seattle Public Utilities
700 5th Avenue, Suite 4900
PO Box 34018
Seattle, WA 98124-4018

Tel (206) 684-5851
Fax (206) 684-4631
TDD (206) 233-7241
ray.hoffman@seattle.gov

<http://www.seattle.gov/util>

3. As noted in the draft plan, Tukwila's 380 Service Level is supplied only from CRPL4 which, given its large diameter, could take at least 72 hours to repair. Hence, Tukwila should pursue an automatic emergency supply source for this area, such as the connection with Highline Water District recommended in the draft plan.
4. There are a number of interties shown in Table 4.1 that differ from our records and Exhibits to our current contract with Cascade Water Alliance:
 - Intertie with KCWD 125 at S 134th St & 44th Ave S - 6": not shown
 - Intertie listed with KCWD 125 for S 116th & Interurban Ave S: we show a 10" not 8"
 - Intertie with City of Renton at W Valley Highway & SW 34th St – 8": not shown
 - Emergency intertie with Seattle listed for E Marginal Way at North City limits: we show 12" meter, not 18"

Please work with Terri Gregg to reconcile these intertie locations and sizes.

5. We concur with WSDOH's comment that Tukwila should create its own water shortage response plan. This plan should be consistent with Cascade's and SPU's but reflect the City's own actions. Also, the SPU Water Shortage Contingency Plan provided in Appendix H has been superseded with the July 2006 version that can be found at:
http://www.seattle.gov/util/groups/public/@spu/@water/documents/webcontent/WATERSHOR_200312021018123.pdf

If you have any questions on our comments, please contact me at 206-684-0839 or joan.kersnar@seattle.gov.

Sincerely,

Joan M. Kersnar, P.E.
Drinking Water Planning Manager

cc: Terri Gregg, Wholesale Contracts Manager, Seattle Public Utilities



STATE OF WASHINGTON
DEPARTMENT OF HEALTH
NORTHWEST DRINKING WATER REGIONAL OPERATIONS
20425 72nd Avenue South, Suite 310, Kent Washington 98032-2388

September 20, 2013

PAT BRODIN
TUKWILA WATER DEPARTMENT
600 MINKLER BLVD
TUKWILA WA 98188

Subject: Tukwila, City of – Water System ID# 89500
King County
July 2013 WS Plan Comments
Submittal 13-0714

Dear Mr. Brodin:

Thank you for submitting the Water System Plan (WSP) for the City of Tukwila (the City) received in this office on July 25, 2013. We have reviewed the plan and offer the following comments. These comments must be adequately addressed prior to approval of the WSP.

1. Has Seattle Public Utilities (SPU) and Cascade reviewed the plan, and concurred with projected ADD water demands? The SPU regional water system has seen relatively flat demand increases over the last 10 years even as population has grown.
2. Section 1.6 Policies and Criteria – Tables 1.2 through 1.5 just have minimum DOH requirements listed – such as minimum service pressures will be greater than 30 psi under peak hour flows. Is this really the City's desired level of service? Many utilities have a pressure range that they consider optimum – nearly always well above 30 psi. Maximum pressures are also usually considered. Reminder that the UPC requires PRVs for services above a certain pressure. Re-evaluate City's desired service / performance standards along with minimum requirements set by the DOH.
3. Also regarding Section 1.6 – many utilities include specific water quality service / performance standards for their water systems. Does the City want to have specific WQ standards for its citizens?



Tukwila, City of Water System
September 20, 2013
Page 2

4. Table 1.4 states that a standby storage volume of 200 gallons per ERU will be used for system reliability. Standby storage is also known as emergency storage. This volume represents just over one day average annual water use for Tukwila (160 gpd/ERU). In the event of a source of supply failure this standby storage allotment would only cover about two days demand. Is this level of reliability consistent with the City's wishes?
5. Chapter 2 – Table 2.8 shows a drastic decrease in Distribution Leakage (DL) in 2009 (kudos), but a nearly equal increase in Non-revenue water of 64 MG. Nearly 10% of the water purchased by the City produced no revenue. Is this level of non-revenue water consistent with the City's service / performance standards?
6. Section 3.4 explicitly deals with distribution system water quality – yet Chapter 3 is entitled 'Source of Supply Analysis' – this is quite confusing. Perhaps the plan can have a separate 'Water Quality Section' that deals with all water quality issues.
7. Since Tukwila purchases all of its water from SPU, the City benefits from inclusion into several of Seattle's Regional Monitoring Programs – this unique relationship should be discussed in the WSP and explicitly addressed per the following:
 - a. Tukwila is part of the Seattle Regional Coliform Monitoring Program (RCMP). Under the RCMP, SPU is responsible for all routine coliform sample collection and analysis. SPU staff collects routine coliform samples from dedicated sample stations located in Tukwila. Participants in the RCMP are given a reduction in the number of routine samples required each month. RCMP systems collect 70% of the total samples required for a stand-alone water system. Tukwila is responsible for all repeat coliform sampling including identifying appropriate repeat sample sites. The following items should be included in the City's individual CMP:
 - i. Need updated – current plan with date included. Must explicitly address Groundwater Rule Requirements.
 - ii. Need schematic showing repeat sample sites.
 - iii. Need sample collection SOP.
 - iv. A stand-alone document is preferred – updated CMP does not have to be in WSP document.
 - v. Repeat protocols should have DOH as primary contact along with SPU WQ staff.

Tukwila, City of Water System
September 20, 2013
Page 3

- vi. The number of routine collection sites (4) is not sufficient for the size of the Tukwila distribution system. All pressure zones should have at least one routine sample site.
 - b. Water systems that purchase surface water from another utility have monitoring and reporting requirements under the Surface Water Treatment Rule (SWTR). Once again Tukwila benefits from inclusion in the Seattle Regional monitoring program. SPU staff fulfills these requirements for daily chlorine residual monitoring and reporting. The WSP should reflect this reality and acknowledge that ultimate responsibility for compliance resides with Tukwila.
 - c. The City is also part of the Seattle Regional Lead and Copper (Pb Cu) Monitoring Program and is part of the Cedar Wholesale Customers Sub-Group for Pb Cu distribution monitoring. This sub-group has qualified for reduced monitoring. Perhaps actual SPU sub-group history and requirements would be more pertinent for WSP purposes than general Federal Rule requirements listed in section 3.4.1.5.
8. Section 6.3.1.2 states that Qs (installed active source capacity) will be assumed to equal Maximum Day Demand (MDD) because of a Cascade policy statement for purposes of calculating equalizing storage. This is not acceptable. The explicit limits of each SPU supply station must be used for each pressure zone. If no SPU supply station directly feeds a pressure zone, then booster pump capacity should be used. SPU supply stations usually have physical limits and may have contractual limits that differ from physical limits. These constraints can be found in Tukwila's (Cascade) contract with SPU. The actual numbers used should be stated in the WSP.
9. Section 6.6 (Chapter 8): The WSP has identified that the water system is deficient in storage in both the 380 Service Level and the 465 Service Level – neither service area has any storage! The recommendation to contact adjacent purveyors is unacceptable. Contacting adjacent purveyors to determine their willingness to provide meet City storage requirements is a planning level activity. SPU has indicated to DOH that they will not provide storage to other utilities unless it is part of their wholesale contract.
10. Appendix H: Tukwila should create its own water system specific water shortage response plan.
11. Please submit copies of the City's Construction Completion Report forms for all water mains installed under the construction document submittal exception provision per WAC 246-290-125(2) for the last six years.

Tukwila, City of Water System
September 20, 2013
Page 4

12. Appendix M: Standard Specifications and Details – please address the following:
 - a. Section 7.1.1 A.1 – Clarify what are ‘King County Health Department standards’ for service connections.
 - b. New lead free requirements are coming into effect for all Group A water systems. Do these specifications reflect this Federal requirement?
 - c. Section 7.2.1 – New water main velocity of 10 feet per second appears to conflict with design standards in Table 1.5 number 5.2 stating 8 fps. Clarify.
 - d. Section 7.2.4 – Thrust Blocking. Many utilities in the Puget Sound Region have discovered that parts of their distribution system are located in soils subject to liquefaction and that utility corridors are becoming extremely crowded (with adjacent utility work affecting the undisturbed characteristics of the thrust block soils). These two scenarios may warrant restrained joints for distribution and transmission main work and should be explicitly called out in this section.
 - e. The specifications and detail sheets should all have current revision dates consistent with this WSP effort.
 - f. Please include Tukwila’s procedures for the distribution main construction document submittal exception process in the body of the water system plan. This exception process is only for distribution mains. The projects still must be designed by a P.E., installed under the oversight of the design engineer, and construction completion formally certified with report forms kept on file.
13. Provide a determination of local government consistency from the City’s Planning and Land Use Department.
14. Provide signed SEPA Checklist and a SEPA Threshold Determination with the final WSP submittal.
15. The water system must meet the consumer input process outlined in WAC 246-290-100(8). Please include documentation of a consumer meeting discussing the WSP, prior to DOH approval of the WSP.
16. Prior to DOH approval, the City’s governing body must approve and adopt the WSP. This is a requirement resulting from the Municipal Water Legislation.

Tukwila, City of Water System
September 20, 2013
Page 5

17. Please provide copies of any comments made by adjacent purveyors, along with your response to those comments.

We hope that you have found these comments to be clear, constructive and helpful in the development of your final draft WSP. We ask that you submit the revised WSP on or before **October 20, 2013**. In order to expedite the review of your revised submittal, please include a cover letter summarizing how each of the above comments was addressed in the revised WSP and where each response is located (i.e., page numbers, Appendices, etc.)

Regulations establishing a schedule for fees for review of planning, engineering and construction documents have been adopted (WAC 246-290-990). Please note that we have included an invoice in the amount of **\$3705.00** for the review of the Water System Plan. This fee covers our cost for review of the initial submittal, plus the review of one revised document. Please remit your complete payment in the form of a check or money order within thirty days of the date of this letter to: **DOH, Revenue Section, and P.O. Box 1099, Olympia, WA 98507-1099.**

Thank you again for submitting your revised Water System Plan for our review. If you have any comments or questions concerning our review, please contact me at (253) 395-6771.

Sincerely,



Richard Rodriguez
WSDOH Regional Planner

Cc: Steve Deem, DOH
Seattle/King County Health
Michael Cusick, P.E., Tukwila Water Dept.
Lara Kammereck, P.E., Carollo Engineers

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Local Government Consistency Review Checklist

Water System Name: City of Tukwila PWS ID: 89500f

Planning/Engineering Document Title: Comprehensive Water Plan Plan Date: July 2013

Local Government with Jurisdiction: City of Tukwila

WAC 246-290-108 Consistency with local plans and regulations:

Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b) (ii).

1) Municipal water suppliers must include a consistency review and supporting documentation in its planning or engineering document describing how it has addressed consistency with **local plans and regulations**. This review must include specific elements of local plans and regulations, as they reasonably relate to water service as determined by Department of Health (DOH). Complete the table below and see instructions on back.

Local Government Consistency Statement	Page(s) in Planning Document	Yes - No - Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the applicable service area.	2-1- 2-4	Yes
b) The <u>six-year growth projection</u> used to forecast water demand is consistent with the adopted city/county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-17	YES
c) Applies to <u>cities and towns that provide water service</u> : All water service area policies of the city or town are consistent with the <u>utility service extension ordinances</u> of the city or town.		NA
d) <u>Service area policies</u> for new service connections are consistent with the adopted local plans and adopted development regulations of all jurisdictions with authority over the service area [City(ies), County(ies)].		
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable; Coordinated Water System plans, Regional Wastewater plans, Reclaimed Water plans, Groundwater Area Management plans, and Capital Facilities Element of Comprehensive plans.	Annexation Element Utilities Element of Comp Plan. 3-1 -3-4	

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

Moira Carr Bradshaw
Signature

27 March 2014
Date

Moira Carr Bradshaw Senior Planner, City of Tukwila
Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

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

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

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

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

A) Documenting Consistency: Municipal water suppliers must document all of the elements in a consistency review per WAC 246-290-108.

- 1 a) Provide a copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that are related to water supply planning.
- 1 b) Include a copy of the **six-year growth projections** that corresponds to the service area. If the local population growth rate projections are not used, provide a detailed explanation on why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.
- 1c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. This applies to cities and towns only.
- 1 d) Include all **service area policies** for how new water service will be provided to new customers.
- 1 e) **Other relevant elements** related to water supply planning as determined by the department (DOH). See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

B) Documenting an Inconsistency: Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and provide direction on how this inconsistency can be resolved.

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

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).



January 14, 2014

Mr. Pat Brodin, P.E.
Tukwila Public Works Department
600 Minkler Boulevard
Tukwila, WA 98188

Board of Directors

Chair
John Marchione
Mayor
City of Redmond

Vice-Chair
Jim Haggerton
Mayor
City of Tukwila

Secretary/Treasurer
Fred Butler
Mayor
City of Issaquah

City of Bellevue

Penny Sweet
Deputy Mayor
City of Kirkland

Lloyd Warren
Commissioner
Sammamish Plateau
Water & Sewer District

Jon Ault
Commissioner
Skyway Water & Sewer District

Chief Executive Officer
Chuck Clarke

SUBJECT: Comments on the City of Tukwila's Draft 2013 Water System Plan

Dear Pat:

Thank you for the opportunity to review and comment on the City of Tukwila's Water System Plan update. We concur with your projected water demands and confirm that the Tukwila Water System Plan aligns with the Cascade Transmission and Supply Plan. Cascade will continue to manage all conservation and water use efficiency programming for its Members as well as managing and doing outreach for the water use efficiency rule as required by the Washington State Department of Health (WSDOH). Relevant to Cascade's role in reviewing and supporting the planning efforts of our Members, additional comments are noted below.

The draft Tukwila Plan contains the 50-year Declining Block Water Supply Agreement between the City of Seattle and the Cascade signed in 2003. In 2013, the contract was renegotiated for a second amendment and restatement. As allowed by mutual agreement between Seattle and Cascade, Exhibit II "Cascade Points of Delivery" is currently being updated.

Section 6.3.3 provides a recommendation that Tukwila discuss options with SPU for emergency and fire suppression issues. Cascade supports the collaborative effort for Tukwila to work with SPU directly on those interties issues respective to needs of the intertie not involving items that affect the wholesale contract.

We have noted that WSDOH provided a comment that the plan update must meet the consumer input process outlined in WAC 246-290-100(8). Likewise Cascade has executed a process on behalf of its Members regarding the update for new Water Conservation Goals. The Cascade Board will receive a report on the completion of that process at its January Meeting.

If you have any questions, please contact me.

Sincerely,

Michael Gagliardo
Director of Planning

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author outlines the various methods used to collect and analyze the data. This includes both primary and secondary data collection techniques. The analysis focuses on identifying trends and patterns over time, which is crucial for making informed decisions.

The third part of the document details the results of the study. It shows that there is a significant correlation between the variables being studied. The data indicates that as one variable increases, the other also tends to increase, suggesting a positive relationship.

Finally, the document concludes with a summary of the findings and some recommendations for future research. It suggests that further studies should be conducted to explore the underlying causes of the observed trends and to test the results in different contexts.



King County

Utilities Technical Review Committee

Department of Natural Resources and Parks

King Street Center

210 South Jackson Street, Suite 512

Seattle, WA 98104-3855

www.kingcounty.gov

RECEIVED

OCT 25 2013

TUKWILA
PUBLIC WORKS

October 15, 2013

Michael Cusick, P.E.
Utilities Engineer
City of Tukwila Public Works Department
6300 Southcenter Boulevard
Tukwila, WA 98188

Dear Mr. Cusick:

Thank you for submitting the City of Tukwila Comprehensive Water Plan (Plan) for King County approval. The Plan was received on July 29, 2013. In accordance with King County Code (KCC) 13.24 the King County's Utilities Technical Review Committee (UTRC) has reviewed the Plan for consistency with the King County Comprehensive Plan and KCC.

In reviewing the Plan, the UTRC found that the Plan is largely consistent with the County's comprehensive plan and code. We have identified four points of clarification or additions that are necessary before we can make a recommendation to the King County Council for approval of the City's Plan. We request you include the following information:

1. Affirm that current King County zoning was mapped and used within the future water demand project for those portions of the retail service area outside of the City and in unincorporated King County;
2. Complete the King County reclaimed water checklist (attached);
3. Affirm the City's water use efficiency goal is consistent with State law; and
4. Clarify and/or provide the City's adopted service area policies as to what "timely and reasonable" service is and aspects of reasonable service considered by the City for service to unincorporated King County.

Often times the construction and/or maintenance of utility lines requires work within the road right-of-way (ROW) for roads in unincorporated King County. When a utility has a proposed project within unincorporated King County, please contact the King County Department of Transportation (KCDOT), Road Services Division, Traffic and Engineering Services Section for coordination with the County's annual overlay program. Failure to do so may result in the denial of the permit to work within the ROW once an overlay of the road section has been completed. Although each utility has a set of construction standards and specifications for their projects, when construction and or maintenance of utilities requires work within the road ROW for roads in unincorporated King County, please be aware that the current edition of the King County Road and Construction standards apply to any installation or work in these ROWs. Not adhering

Michael Cusick, P.E.

October 15, 2013

Page 2

to these standards could result in the installation of non-specified and approved methods and/or materials that are out of the specifications for King County, and could potentially add additional costs to the purveyor for future repairs or adversely affect acceptance of those repairs/installations. The KCDOT- 2007 King County Road Design and Construction Standards can be found on the World Wide Web at <http://www.kingcounty.gov/transportation/kcdot/Roads/EngineeringServices/RoadStandards2007.aspx>

We look forward to seeing the final Plan and working with you to secure the King County Council's approval. The Council's action represents King County's final action on the Plan and is the statement of consistency under the Revised Code of Washington 43.20.260.

Franchises are required for agencies that provide service within unincorporated King County. A valid franchise must be on file in order to obtain a ROW construction permit. A representative of Facilities Management Division (FMD) is available to assist you with an application if you so desire. You may contact Doug Williams at Real Estate Services in FMD at 206-296-0887 for more information.

If you have any questions or concerns about any of the information in the letter, please do not hesitate to call me at 206-477-5387.

Sincerely,



Stephen Hirschey

Chair, Utilities Technical Review Committee

cc: Richard Rodriguez, Regional Planner, Washington State Department of Health

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Third block of faint, illegible text in the middle section.

Fourth block of faint, illegible text in the lower middle section.

Fifth block of faint, illegible text in the lower section.

Sixth block of faint, illegible text near the bottom of the page.

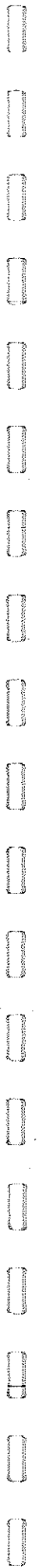
Seventh block of faint, illegible text at the very bottom of the page.

ADOPTING RESOLUTION

INTERTIE AGREEMENTS

APPENDIX G
INTERTIE AGREEMENTS - KCWD #125

17967



23441



City of Tukwila

6200 Southcenter Boulevard

Tukwila Washington 98188

(206) 433-1800

Gary L. VanDusen, Mayor

MEMORANDUM

TO: Byron Sneva, Public Works Director

FROM: Phil Fraser, Senior Engineer

DATE: April 25, 1986

SUBJECT: Mechanically Operated Interties - Tukwila/Water District 125
@ 52nd Avenue South/Interurban Avenue South and South 131st
Place/44th Avenue South

In compliance with my 8/8/85 and 1/9/86 letters, the enclosed 4/15/86 letters (2) of Phil Botch and Associates, Inc. - Water District 125 requests Tukwila enter into two emergency intertie agreements (attached) for the purpose of operating these two constructed interties. These interties are in compliance with the requirements of the Seattle Water Department (see 1/16/86 letter of Harry Pratt) allowing such interties for emergency purposes. Also enclosed are the following:

- A. Signed-off inspection permits.
- B. Metro right of entry agreement (52nd/Interurban Avenue Intertie)
- C. As-built plans (2 sets)
- D. 1/17/86 Memo: Status Report.
- E. Executed agreements (2) (one copy each) by 12/5.

Per the agreements, section 2 charges for use of these interties will be at "new" water rates + \$0.05 per 100 cubic feet.

Recommended is the City enter into these two agreements with Water District 125.

cc: City Engineer
~~Finance~~ file 2 3441
 Finance Director
 Sr. Accountant
 CITY CLERK
 Attachments (11)



CITY OF TUKWILA & WATER DISTRICT NO. 125
AGREEMENT TO PROVIDE WATER SERVICE
DATE 4/28/86 A & C FILE # 86-033

THIS AGREEMENT made this 1st day of May, 1986, Water District #125
between Water District No. 125, King County, and City of Tukwila, S. 131st + 44th
(municipality). 1 of 2

WHEREAS, Water District No. 125 and City of Tukwila,
(municipality), are corporations organized under the laws of the State
of Washington; and

WHEREAS, the State Department of Social and Health Service
recommends Water Service Agreements between adjacent water utilities;
and

WHEREAS, the Comprehensive Plan of Water District No. 125 anti-
cipates such needs; and

WHEREAS, this intertie is of mutual benefit to provide emergency
water supply for the City of Tukwila and Water District No. 125; and

NOW THEREFORE it is hereby agreed as follows:

1. Scope of Service

The City of Tukwila will provide the following service to Water
District No. 125.

Upon declaration that an emergency exists by Water District No.
125, the City of Tukwila will provide water to Water District
No. 125.

Location of meter will be: S. 131st Pl. and 44th Ave. S.

Size and type of meter will be: 6"

Meter Number or identification: _____

Meter will be owned by: Water District No. 125

Meter will be maintained by: Water District No. 125

Meter will be installed and paid for by: Water District No. 125

Meter will be read by: City of Tukwila

Hydraulic gradient provided by the City of Tukwila at meter will
be:

(max.)	390	HGL
(min.)	N/A	HGL

Estimated available flow will be:

(max.)	1,000	GPM
(min.)	N/A	GPM

Estimated annual consumption will be:

(max.)	0	MG
(min.)	N/A	MG

Intertie valves will be normally: Closed

2. Cost of Water

Charges for water will be the current wholesale rate charged by
the Seattle Water Department for "New" water as defined by the
Water Purveyor Contract plus \$0.05 per 100 cubic feet of water
used.

3. Indemnification

Water District No. 125, agrees to indemnify and
hold harmless the City of Tukwila from any claim arising from
this agreement. Furthermore, it is understood and agreed that
the City of Tukwila makes no warranties or assurances as to
water availability, pressure or volume at any given time. It is

understood that if the City of Tukwila's water service to the interconnection point is temporarily interrupted for repair or an emergency, the City is not obliged to provide an alternative source of supply. The City of Tukwila does, however, warrant that it will not, except for reasons such as the foregoing, interrupt the water supply to the interconnection.

4. Notification

In the event Water District No. 125 requires emergency water supply through this intertie, Water District No. 125 shall notify the City of Tukwila in writing prior to commencing and upon termination of use. Notification shall include the time, date, and meter reading at commencement and termination of use.

5. Reciprocity of Agreement

In the event that the City of Tukwila desires to purchase water from Water District No. 125 through the aforementioned meter, Water District No. 125 agrees to provide water under the same conditions agreed to by the City of Tukwila in paragraphs 1, 2, and 4, provided: the City of Tukwila agrees to indemnify and hold harmless Water District No. 125 from any claim arising from this agreement. Furthermore, it is understood and agreed that Water District No. 125 makes no warranties and assurances as to water availability, pressure or volume at any given time. It is understood that if Water District No. 125's water service to the interconnection point is temporarily interrupted for repair or an emergency, Water District No. 125 is not obliged to provide an alternative source of supply. Water District No. 125 does, however, warrant that it will not, except for reasons such as the foregoing, interrupt the water supply to the interconnection.

6. Term

This Agreement, except for the water rate, shall extend for ten years from the date hereof, and shall continue indefinitely thereafter unless terminated by either party for good cause shown.

CITY OF TUKWILA, WASHINGTON

WATER DISTRICT NO. 125

BY: [Signature]

BY: [Signature]
PRESIDENT OF THE BOARD OF WATER COMMISSIONERS

attest:

BY: [Signature]
City Clerk

BY: [Signature]
SECRETARY OF THE BOARD OF WATER COMMISSIONERS

4-15-76

CONTROL # 26-005
PERMIT # M-04-86

CITY OF TUKWILA
6200 SOUTHCENTER BLVD.
TUKWILA, WA 98188

ISSUE DATE 1-21-00
EXPIRATION DATE 7-21-86

WORK ORDER #

- CURB CUT/ACCESS/SIDEWALK
- CHANNELIZATION/STRIPING/SIGNING
- IN PUBLIC RIGHT-OF-WAY
- FIRE LOOP/HYDRANT
- LANDSCAPE IRRIGATION

- SEWER MAIN EXTENSION
- STORM DRAINAGE
- WATER MAIN EXTENSION
- MISC. Emergency Intertie

THE UNDERSIGNED HEREBY APPLIES FOR PERMISSION TO install emergency intertie per approved plan and Public Works letter dated January 9, 1986. Prior to sign-off/use of this emergency intertie a written approval to use this intertie shall be provided from the Water Superintendent for the City of Seattle or his designee, per the requirements of the Seattle Water Department's Purveyor's Agreements with Water District No. 125 and the City of Tukwila. Use of this intertie shall be in accordance with the requirements of the City of Tukwila Public Works

Director and all purveyor's agreements Dave Grage (433-1860) OF COMMENCEMENT
THE APPLICANT MUST NOTIFY CITY INSPECTOR
COMPLETION OF WORK AT LEAST 24 HOURS IN ADVANCE.

SITE ADDRESS S 131 Pl & 44 Av S NAME OF PROJECT Emergency Intertie
 NAME OF OWNER Water District #125 (co-user City of Tukwila) PHONE 242-4750
 ADDRESS PO Box 68147, Seattle, WA ZIP 98168
 CONTRACTOR Water District #125 PHONE _____
 ADDRESS Same as above ZIP _____

FEES PLAN CHECK FEE \$ 10.00 (000/345.830) RECEIVED BY N/A
 INSPECTION FEE \$ 15.00 RECEIPT # _____
 TOTAL Waived

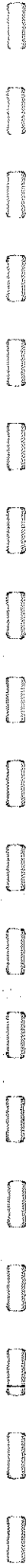
Water District #125 ACCEPTS THIS PERMIT AND AGREES TO ABIDE BY ALL APPLICABLE SECTIONS OF THE CITY OF TUKWILA MUNICIPAL CODE. WE AGREE THAT THE CITY OF TUKWILA SHALL BE HELD HARMLESS FROM ALL OR ANY CLAIMS ARISING AS A RESULT OF THIS PROJECT.
 PERMITS WHICH HAVE Lapsed BEYOND THE PERMIT EXPIRATION DATE SHALL REQUIRE A REAPPLICATION / REISSUANCE OF THE PERMIT THROUGH THE CITY OF TUKWILA AT AN ADDITIONAL FEE (433-1849).

APPLICANT'S SIGNATURE [Signature] TITLE DISTRICT ENGINEER
 APPROVED BY: [Signature] CC: APPLICANT
 INSPECTOR
 CITY SHOP
 BUILDING OFFICIAL
 FINANCE DEPT. (IF APPLICABLE)
 FIRE DEPT. (IF APPLICABLE)
 FRITZ FRANK, SENIOR ENGINEER, CITY OF TUKWILA

I HEREBY CERTIFY THAT THE PERMIT HOLDER WHOSE NAME AND ADDRESS APPEARS ON THIS RECORD HAS FACTORILY MET THE STANDARDS AND CONDITIONS FOR THE PROJECT APPROVED HEREIN.

FIELD INSPECTION DATE 2-27-86 CITY INSPECTOR [Signature]

PERMIT NOT SIGNED-OFF BECAUSE _____ INITIALS _____ DATE _____





PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAIN STREET

BELLEVUE, WASHINGTON 98004

TELEPHONE (206) 682-5300

April 15, 1986

City of Tukwila
6200 Southcenter Blvd.
Tukwila, WA 98188

Attn: Phil Fraser

Re: Intertie at Interurban Ave. S. and 52nd Ave. S.

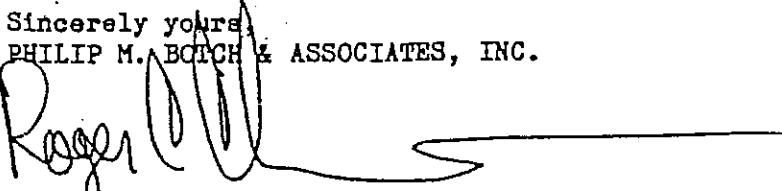
Dear Mr. Fraser:

On behalf of King County Water District No. 125, I am requesting that the City of Tukwila enter into an emergency intertie agreement with Water District No. 125. I understand you have in hand the referenced agreement executed by the Water District. After acceptance by the City, please forward the executed copies of the agreement to Water District No. 125 at P. O. Box 68147, Seattle, WA 98168.

Attached are two copies of the as build drawings of the intertie. I inspected the installation of this facility and it was installed in accordance with plans approved by the City.

If you have any questions, please call.

Sincerely yours,
PHILIP M. BOTCH & ASSOCIATES, INC.



Roger C. Eberhart, P.E.

Enclosure

cc: Water District No. 125

RCE/ld

85.100





City of Tukwila

6200 Southcenter Boulevard

Tukwila Washington 98188

433-1800

Gary L. VanDusen, Mayor

January 9, 1986

Mr. Roger C. Eberhart, P.E.
Philip M. Botch & Associates, Inc.
11000 Main Street
Bellevue, WA 98004

RE: Emergency Intertie Between Water District No. 125 and the
City of Tukwila at South 131st Place and 44th Ave. South
(Schedule B on sheet no. 4 of 5 and 5 of 5)

Dear Mr. Eberhart:

The Public Works Department has reviewed and approved Sheet Nos.
4 of 5 and 5 of 5 for Schedule B Emergency Intertie only, per the
following comments and requirements:

Twenty-four hours prior to beginning construction of this emer-
gency intertie, your contractor shall apply for and obtain a no-fee
permit to carry out this work.

This intertie shall be provided per the requirements of our City's
Inspector (Dave Graga - telephone number 433-1863) and the follow-
ing conditions:

1. Prior to sign off/use of this emergency intertie, a written approval to use this intertie shall be provided from the Water Superintendent for the City of Seattle or his designee, per the requirements of the Seattle Water Department's Purveyor's Agreements with Water District No. 125 and the City of Tukwila. Use of this intertie shall be in accordance with the requirements of the City of Tukwila Public Works Director and all purveyor's agreements.
2. The emergency intertie shall be provided with a mechanism which allows the water to flow either direction.
3. The intertie shall be built by wet tap and per all field conditions of the City's Inspector.

Mr. Roger C. Eberhart, P.E.
Jan. 9, 1986
page 2

If you have any questions regarding this matter, please do not
hesitate to call me at 433-1856.

Sincerely,



Phil Fraser
Senior Engineer

cc: Public Works Director
Ted Fraemire
City Engineer
Dave Grage
Tukwila Adm. Files:

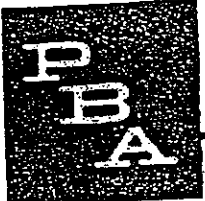
Intertie agreements/purveyor's agreements.

/cd

Enclosure (1)



CR 017967



CONSULTING ENGINEERS

PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAW STREET BELLEVUE, WASHINGTON 98004 TELEPHONE (206) 652-5300

January 7, 1985

RECEIVED
CITY OF TUKWILA

Seattle Water Department
Water Management & Engineering
921 - 2nd Avenue
10th Floor Exchange Building
Seattle, WA 98104

Attn: Harry Pratt

Re: Emergency Intertie Between
Water District No. 125
and the City of Tukwila

Dear Mr. Pratt:

As we discussed on January 3, 1986, Water District No. 125 requests approval of an emergency intertie between the Water District and the City of Tukwila.

This intertie will be located at the intersection of South 131st Place and 44th Avenue South. The intertie will be constructed to allow water to flow only from Tukwila to the Water District. It will be metered, include a PRV, and operate automatically to provide additional water for fire flows in excess of the 2,500 GPM the District's system can supply.

This intertie will be temporary and will be discontinued upon completion of the reconstruction of King County's Interurban bridge.

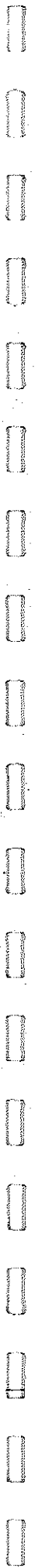
If you have any questions, please call.

Sincerely yours,
PHILIP M. BOTCH & ASSOCIATES, INC.

Roger C. Eberhart, P.E.

cc: Phil Fraser, City of Tukwila
Water District No. 125
Document No. 82.40

RCE/jkc





CONSULTING ENGINEERS

PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAIN STREET

BELLEVUE, WASHINGTON 98004

TELEPHONE (206) 682-5300

December 27, 1985

City of Tukwila
6200 Southcenter Blvd.
Tukwila, WA 98188

RECEIVED
CITY OF TUKWILA

Attn: Phillip R. Fraser

Re: Temporary Intertie With
Water District No. 125

Dear Mr. Fraser:

In response to your August 12, 1985 letter (copy enclosed), I am resubmitting plans for a temporary intertie between the City of Tukwila and Water District No. 125. All of your comments referred to the intertie at Interurban Avenue South and 42nd Avenue South. After construction of a major transmission main within the District and testing of it's effect, that intertie will not be necessary and has been dropped from our plans.

However, the intertie at South 131st Place and 44th Avenue South is still necessary to provide adequate fire flow during the time the Interurban Bridge across the Duwamish is being reconstructed. That intertie is shown on the attached plans as Schedule B of Contract 85-3. I request the City allow construction of this intertie to proceed and the facilities to remain in place during the bridge construction. The Water District will remove the intertie upon completion of the bridge.

The Water District will serve the normal needs of the area through two PRV sources from other pressure zones. The PRV in this intertie will be set to open only when fire flow to one of the major customers in the area exceeds 2,400 GPM. It is estimated that a maximum of 800 GPM will be taken during that peak demand. We fully expect that it will never be used.

Tukwila's ten inch main will be live tapped, so no disruption of service is expected. In addition, backflow through the intertie will be provided by a check valve and all flows to Water District No. 125 will be metered. The District is prepared to pay Tukwila for any water taken at Tukwila's standard rates in effect at the time. Some water may be used during set up and testing of the intertie.

City of Tukwila
Temporary Intertie With WD #125

Page 2
December 27, 1985

Also enclosed is a permit request to work within Tukwila's right-of-way at the site.

If you have any questions or would like to discuss this intertie further, please call.

Sincerely yours,
PHILIP M. BOTCH & ASSOCIATES, INC.



Roger C. Eberhart, P.E.

Enclosure

cc: Water District No. 125
Document No. 82.26

RCE/jka



City of Tukwila

6200 Southcenter Boulevard

Tukwila Washington 98188

433-1800

Gary L. VanDusen, Mayor

August 21, 1985

RECEIVED

AUG 26 1985

PHILIP M. BOTCH & ASSOC.

Phil Botch and Associates
11000 Main Street
Bellevue, Washington 98004

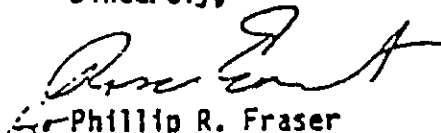
Dear Sirs:

Enclosed is the proposed interties between 125 and the City of Tukwila. Requested is the following:

1. Provide the City with a revised plan which indicates the two locations of the 6" waterline for Water District #125 in SR-181.
2. Provide a revised plan which relocates the 60 LF of 18" casing to the south in such a manner as there is least impact to Interurban Avenue South traffic. Also indicate casing under entire pavement area (call Ted Freemire for further clarification at 433-1861.).
3. Existing 12" waterline will be in conflict with the proposed 96" ETS line requiring adjustment of this facility. If appropriate, provide necessary adjusting mechanisms recognizing that at some-time in the life of this intertie the 12" water main that is existing will be realigned to accommodate the ETS line.

I look forward to receiving your resubmittal of this proposal at your earliest convenience.

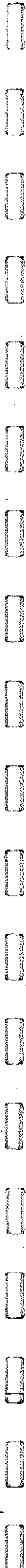
Sincerely,


Phillip R. Fraser
Senior Engineer


/cs
(BOTCH)
M.10

cc: Ted Freemire
File: 85-SW01 - 8

Enclosure: (1)



CONSULTING ENGINEERS


PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAIN STREET

BELLEVUE, WASHINGTON 98004

TELEPHONE (206) 682-5300

April 15, 1986

City of Tukwila
6200 Southcenter Blvd.
Tukwila, WA 98188

Attn: Phil Fraser

Re: Intertie at S. 131st Pl. and 44th Ave. S.

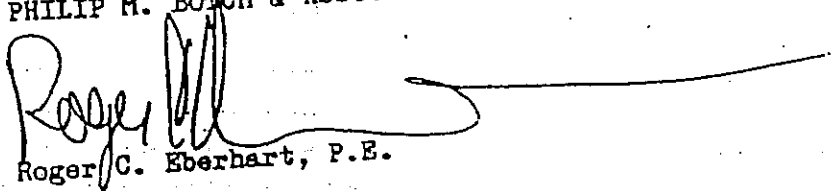
Dear Mr. Fraser:

On behalf of King County Water District No. 125, I am requesting that the City of Tukwila enter into an emergency intertie agreement with Water District No. 125. I understand you have in hand the referenced agreement executed by the Water District. After acceptance by the City, please forward the executed copies of the agreement to Water District No. 125 at P. O. Box 68147, Seattle, WA 98168.

Attached are two copies of the as build drawings of the intertie. I inspected the installation of this facility and it was installed in accordance with plans approved by the City.

If you have any questions, please call.

Sincerely yours,
PHILIP M. BOTCH & ASSOCIATES, INC.



Roger C. Eberhart, P.E.

Enclosure

cc: Water District No. 125

RCE/lid

85.101

RECEIVED

APR 17 1986

CITY OF TUKWILA



23441
17967

DATE A & C FILE # 86-024

CO. Document No. 78, 23

DATE 4/28/86

CITY OF TUKWILA & WATER DISTRICT NO. 125
AGREEMENT TO PROVIDE WATER SERVICE Water Dist # 125
Interurban Ave. S. + 52nd S

THIS AGREEMENT made this 1st day of May, 1986 1982
between Water District No. 125, King County, and City of Tukwila,
(municipality).

WHEREAS, Water District No. 125 and City of Tukwila,
(municipality), are corporations organized under the laws of the State
of Washington; and

WHEREAS, the State Department of Social and Health Service
recommends Water Service Agreements between adjacent water utilities;
and

WHEREAS, the Comprehensive Plan of Water District No. 125 anti-
cipates such needs; and

WHEREAS, this intertie is of mutual benefit to provide emergency
water supply for the City of Tukwila and Water District No. 125; and

NOW THEREFORE it is hereby agreed as follows:

1. Scope of Service

The City of Tukwila will provide the following services to Water
District No. 125.

Upon declaration that an emergency exists by Water District No.
125, the City of Tukwila will provide water to Water District
No. 125.

Location of meter will be: Interurban Ave. S. & 52nd Ave. S.

Size and type of meter will be: 4"

Meter Number or identification: _____

Meter will be owned by: Water District No. 125

Meter will be maintained by: Water District No. 125

Meter will be installed and paid for by: Water District No. 125

Meter will be read by: City of Tukwila

Hydraulic gradient provided by the City of Tukwila at meter will
be:

(max.) 360 HGL

(min.) N/A HGL

Estimated available flow will be:

(max.) 1,000 GPM

(min.) N/A GPM

Estimated annual consumption will be:

(max.) 40 MG

(min.) N/A MG

Intertie valves will be normally: Closed

2. Cost of Water

Charges for water will be the current wholesale rates charged by
the Seattle Water Department for "New" water as defined by the
Water Purveyor Contract plus \$0.05 per 100 cubic feet of water
used.

3. Indemnification

Water District No. 125, agrees to indemnify and
hold harmless the City of Tukwila from any claim arising from
this agreement. Furthermore, it is understood and agreed that
the City of Tukwila makes no warranties or assurances as to
water availability, pressure or volume at any given time. It is

understood that if the City of Tukwila's water service to the interconnection point is temporarily interrupted for repair or an emergency, the City is not obliged to provide an alternative source of supply. The City of Tukwila does, however, warrant that it will not, except for reasons such as the foregoing, interrupt the water supply to the interconnection.

4. Notification

In the event Water District No. 125 requires emergency water supply through this intertie, Water District No. 125 shall notify the City of Tukwila in writing prior to commencing and upon termination of use. Notification shall include the time, date, and meter reading at commencement and termination of use.

5. Reciprocity of Agreement

In the event that the City of Tukwila desires to purchase water from Water District No. 125 through the aforementioned meter, Water District No. 125 agrees to provide water under the same conditions agreed to by the City of Tukwila in paragraphs 1, 2, and 4, provided: the City of Tukwila agrees to indemnify and hold harmless Water District No. 125 from any claim arising from this agreement. Furthermore, it is understood and agreed that Water District No. 125 makee no warranties and assurances as to water availablility, pressure or volume at any given time. It is understood that if Water District No. 125's water service to the interconnection point is temporarily interrupted for repair or an emergency, Water District No. 125 is not obliged to provide an alternative source of supply. Water District No. 125 does, however, warrant that it will not, except for reasons such as the foregoing, interrupt the water supply to the interconnection.

6. Term

This Agreement, except for the water rate, shall extend for ten years from the date hereof, and shall continue indefinitely thereafter unless terminated by either party for good cause shown.

CITY OF TUKWILA, WASHINGTON

WATER DISTRICT NO. 125

BY: [Signature]

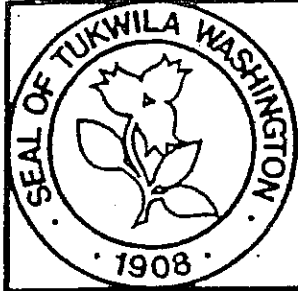
BY: James J. [Signature]
PRESIDENT OF THE BOARD OF WATER COMMISSIONERS

attest:

BY: Margie Anderson
City Clerk

BY: C. H. Walmer
SECRETARY OF THE BOARD OF WATER COMMISSIONERS

185
4.26.84



City of Tukwila

6200 Southcenter Boulevard
Tukwila Washington 98188

Gary L. VanDusen, Mayor

MEMORANDUM

TO: Byron G. Sneva, P.E., Public Works Director
FROM: Phil Fraser, Senior Engineer *PF*
DATE: January 17, 1986
SUBJECT: New Interties with Water District 125

This is a status report regarding the two interties that are being provided between the City of Tukwila and Water District 125.

Last summer, a permanent intertie was constructed at Interurban Avenue South and 52nd Avenue South. Correspondence to Water District 125 through Phil Botch and Associates required that certain paperwork be provided the City and approval for activating this permanent intertie be obtained through the Tukwila City Council prior to its use. Roger Eberhardt of Phil Botch and Associates is now putting this information together so it can be submitted to our City Council in the next two to four weeks. (See Phil Fraser's letter of August 8, 1985 for the permanent intertie).

Currently, the construction of a temporary intertie at the intersection of South 131st Place and 44th Avenue South has been approved to be used on an emergency basis. Also, water District 125 is now producing requested paperwork and approvals through the Seattle Water Department to assure the City that all conditions of the purveyor's agreements between Water District 125, Tukwila and the Seattle Water Department have been met.

It has been assumed by staff that because the intertie located at South 131st Place and 44th Avenue South is of a temporary nature (tied to the timeline of rebuilding the Interurban Avenue bridge - King County is scheduled to build it within one year, beginning April of this year) that City Council approval is not necessary for such a temporary use of the City's water system. Once this King County bridge has been constructed this intertie will be abandoned by Water District 125 and the City of Tukwila.

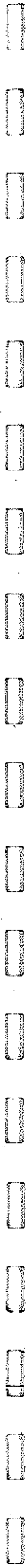
cc: City Engineer
Roger Eberhardt, Phil Botch & Assoc.
Tukwila Maintenance Shops
Water District 125

~~Turnover file: 2.00.19~~ DIST. 125 intertie 2.34.41

CITY CLERK

Enclosure (1)

/cd





PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAIN STREET

BELLEVUE, WASHINGTON 98004

TELEPHONE (206) 682-5300

January 10, 1985

Seattle Water Department
 Water Management & Engineering
 821 - 2nd Avenue
 10th Floor Exchange Building
 Seattle, WA 98104

Attn: Harry Pratt

Re: Emergency Intertie Between
 Water District No. 125
 and the City of Tukwila

RECEIVED
 CITY OF TUKWILA

JAN 11 1985

cd
 PUBLIC WORKS

Dear Mr. Pratt:

On January 7, 1986, I requested approval of an emergency intertie with the City of Tukwila. That intertie will be located at the intersection of South 131st Place and 44th Avenue South. The Water District also requests approval of an additional emergency intertie between the Water District and the City of Tukwila.

This intertie will be located at the intersection of 52nd Avenue South and Interurban Avenue. The intertie will be constructed to allow water to flow from Tukwila to the Water District and vice versa. It will be metered and manually operated to provide water if the normal supply lines are shut down for an emergency or repair.

If you have any questions, please call.

Sincerely yours,
 PHILIP M. BOTCH & ASSOCIATES, INC.


 Roger C. Eberhart, P.E.

cc: Phil Fraser, City of Tukwila
 Water District No. 125
 Document No. 82.44

RCE/jkc



UTILITY PERMIT APPLICATIONPermit Number: 185046

Utility and Address: King County Water District No. 125
P.O. Box 68147
Seattle, WA 98168

Applicant: Frank Pearson Telephone: (206) 242-9547

Application is hereby made by the above referenced utility to the municipality of the City of Tukwila to perform work as noted below or as shown on attached drawing(s):

See Attached Drawings

Note open cut along 52nd Avenue South.

This permit is valid for 60 calendar days from 7/24/85.
 The applicant shall comply with all State and local laws or ordinances. The applicant shall save the City harmless from any and all damages which may accrue to any person or property because of this installation or the maintenance thereof. Work performed under this permit shall include:

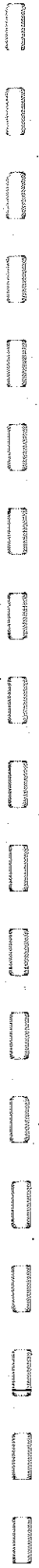
- 1) 24 hours prior to construction the contractor shall notify the City Inspector, Pat Brodin, at 433-1854.
- 2) Prior to construction all utilities in the vicinity shall be field located. NOTE: For City of Tukwila utility locates call 433-1860.
- 3) Detours within the public right of way shall be in accordance with the current edition of the Manual On Uniform Traffic Control Devices.
- 4) For work within public road - no open cut allowed unless specifically approved.

City of Tukwila

Approved by: *Don Earnst*

Title: CITY ENGINEER

Date Approved: 7/24/85





PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAIN STREET

BELLEVUE WASHINGTON 98004

TELEPHONE (206) 682-5300

January 31, 1986

City of Tukwila
6200 Southcenter Blvd.
Tukwila, WA 98188

Attn: Phil Fraser

Re: Mechanically Operated Intertie
Tukwila/Water District No. 125
Interurban Ave. South and 52nd Ave. South

Dear Mr. Fraser:

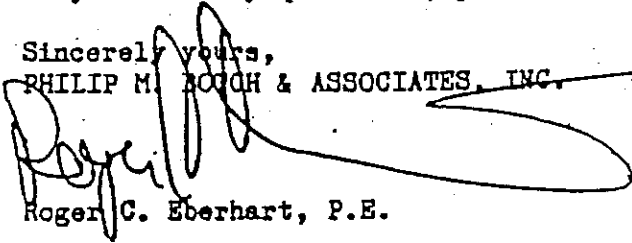
Enclosed for your reference is a copy of your August 8, 1985 letter approving the plans and establishing the conditions for activating the referenced intertie. Also enclosed are a letter of approval from the Seattle Water Department for the intertie and a Right-of-Entry Agreement from Metro authorizing access to the intertie meter.

The facilities have been constructed in accordance with the approved plans and all conditions of your letter have been complied with.

The enclosed Agreement to Provided Water Services is submitted for review by the appropriate City Staff and approval by the City Council. Please return an executed copy of the agreement to Water District No. 125; P.O. Box 68147; Seattle, WA 98168.

If you have any questions, please call.

Sincerely yours,
PHILIP M. BOTCH & ASSOCIATES, INC.

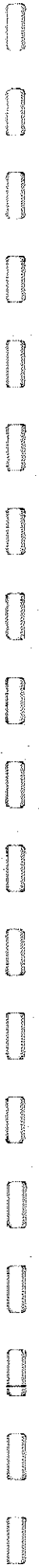


Roger C. Eberhart, P.E.

Enclosure

cc: Water District No. 125
Document No. 82.95

RCE/jkc





City of Tukwila ¹⁷⁹⁶⁷

6200 Southcenter Boulevard
Tukwila Washington 98188
433-1800
Gary L. VanDusen, Mayor

August 8, 1985

Phillip M. Botch & Associates
11000 Main Street
Bellevue, Washington 98004

RE: MECHANICALLY OPERATED INTERTIE: WATER DISTRICT #125/TUKWILA
Plan Approval

Dear Sirs:

The Attached plan has been reviewed and approved by Public Works per the following comments and conditions:

1. 24 hours prior to beginning work, Water District #125 Contractor shall apply for and obtain a no fee Street Use Permit to provide an Intertie between Water District #125 and City of Tukwila Water distribution systems.
2. 24 hours prior to carrying out this work, Water District #125 Contractor shall apply for and obtain an Excavation Permit (Permit Fee = \$100.00) and provide necessary bonds and insurance, per the City's Excavation Ordinance.
3. The construction of this intertie has been authorized through the Public Works Director and City Engineer prior to City/W.D. #125 agreements through Council/Commissioners. However, this intertie will not be allowed to become operable and it is recognized that it is built without guarantee of use until the following arrangements are complete:
 - A. A contract is executed between Tukwila and Water District #125 for use of this intertie, including charge rate for water use, conditions by which intertie is allowed, amount of water committed to run through intertie, and duration of intertie agreement.
 - B. Appropriate authorizations through the Seattle Water Department officials allowing amendment to Tukwila's/S.W.D./WD #125's conveyer agreements, allowing for this intertie.

90 calendar days are allowed by Tukwila for WD #125 to secure agreements acceptable to Tukwila, as described above. After the 90 day period, Tukwila has the right to require WD #125 to remove this intertie and restore the properties to their original condition, all at WD 125's expense, if the appropriate agreements described above have not been fully executed by all parties.

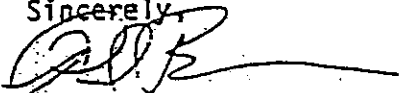
Phillip M. Botch & Associates
Page 2

4. A copy of the right of entry onto the Metro Park and Ride Lot properties shall accompany the permits. Necessary easements allowing either #125/ Tukwila or Seattle Water Department personnel access to these facilities shall be provided prior to sign off of these permits.
5. Blocking shall be provided on main line and bends, per the requirements of the City's inspector.
6. The new lines shall be wet tapped onto the City's lines, and tested per the City inspector's requirements (AWWA).
7. Surveying in of this line shall be coordinated with Metro's Park & Ride design consultants and Metro staff. The vault and valves to be provided at the final sidewalk grade, coordinated with Metro staff.

It is understood by this plan review that the use of the intertie is intended to be reciprocal, with the operations of this intertie per requirements of the City, including prior notification and authorization by the City. The single meter in the Vault is to be mechanically turned around to allow metering in either direction.

If you have any question regarding this matter do not hesitate to call me at 433-1256.

Sincerely,



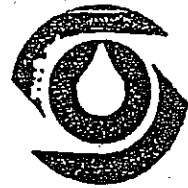
Phil Fraser
Senior Engineer

- cc. Public Works Director
- City Engineer
- City Clerk
- Finance
- Permit File

Enclosure: (1)

Seattle Water Department

Kenneth M. Lowthian, Superintendent
Charles Royer, Mayor



January 16, 1986

Phillip M. Botch and Assoc.
11000 Main Street
Bellevue, WA 98004

RECEIVED
JAN 21 1986
PHILLIP M. BOTCH & ASSOC.

Attn: Roger C. Eberhart, P.E.

Re: Emergency Intertie Between
W.D. No. 125
and the City of Tukwila

Dear Mr. Eberhart:

Thank you for your letter of January 7th, advising us of the intention of the two water utilities to construct a temporary emergency intertie at South 131st Place and 44th Avenue South including a pressure regulator valve such that water will flow only in event of fire flows in excess of 2,500 GPM.

In response to your letter of January 10th an intertie is hereby approved between the two water utilities, for emergency operation located at 52nd Avenue South and Interurban Avenue.

For the record will you please provide a copy of the intertie agreement(s) after being signed by the two water utilities.

Thank you for your attention to this matter. Call me if you have any questions.

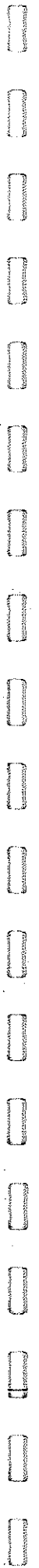
Sincerely,


HARRY L. PRATT
Chief Technical Advisor

HLP:je

cc: Phil Frazier, City of Tukwila
Frank Pearson, W. D. 125

Handwritten notes in left margin:
NLS - 1/16/86
L. OTTER
FRANK
TO: HLT
FRANK PEARSON
CITY OF TUKWILA
INTER-TIE
AND
ATTN: FRANK PEARSON



RIGHT OF ENTRY AGREEMENT

This Agreement made this 9TH day of OCTOBER 1985, by and between Water District No. 125 (the District herein) and its assigns, and the MUNICIPALITY OF METROPOLITAN SEATTLE (Metro herein).

This Right of Entry is given the District and its assigns by Metro for the purpose of designing, installing, constructing, reading, and repairing a water meter with all connections, manholes and appurtenances thereto together with the right of ingress to and egress from over, across, along, in, upon and under the property described in the attached Exhibit A.

Metro, the District and its assigns, by granting and accepting this Right of Entry respectively, mutually covenant and agree as follows:

1. This Right of Entry will become null and void at such time as the property described in Exhibit "A" is conveyed to the City of Tukwila for street purposes or December 31, 1987, whichever shall first occur.
2. By executing this Right of Entry Agreement, Metro does not waive any legal remedies available to it for just compensation. In the event the property described in Exhibit "A" is not conveyed to the City of Tukwila before December 31, 1987, as contemplated above, then if requested by Metro, the District and its assigns shall remove all facilities installed under this Right of Entry at its own expense or purchase an easement for said facilities based on the fair market value of the easement rights to be acquired.
3. The District and its assigns shall protect and save harmless Metro from and against any and all claims, damage to or loss or destruction of property whatsoever suffered by Metro, their successors and assigns, tenants, licensees and invitees because of the installation and construction of said water meter, but the District and its assigns shall not be so obligated in the event of the negligence of Metro, their successors and assigns, tenants, licensees and invitees causing such damage, loss or destruction.
4. The District and its assigns shall, upon completion of construction of any facilities described herein, remove all debris and restore the surface of the property as nearly as possible to the condition in which it existed at the date of this Agreement.
5. This Right of Entry is subject to such leases, licenses and permits heretofore granted by Metro or predecessors in interest affecting said property as may be currently valid at law.

KING COUNTY WATER DISTRICT NO. 125

By: James J. [Signature]
Title: Chair.

MUNICIPALITY OF METROPOLITAN SEATTLE

By: Susan M. [Signature]
Title: Right-of-Way & Property Supervisor

DOCUMENT NO. 69.13
WD #125 TUKWILA INTERTIE

EXHIBIT A

PROPERTY DESCRIPTION FOR RIGHT OF ENTRY PERMIT

A STRIP OF LAND 10 FEET WIDE, 5 FEET EACH SIDE OF THE CENTER LINE DESCRIBED AS FOLLOWS:

COMMENCING AT A BRASS CAP MONUMENT LOCATED AT THE INTERSECTION OF INTERURBAN AVENUE SOUTH AND 52ND AVENUE SOUTH; THENCE SOUTH $46^{\circ}14'37''$ EAST, 100 FEET ALONG THE CENTER LINE OF 52ND AVENUE SOUTH AS PROPOSED FOR THE RIGHT-OF-WAY DEDICATION TO THE CITY OF TUKWILA; THENCE NORTH $43^{\circ}45'23''$ WEST, 14.58 FEET TO THE EXISTING NORTH RIGHT-OF-WAY LINE FOR 52ND AVENUE SOUTH, THE POINT OF BEGINNING; THENCE NORTH $43^{\circ}45'23''$ WEST, 15.42 FEET TO THE PROPOSED RIGHT-OF-WAY LINE FOR 52ND AVENUE SOUTH, END OF THIS DESCRIPTION.

A G R E E M E N T

THIS AGREEMENT is effective on the last date of acceptance indicated below and is between the CITY OF TUKWILA (hereinafter the "City"), a city incorporated and existing under the laws of the State of Washington and WATER DISTRICT NO. 125, KING COUNTY (hereinafter the "District"), a water district incorporated and existing under the laws of the State of Washington;

WHEREAS, an industrial water user, Seattle Rendering Works, Inc., owns and operates a plant lying within the corporate limits of the City and which has been served by the City's water utility; and

WHEREAS, the parties agree that the interests of all concerned would be best served by the District providing water service to the above mentioned property of Seattle Rendering Works, Inc., under the terms set forth below;

WITNESSETH:

IT IS AGREED by and between the parties as follows:

1. Installation of Service. The City will install a new 6-inch water distribution line on the property of Seattle Rendering Works, Inc., the cost of which is estimated at \$15,000.00 and which will be paid for by the City.

2. Connection to District's Line. The aforementioned new service will be connected to the District's 6-inch main which crosses the railroad tracks outside and northwest of the entrance to the Seattle Rendering Works, Inc. plant.

3. Flow Meter. The City will install a 6-inch flow meter and vault in the new service at the west property line of the Seattle Rendering Works, Inc.

4. Easements. The City will obtain and later assign to the District all necessary easements from the landowners M & L Investments and Burlington Northern Railroad. The legal description of the Seattle Rendering Works, Inc. property is as follows:

That portion of C. E. Brownell Donation Claim more particularly described as follows:

Beginning near the West line of Section 13, Township 23 N, Range 4 E.W.M. at a concrete monument which is 1,510.74 feet South of and 2,143.89 feet West of the Northeast corner of said donation Claim and running thence Due West parallel to the North line of said Donation Claim 1,715.29 feet to a point one foot West of the Most Westerly rail of the Northern Pacific Railroad; thence parallel to said rail North $27^{\circ}21'30''$ West 668.61 feet; thence south $69^{\circ}22'40''$ west 47.44 feet to an iron pipe on the Westerly line of the right of way of said Northern Pacific Railroad, which iron pipe is the true point of beginning; thence continuing South $69^{\circ}22'40''$ West 190.00 feet to a second iron pipe at the top of the East Bank of the Duwamish river; thence continuing south $69^{\circ}22'40''$ west about 30 feet to mean

high water of said Duwamish river as same has averaged for past five years; thence along said High water line Southeasterly to said Westerly line of right of way; thence Northwesterly along said Westerly line of right of way about 290.0 feet to the true point of beginning. Reserving therefrom an easement for use of premises owned by grantors to north of above described tract on and over a strip of land 30 feet wide adjacent to said Northern Pacific right of way extending from Northerly line of above described tract Southerly to South side of grade crossing of said railroad right of way as said grade crossing now exists or as said grade crossing may be reconstructed. Situated in King County, Washington.

5. Transfer of Ownership. After completion of construction, the City will transfer ownership of the new service and underlying easements to the District, which will then provide permanent water service to the Seattle Rendering Works, Inc. property.

6. Payment by District. The District will pay the City for its construction and financing costs incurred in the installation of the aforementioned new service as follows: cash, without interest, if paid within ninety (90) days of January 1, 1979; or over a period of not more than ten (10) years, in installments with payments of no less than 10 per cent of the total, paid no less than annually, with interest of nine (9) per cent per annum from April 1, 1979, on the declining balance.

7. Security Agreement. The District ("Debtor") hereby grants to the City ("Secured Party") a security interest in all of the property described in the Bill of Sale executed,

as provided in Paragraph 5 above, together with all increases therein, all added and substituted parts and equipment, tools, parts, accessories, supplies and improvements therefor.

All of said property is located in King County, Washington.

This security agreement is given to secure the payment and performance of all indebtedness and obligations of Debtor to Secured Party presently existing and hereafter arising, direct or indirect, and interest thereon.

If any of the property is to be or has been attached to real estate, the description of that real estate is set forth in Paragraph 4 above.

ACCEPTED:

December 19, 1978

CITY OF TUKWILA

By Edgar D. Bauch
Edgar D. Bauch, Mayor

APPROVED:

Terence R. Monaghan
TERENCE R. MONAGHAN, P.E.
Public Works Director

ACCEPTED:

December 13, 1978.

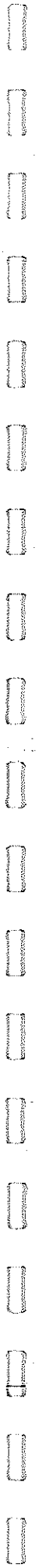
WATER DISTRICT NO. 125, KING COUNTY

By James I. Angle
James I. Angle, President
Board of Commissioners

By C. H. Walmer
C. H. Walmer, Secretary
Board of Commissioners

By W. C. L. Wiese
W. C. L. Wiese, Member
Board of Commissioners

**APPENDIX H
INTERTIE AGREEMENT - HIGHLINE**



APPLICATION and AGREEMENT

(Not Binding Until Signed By Commissioners)

Meter No. Nil

Date: 3/13/79 Meter Size: 12" Turbine Intertie Received With Application: Nil

Street Address: _____

Block: _____ Addition: _____

Name of Applicant: City of Tukwila

Address: 6200 Southcenter Blvd. Tukwila, Wa. 98188 No. Of Units: _____

Location Of Meters: _____

Special Instructions: To be billed at \$.22 per 100 Cu. Ft. per agreement for fire flow standby between the District and the City. (To be reviewed periodically)

The undersigned, hereinafter called the "applicant," hereby makes application for water service from Water District No. 75, King County, hereinafter called the "District," and in consideration that the said District furnish water, the applicant agrees to pay for the same at the rate and in the manner provided or to be hereafter provided by the Board of Water Commissioners and to abide by such other rules and regulations as may be made by resolution of the Board of Water Commissioners of said District. The applicant further agrees that the Water District hereby reserves the right to charge and collect such rates and enforce such penalties as may be provided by resolution of the Board and to temporarily discontinue the service at any time without notice. It is further agreed that in case the supply of water shall be interrupted or fail by reason of accident or any other cause whatsoever, the District shall not be liable for damages for such interruption or failure nor shall such failure or interruption for any period of time be held to constitute a breach of contract upon the part of the District or in any way relieve the applicant from performing the obligations of this contract. The District, in consideration that the applicant pay the charges and the rates and abide by the rules, regulations and resolutions of the Board in force on the date of this application, or as hereinafter enacted or amended, agrees to furnish water to the premises herein described according to the terms and conditions hereof. Applicant further agrees that he will protect and save harmless the District from all claims for damages occasioned by breaking or leaking of any of the pipes and appurtenances used for the supplying of water. Applicant further agrees that in the event he shall fail to pay the rates, charges and penalties as aforesaid, or if the resolutions, rules or regulations of the District are in any respect violated by applicant, his agent, tenants or persons acting in his behalf, the District may disconnect the water at his own cost and charge.

Accepted: Edgar D. Bauch *Mary*

By: City of Tukwila Agent/Builder
6200 Southcenter Blvd. Address
433-1800 Telephone

Application Accepted _____ WATER DISTRICT COMMISSION
_____ day of _____, 19____ By: _____

Key to W 75
No. _____



LYLE M. LINDBLAD, Chairman
HENRY B. LYLE, Secretary
DAN N. CALDWELL, Commissioner

17967

JERRY P. HARRIS
General Manager
MAXINE J. CONRAD
Office Manager

Water District No. 75, King County

Telephone 824-0375

P.O. Box 68100, Riverton Heights Station

Office: 19863 28th Avenue So.

SEATTLE, WASHINGTON 98188

April 16, 1980

City of Tukwila
6200 Southcenter Blvd.
Tukwila, WA. 98188

Attn: Ted Uomoto

Re: City of Tukwila/Water District No. 75
Water Intertie

Dear Mr. Uomoto:

This is a reply to your April 8, 1980 communication pursuant to several discussions that we have had about water service between our two utilities.

The current configuration existing at S. 180th St. and Andover Park West, contemplates water flowing in either direction between Water District No. 75 and the City of Tukwila. This concept was recommended by Mr. Segale of the Segale Industrial Park. His thoughts were that a somewhat better fire rate might be obtained if there were two sources of supply. I specifically mention this because, with the implications of demand type service proposed from our two utilities, there is less likelihood that water will flow from Tukwila to Water District No. 75. The bypass at this location will become of emergency nature only.

We have reviewed the requirements for implementing demand service between our two utilities. We foresee about four areas that must be addressed as follows:

A feasibility study with a computer print-out will give us a hydraulic analysis of your system. This will be necessary. Such a study was performed several years ago. Since the original study, the Segale Industrial Park has been developed, the McCann Industrial Park has been developed, and a number of additions and betterments have been accomplished in our two systems. In fact, there is now an intertie between the City of Tukwila and the City of Renton and another intertie

RECEIVED
PUBLIC WORKS DEPT.
CITY OF TUKWILA

[Handwritten Signature]

APR 18 1980

between the City of Tukwila and the City of Kent. The hydraulic analysis must therefore be updated to determine the implications of these changes. It would be our impression that this work should proceed immediately because much of our design is dependent upon this result. We estimate the cost of this study, including about six different flow configurations, or conditions a flow, at about \$9,400.

The Segale Industrial Park has been having internal problems due to a "locked system" resulting from the several pressure reducing valves that they have. The changes that we contemplate will necessitate a hydraulic operated pressure relief valve to prevent excessive pressures from occurring within our system. A design has been performed for this equipment. We estimate the cost of this installation at \$5,600.

We have reviewed the print-out of the City of Seattle monitoring that was performed on the City of Tukwila system in the year of 1979. We find that the major demand on your system occurs in the morning. Water District No. 75 experiences a secondary peak at about this time. This indicates the need for demand metering and print-outs so that the flow can be monitored to avoid a responsibility to the City of Seattle by Water District No. 75. We estimate the cost for this metering equipment at about \$1,500.

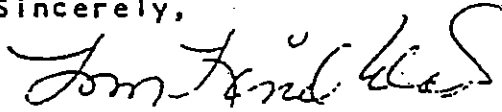
In our original proposal for providing service to you several years ago, we indicated the necessity for "balancing" your meters. The reason for this is that the computer print-out indicated that a number of your meters were non-operative during peak demand. This will occur if a pressure reducing valve is not properly adjusted and does not give recognition to the elevation at which it is installed. It will be necessary to "fine tune" the adjustment of all pressure reducing valves in the system so that proper flow can be obtained from each unit during peak demand. This work was previously accomplished by your Water Superintendent, Ted Freemire. Ted has done such an excellent job at this, I thought that we might prevail on him to continue this work. We anticipate some involvement from our office during the time that Ted is making these adjustments. We estimate this cost at \$1,200.

The total estimated cost for adjustments and "conversion" is estimated at \$17,000. It is our suggestion that Water District No. 75 pay for the cost of the pressure relief valve in the Segale Industrial Park and share the cost of the demand metering. On this basis, the City of Tukwila would pay \$11,250 and Water District No. 75 would pay \$6,350.

After the proposed system is operative, it is our suggestion that the City of Tukwila pay the standard charge for water through the meter as previously prescribed.

We will appreciate your consideration and concurrence in this proposal.

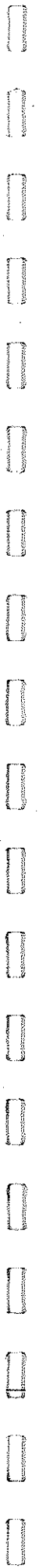
Sincerely,



Lyle Lindblad
President of the Board of Commissioners

LL/jvh

By Mayor and 4/21/80
Fraser/Songman



WATER DISTRICT NO. 75, KING COUNTY

RESOLUTION NO. 80-10-15N

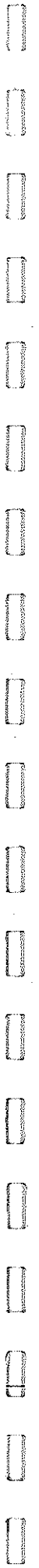
Resolution Approving A New Rate For
Sale Of Water To The City Of Tukwila

BE IT RESOLVED by the Commissioners of Water District No. 75 King County that they hereby fix the following rate for the sale of water by the District to the City of Tukwila, in view of a new rate imposed by the city of Seattle upon the Water District: 25¢ per 100 cubic feet of water furnished by the District to the City of Tukwila.

Passed by the Commissioners the 15th day of October, 1980.

Tom Lindberg

D. J. Caldwell



APPLICATION FOR WATER METER INSTALLATION:

Date: 3-7-79

I hereby apply to the City of Tukwila for a water meter installation to the following property:

Name of Owner: King County Water District # 75

Address: 19863 28th Avenue South, Seattle, WA 98188

Number of meters 1 Size of meters 6"

Location or special instructions: Bill at 22¢/100 CF per agreement for fire flow standby

I understand that the charge for this installation is based on the cost of materials plus labor and connection charge. I agree to pay the installation deposit charge in the amount of \$ 0 on the signing of this application and the balance of the cost when billed (overpayment will be refunded).

Contractor NA

Address NA

NA

Telephone NA

Payment \$ 0

Receipt No. NA

Received by NA

Jerry P. Adams
Signature of Applicant

Work Order No. NA

o.s.-j Ron S
C.C. Mac...
" ...



APPENDIX I
INTERTIE AGREEMENT - RENTON



AGREEMENT FOR THE EMERGENCY SALE OF WATER
BETWEEN
THE CITY OF RENTON AND THE CITY OF TUKWILA

RECORDED
KING COUNTY
RECORDER
APR 11 1995

This AGREEMENT made and entered into this 21st day of March 1995, by and between the CITY OF RENTON, a municipal corporation of the State of Washington, hereinafter called "RENTON" and the CITY OF TUKWILA, a municipal corporation of the State of Washington, acting through its Water Department, hereinafter called "TUKWILA".

WHEREAS, RENTON and TUKWILA may experience periodic water supply shortfall;
WHEREAS, RENTON and TUKWILA recognize the public benefits of cooperation and collaborative problem solving;
WHEREAS, RENTON and TUKWILA are willing to sell water in an emergency at the existing system interties;
WHEREAS, the parties desire to enter into an AGREEMENT providing for the emergency sale of water.

NOW THEREFORE, IT IS AGREED AS FOLLOWS:

- 1) Term of AGREEMENT. The effective date of this AGREEMENT shall be April 7, 1995. The AGREEMENT shall be for a minimum of one (1) year and shall continue in full force and effect in its present form, or as amended until terminated by either party in accordance with Section 13 of this AGREEMENT. The rates and quantities of water sold are set forth in Sections (2), and (6).
- 2) Rate. For 1995 the BUYER shall pay to the SELLER for all water delivered at the rate of \$1.35 per 100 cubic feet, which is the Seattle Water Department summer new water rate for 1995. The rate charged to the BUYER shall be adjusted each year on January 1st using the method described as follows. The rate charged by the SELLER shall be the larger of the following: 1) the current Seattle Water Department summer new water rate (in dollars per 100 cubic feet) or 2) [\$1.24 per 100 cubic feet] times [the current City of Renton retail commodity rate (in dollars per 100 cubic feet)] divided by [\$1.68 per 100 cubic feet].
- 3) Metering. RENTON and TUKWILA shall each provide, and own and maintain, an appropriate metering device to measure the water flowing through the intertie. An interlocal agreement may be prepared to allow one party to operate and maintain the intertie and distribute the costs equally between the both parties. As soon as either becomes aware of flow of water through the intertie that party will notify the other. If prior notification is feasible, the party requesting the water shall provide a description and documentation of the emergency condition to the other party. Each party will monitor its meter(s) on a regular basis.
- 4) Priority and Continuity of Service. The determination of whether water is available for emergency sale shall be at the sole discretion of the party delivering (selling) the water. In the event of a condition requiring restrictions on the delivery of water, the party delivering the water shall have the right to restrict or interrupt service. The party providing water may voluntarily interrupt or reduce deliveries of water if it determines that such interruption or

reduction is necessary or reasonable. Except in cases of emergency and in order that operations will not be unreasonably interfered with, the party providing water shall give the party buying water, reasonable notice of any such interruption or reduction, the reason therefor, and the probable duration thereof. The party buying water shall discontinue or reduce service from the intertie upon reasonable notice. Service shall be reactivated or increased again subject to the aforementioned conditions.

- (5) Water Quality. The quality of water delivered under this AGREEMENT shall be subject to applicable provisions of State and Federal law and rules and regulations of the appropriate State agency governing water quality, and subject also to applicable provisions of City ordinances relating thereto and not inconsistent herewith. Each party agrees to deliver water which shall be of no less quality than is delivered to its other retail customers throughout the service area.
- 6) Quantity of Water. Depending upon demand conditions, water availability (including conservation impacts), as well as aquifer behavior, in the water systems, each City may make available, for purchase by the other City, up to the approximate amount of two million seven hundred thousand (2,700,000) gallons per day, at flow rates varying from zero to 1,875 gallons per minute, from the existing emergency intertie located on the West Valley Highway.
- 7) Coordination and Project Management.

A) Operations:

For the purpose of operating the water system intertie between RENTON and TUKWILA, coordination shall occur between representatives of the systems, who are:

Water Maintenance Manager, City of RENTON
and
Water Manager, City of TUKWILA
(or their designated representatives)

The coordination shall consist of exchanging operational information such as when the intertie is used, the respective flow rates, pumping capacities, back-pressure sustaining valve setpoints, system pressure effects, water quality characteristics, and other operational information as necessary to accomplish the purposes of this AGREEMENT while maintaining safe operation of both systems.

B. Engineering:

For the purposes of coordinating engineering issues regarding the RENTON and TUKWILA intertie, the following personnel shall be the designated representatives:

Water Utility Supervisor, City of RENTON
and
City Engineer, City of TUKWILA
(or their designated representatives)

9504111053

The engineering issues addressed shall include operational criteria as well as hydraulic behavior, water quality considerations, and other appropriate engineering issues.

C. Administration:

For the purposes of AGREEMENT administration and AGREEMENT modifications or interpretations, the following personnel shall be the designated representatives:

Planning/Building/Public Works Administrator, City of RENTON
and
Public Works Director, City of TUKWILA
(or their designated representatives)

- 8) Payment. The City providing the water shall read the meter once each month at approximately thirty (30) day intervals. Payment shall be made by the City receiving water as soon as possible after receipt of statement and in any event, not later than the tenth (10) of the second month following the presentation of the bill.

In the event a meter shall fail to register or obviously register incorrectly, the amount of water considered delivered through said meter shall be based upon the best data available (e.g., recent past meter readings, observations of fire fighting equipment in use) subject to negotiation by the cities.

- 9) Penalties For Late Payment. The City selling water may assess a late charge on the City buying water for failure to comply with the provisions in Section (8). This charge shall be at the rate of twelve percent (12%) per year. In the event that the City buying water should fail to make any payment for a period of sixty (60) days after the same becomes due, the City selling water shall have the right to terminate further water service without further notice, until such delinquency is cured.
- 10) Procedure for Amending the Contract. Either party can request the other to consider an amendment of the AGREEMENT. Any proposed amendments shall be made in writing. Amendments may be made if they are mutually acceptable to RENTON and TUKWILA and signed by both parties. Minor or operational amendments may be made by the Administrators.
- 11) Access to Facilities and Records. Each party shall be entitled to inspect the intertie facilities of the other at any reasonable time. Both parties agree to make mutually available such information or records regarding the intertie as are at their disposal and as may be reasonably necessary to properly implement any section of this AGREEMENT.
- 12) Non-Assignability. Neither this AGREEMENT nor any interest therein shall be transferred or assigned by either City without prior written consent of both Cities.

9504111053

13) Termination. This AGREEMENT may be terminated in whole or in part by either party any time after one year from date of this AGREEMENT, upon ten (10) days written notice sent by certified mail to the other party.

IN WITNESS WHEREOF, the parties have hereunto set their hands this day and year above written.

CITY OF RENTON

By: Earl Clymer
Earl Clymer, Mayor

ATTEST/AUTHENTICATED:

Marilyn J. Petersen
Marilyn J. Petersen, City Clerk

APPROVED AS TO LEGAL FORM:

Larry Warren
Larry Warren, City Attorney

CITY OF TUKWILA

By: John W. Rants
John W. Rants, Mayor

ATTEST/AUTHENTICATED:

Jane E. Cantu
Jane E. Cantu, City Clerk

APPROVED AS TO LEGAL FORM:

Linda Cohen
Linda Cohen, City Attorney

9504111053

A G R E E M E N T

THIS AGREEMENT entered into this 18th day of December 1978, by and between the CITY OF RENTON, hereinafter referred to as "Renton" and the CITY OF TUKWILA, hereinafter referred to as "Tukwila".

WHEREAS Municipal Corporations are given the power to contract under RCW 39.34 for cooperative services, and

WHEREAS it is necessary for Tukwila and Renton to enter into this Agreement to provide a water intertie system, and

WHEREAS it is mutually beneficial to both parties to enter into this Agreement to provide emergency water flow and water supply primarily for emergency fire protection, NOW THEREFORE,

IN CONSIDERATION of the mutual benefits conveyed hereby do agree as follows:

1. Both parties agree to cooperate in the construction of a water flow intertie system uniting the water supplies of the City of Renton and the City of Tukwila at a point on the West Valley Highway.

2. The intertie system will be constructed by the City of Renton at the City of Renton's expense and ownership of said facility shall remain with the City of Renton. The City of Renton hereby agrees to operate and maintain said facility.

3. Both parties agree to permit the intertie system to remain open at all times except in cases of emergency, and then to close the facility only as long as the emergency dictates that the closure remain. If a closure is necessary the closing party agrees to notify the other party's Fire Department and Water Department immediately upon said closure.

4. Both parties agree that the rate to be charged for water used under this Agreement will be at the rate of Eight Dollars (\$8.00) per month fire protection service charge plus \$0.33 per 100 cubic feet of water used. Billing for said charge shall be made in the normal course of business and paid by the other party promptly upon receipt of the invoice. Failure to pay for water utilized under this Agreement or for use for other than emergency purposes, unless otherwise agreed upon, shall be grounds for termination of this Agreement.

5. Either party may cancel this Agreement for material breach of its terms by written notice served upon the other party at least twenty (20) days prior to the proposed termination date. If the breaching party removes the breach and performs under terms of this Agreement before the termination date, the Agreement shall remain in full force and effect. However, if the breach is not removed and continues, then the Agreement shall be null and void in all respects except for the obligation to make payments as defined for water used prior to the termination date.

CITY OF TUKWILA

By Edgar R. Bauch
Mayor

By Marian Anderson
City Clerk

CITY OF RENTON

By P. J. Delaurenti
Mayor

By Marian E. Mator
City Clerk, Deputy

Approved as to form:

Lawrence J. Warren
Lawrence J. Warren, City
Attorney for City of Renton

Lawrence E. Hunt
City Attorney for City of Tukwila



THE CITY OF RENTON

MUNICIPAL BUILDING 200 MILL AVE. SO. RENTON, WASH. 98055

CHARLES J. DELAURENTI, MAYOR

DELORES A. MEAD
CITY CLERK

December 18, 1978

RECEIVED
DEC 20 1978

Mr. Terence R. Monaghan
Public Works Director
City of Tukwila
6200 Southcenter Boulevard
Tukwila, Washington 98188

Dear Mr. Monaghan:

We enclose herewith for your file copy of a water inter-tie agreement between the City of Renton and the City of Tukwila which has been signed by the Mayor and Deputy City Clerk and approved by Mr. Warren.

Yours very truly,

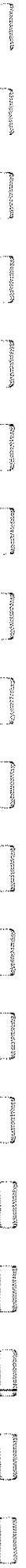
CITY OF RENTON

Maxine E. Motor.
Deputy City Clerk

MEM:bh

Enc.

cc: Maxine Anderson,
Tukwila City Clerk





PUBLIC WORKS DEPARTMENT
6230 Southcenter Boulevard
Tukwila, Washington 98067
telephone (206) 242-2177

COUNCIL ACTION		
4/10	8/28	3

MEMORANDUM

Date: August 16, 1978
 To: Mayor Bauch
 From: Terry Monaghan, Public Works Director
 Subject: Emergency Intertie between the City of Tukwila and the City of Renton

Attached is a letter from the City of Renton requesting an intertie between the City of Tukwila and the City of Renton water systems. The intertie is proposed on the east side of the West Valley Highway at the common boundary of both jurisdictions. The purpose of the intertie would be for emergencies, particularly fire emergencies.

As indicated in the letter, the cost of installing the intertie will be entirely borne by developers through the City of Renton. The status of one of these developments, the Benaroya project at S. W. 43rd Street (South 180th Street) is such that the need for the intertie is immediate.

Our rate structure provides three options of charging for this intertie. These are:

1. TMC 14.04.240 - A demand charge of \$115.00 per month for an 8" meter plus a commodity charge of \$0.33 per 100 cubic feet used in excess of 500 cubic feet. This is our regular customer rate for consumers within the City limits.
2. TMC 14.04.250 - A monthly fire protection charge of \$8.00 per month for an 3" meter which is solely for water supplied for fire protection purposes exclusively and represents a service charge; no charge is made for the water drawn.
3. TMC 14.04.260 - A demand and commodity charge as in item 1 above, or another rate fixed by the City Council as allowed under this section.

I would propose a reciprocal rate structure of \$8.00 per month fire protection service charge with \$0.33 per 100 cubic feet charge for water used.

In addition to the first cost being borne by Renton, the annual maintenance costs will also be borne by Renton.

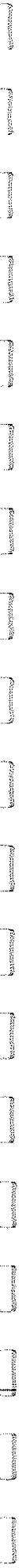
Also attached for your information is a copy of the intertie as designed, a letter to Warren Gonnason from me and a map showing the general location of the Benaroya project and the intertie.

TRM/dp

Enclosures

ENGINEERING·STREETS·WATER·SEWER·PARKS·BUILDING

TUKWILA OFFICE





PUBLIC WORKS DEPARTMENT
6230 Southcenter Boulevard
Tukwila, Washington 98067
telephone (206) 242-2177

August 16, 1978

Mr. Warren Gonnason, P. E.
Public Works Director
City of Renton
200 Mill Avenue South
Renton, Washington 98055

Dear Warren:

Renton/Tukwila Intertie

I have received your letter of August 1, 1978 and have preliminarily reviewed the plan for the proposed intertie between our respective cities.

With respect to the procedural aspects of the intertie, I would suggest that your consultant pursue concurrence and approval of the intertie with the City of Seattle Water Department and the Department of Social and Health Services. I would also suggest that a reciprocal water rate of \$3.00 per month service charge for fire protection be established and agreed upon and \$0.33 per 100 cubic feet be charged by either jurisdiction in the event water is drawn at the intertie.

As to the design of the system, I would like to see electrical power to the vault to provide service for a sump pump, lights in the vault and also potential dehumidification and heat in the vault. I would like to see spare conduit capacity in the vault for future supervisory control and telemetering. Consideration should be given to venting the vault.

The manhole covers should be the gasketed and locking type.

While these are all of the comments I have at this time, I will be passing along the plans to our Fire Department, who may have additional comments.

On the more basic issued as to agreement to allow this intertie to become a reality, I will be discussing this with the City Council on Monday, August 21, and hope to have the approval necessary to authorize you to proceed.

Sincerely,

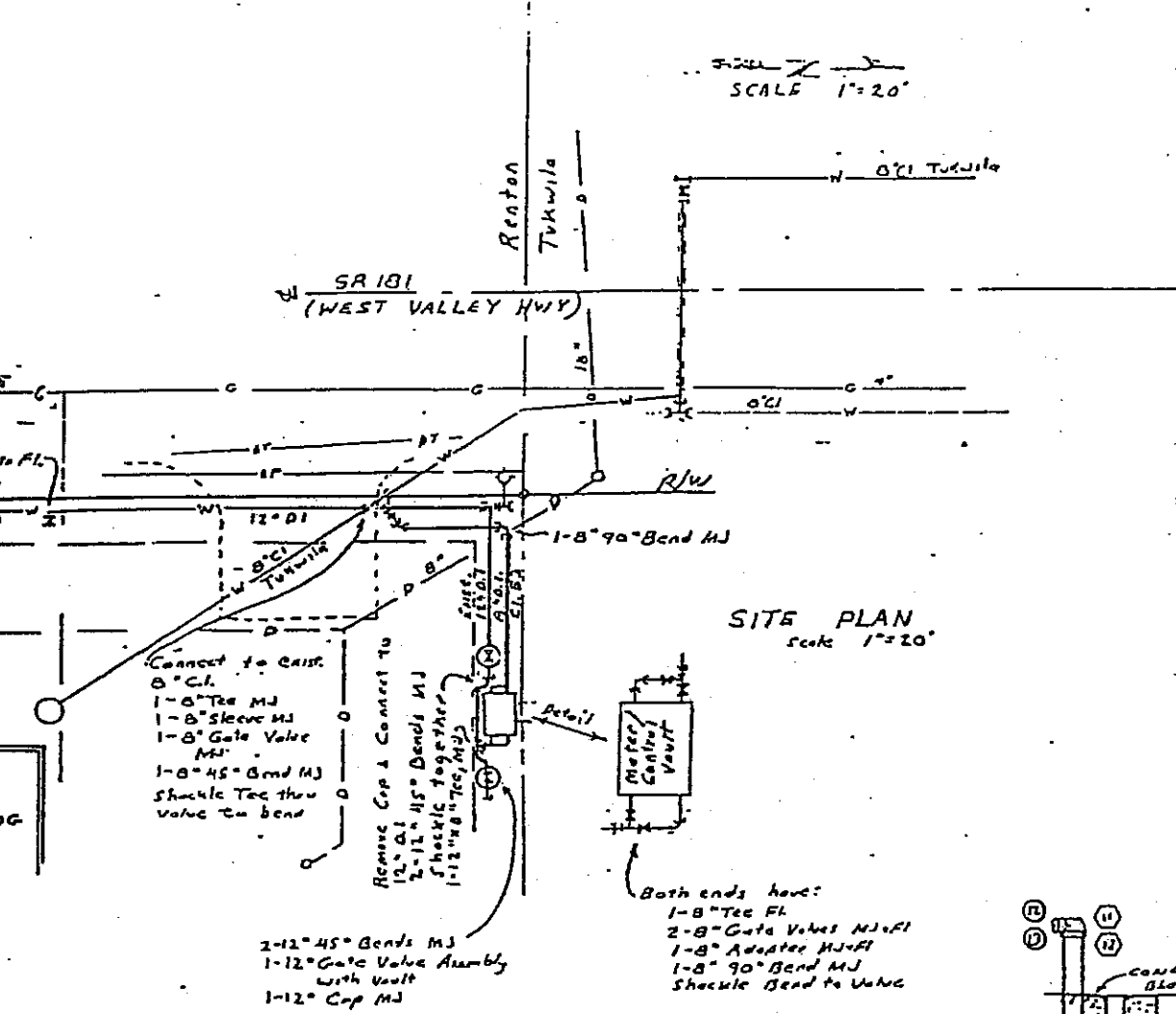
Terence R. Monaghan, P. E.
Public Works Director

TRM/dp

ENGINEERING CONSULTANTS

RECEIVED
AUG 21 1978
CITY OF RENTON

SCALE 1"=20'



SITE PLAN
Scale 1"=20'

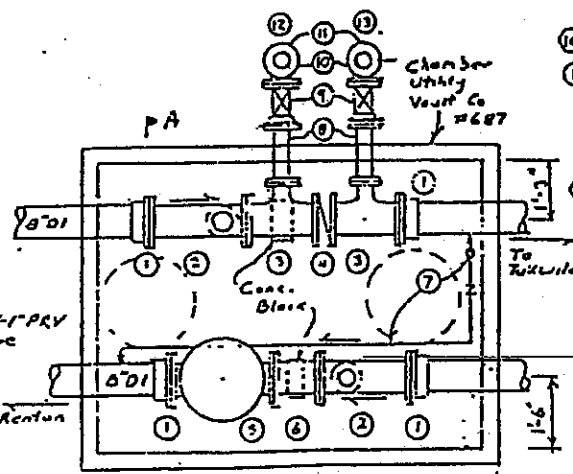
Connect to exist.
8" Cl.
1-8" Tee MJ
1-8" Sleeve MJ
1-8" Gate Valve MJ
1-8" 45° Bend MJ
Shackle Tee thru
valve to bend

Remove Cap & Connect To
12" Cl. 45° Bends MJ
2-12" 45° Bends MJ
Shackle Together
1-12" 8" Tee MJ

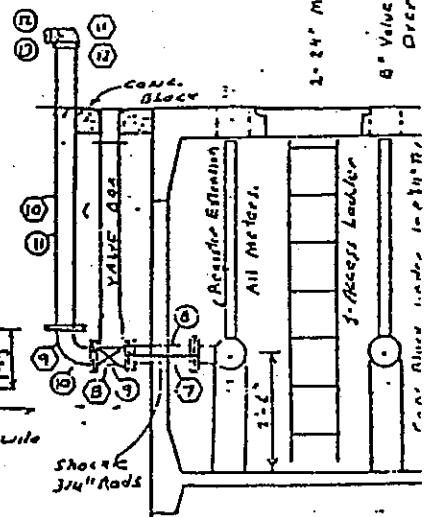
2-12" 45° Bends MJ
1-12" Gate Valve Assembly
with Vault
1-12" Cap MJ

Both ends have:
1-8" Tee Fl.
2-8" Gate Valves MJ/Fl
1-8" Adaptor MJ/Fl
1-8" 90° Bend MJ
Shackle Bend to Valve

- PIPING KEY**
- ① 4- 8" FLX Pipe Couplings
 - ② 2- 8" Tube meters, Fl.
 - ③ 2- 8" 4" Tees Fl.
 - ④ 1- 8" Check Valve
 - ⑤ 1- 8" Pressure Reducing Valve
 - ⑥ 1- 8" Spool Fl. 1' long
 - ⑦ 1" Meter & line, 2-1" Coups., 1-1" PRV
 - ⑧ 1-1" Disc Meter, 1-1" Check Valve
 - ⑨ 2- 4" FLX Cl. Adaptors 1'6" long
 - ⑩ 2- 4" Gate Valves MJ/Fl
 - ⑪ 2- 4" Fl. & Threaded Galv. Steel Adaptors Vertical (Determine length in field)
 - ⑫ 1- 4" Fire Dept 90° Connection
 - ⑬ 1- 4" x 2- 1/2" Fire Dept 90° Connection



INTERIOR PIPING
Scale 1/2"=1'-0"



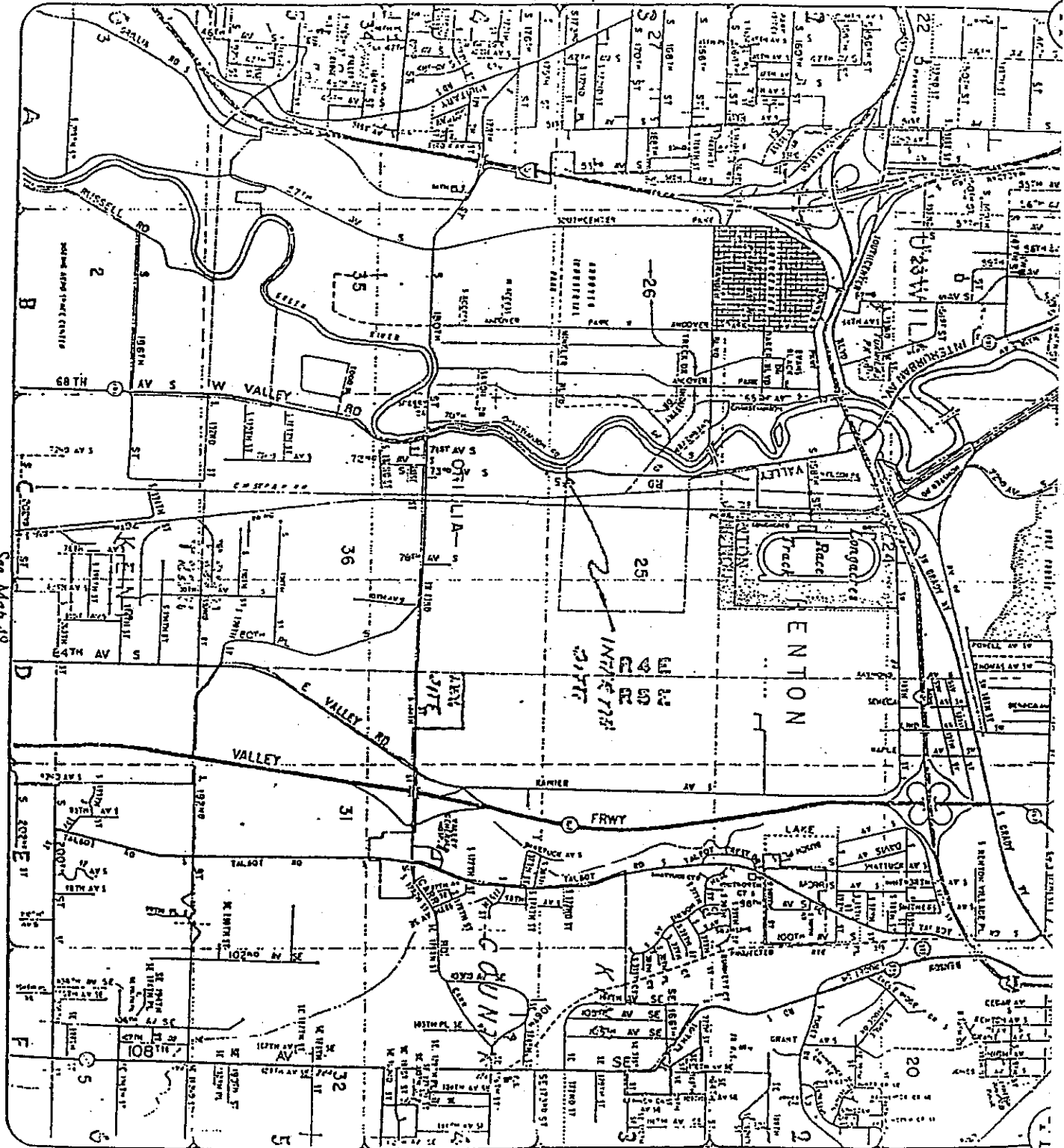
SECTION A-A
(Both Sides)

Key or Valve Symbols
to be used
this plan
Style 12
Class 200-01



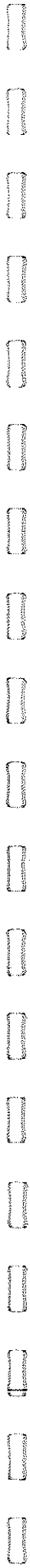
CITY OF RENTON DEPARTMENT OF ENGINEERING	
METER / CONTROL	
KENT/TUKWILA INTERTIE	
DESIGNED BY: [Signature]	DATE: 7/23/75
DRAWN BY: [Signature]	DATE: 7/23/75
CHECKED BY: [Signature]	DATE: 7/23/75
APPROVED BY: [Signature]	DATE: 7/23/75

See Map 40



See Map 48

See Map 42



APPENDIX J
INTERTIE AGREEMENT - KENT



A G R E E M E N T

THIS AGREEMENT entered into this 28 day of *June* 1979, by and between the CITY OF KENT, hereinafter referred to as "Kent" and the CITY OF TUKWILA, hereinafter referred to as "Tukwila".

WHEREAS Municipal Corporations are given the power to contract under RCW 39.34 for cooperative services, and

WHEREAS it is necessary for Tukwila and Kent to enter into this Agreement to provide a water intertie system, and

WHEREAS it is mutually beneficial to both parties to enter into this Agreement to provide emergency water flow and water supply to meet Kent's needs during periods of peak demand and for emergency flow and fire protection in both cities,

NOW, THEREFORE, IN CONSIDERATION of the mutual benefits conveyed hereby do agree as follows:

1. Both parties agree to cooperate in the construction of a water flow intertie system uniting the water supplies of the City of Kent and the City of Tukwila at a point on the West Valley Highway.
2. The intertie system will be constructed by the City of Kent at the City of Kent's expense and ownership of said facility shall remain with the City of Kent. The City of Kent hereby agrees to operate and maintain said facility.
3. Both parties agree that the intertie system will not be operated except during periods when either party desires to obtain

water from the other party. Whenever either party wishes to operate the intertie, ten days notice shall be given to the other party, except that in the case of an emergency, such notice shall not be required. Whenever operated, the operating party agrees to notify the other party's Fire Department and Water Department immediately.

4. Both parties agree that the rate to be charged for water used under this Agreement will be at the rate of \$0.33 per 100 cubic feet of water used. Billing for said charge shall be made in the normal course of business and paid by the other party promptly upon receipt of the invoice. Failure to pay for water utilized under this Agreement or for use for other than emergency purposes, unless otherwise agreed upon, shall be grounds for termination of this Agreement.

5. Either party may cancel this Agreement for material breach of its terms by written notice served upon the other party at least twenty (20) days prior to the proposed termination date. If the breaching party removes the breach and performs under terms of this Agreement before the termination date, the Agreement shall remain in full force and effect. However, if the breach is not removed and continues, then the Agreement shall be null and void in all respects except for the obligation to make payments as defined for water used prior to the termination date.

CITY OF TUKWILA

BY

Edgar H. Bauch
Mayor

CITY OF KENT

BY

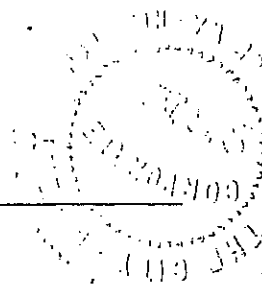
Isabel Hoza
Mayor

Attest:

By Mafine Anderson
City Clerk

Attest:

By Maie Jensen
City Clerk



Approved as to Form:

James E. Hart
City Attorney for
City of Tukwila

Approved as to Form:

Wonal Ethier
City Attorney for
City of Kent



CITY OF SEATTLE DECLINING BLOCK CONTRACT

RECEIVED

JAN 12 2004

TUKWILA
CITY SHOPS

**50-YEAR DECLINING BLOCK
WATER SUPPLY AGREEMENT BETWEEN
THE CITY OF SEATTLE
AND
THE CASCADE WATER ALLIANCE**

12-15-03

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- I. Other Agreements
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- III. Block Allocation by Individual Water Utilities
- IV. Seattle Supply System Facilities
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50-YEAR DECLINING BLOCK
WATER SUPPLY AGREEMENT BETWEEN
THE CITY OF SEATTLE
AND
THE CASCADE WATER ALLIANCE

This Agreement between the City of Seattle, a municipal corporation ("Seattle"), and the Cascade Water Alliance, a non-profit organization of municipalities formed under authority of Chapter 39.30 RCW ("Cascade"), is dated this ____ day of _____, 2003 to be effective January 1, 2004.

Whereas Seattle is a regional water supplier currently providing service to numerous water utilities in King County Washington; and

Whereas the Cascade Water Alliance was formed for the purpose of providing water supply to its Members; and

Whereas the Cascade Water Alliance, desires to enter into a single agreement for water supply with Seattle for some of its Members in lieu of these Members' existing separate contracts with Seattle;

Now therefore, Seattle and Cascade agree to the following terms and conditions for the provision and purchase of a 50-year declining block water supply.

ARTICLE I - AGREEMENT

Seattle agrees to sell to Cascade and Cascade agrees to purchase from Seattle, according to the terms of this Agreement, a wholesale supply of water and the transmission capacity sufficient to deliver such water supply to Cascade.

The term of this Agreement is fifty (50) years, with an effective date of January 1, 2004 and a termination date of December 31, 2053.

Apart from the contract right to purchase water from Seattle under the terms of this Agreement, neither Cascade nor any Cascade Member has any right or claim to the Seattle Water System, the Cedar and Tolt Rivers and to the Highline Well Fields, or to any other water right or claim held by Seattle. Likewise, Seattle shall have no right or claim to the Cascade Water System or to any groundwater right or claim held by any Cascade Member, or to any future source of supply developed by Cascade or by any of its Members. At the termination of this Agreement, Seattle shall have no further obligation to supply Cascade or any Cascade Member with water, with the exception of Cascade's right to purchase up to 5.3 MGD as set forth in Section 3.5.

ARTICLE II - DEFINITIONS

Average Daily Demand ("ADD"). The amount of water supplied by the Seattle Water System to Cascade in a calendar year divided by the number of days in that calendar year.

AWWA. American Water Works Association.

Cascade Block. The total amount of water Seattle commits to supply Cascade under this Agreement, as more fully expressed in Article III.

Cascade Member. A municipal water supplier that has entered into a Membership Agreement with the Cascade Water Alliance.

Cascade Sub-regional System. Seattle Transmission assets serving Cascade Members as listed in Exhibit VII.

Cascade Volume Charge. In any year, the Cascade Volume Charge is the average cost to Cascade of each million gallons of water in the Cascade Block. The Cascade Volume Charge shall be calculated by dividing the projected annual cost of the Cascade Block calculated in accordance with Section 8.9.B, by the product of the Cascade Block and 365.

Cascade Water System. Tangible and intangible assets owned or operated by Cascade useable in connection with the provision of water supply.

Existing Supply System Facilities. Seattle Supply System assets as listed in Exhibit IV.

Existing Transmission System Facilities. Seattle Transmission System assets as listed in Exhibit V.

Firm Yield. The estimated amount of water that Seattle's Supply System can provide according to Seattle's supply reliability standard and expressed in annual average MGD. For purposes of this contract, Seattle's Firm Yield is 171 MGD, unless modified pursuant to Section 3.2.

Management Agreement. A written agreement, pertaining to subjects authorized by this Agreement, between the Director, Seattle Public Utilities, and the General Manager, Cascade Water Alliance.

MGD. Million gallons per day.

Party (ies). Seattle and/or Cascade, as well as their respective successors and assigns.

Peak Month. The consecutive thirty- (30) day period during a calendar year in which Cascade puts its maximum demand upon the Seattle Water System.

Peak Season. June 1 through September 30.

Points of Delivery. Specific metered delivery locations at which Seattle provides a defined level of service.

Rate of Return on Investment. The average cost of debt of the Seattle Water System plus 1.5 percent.

Seattle Water System. The Seattle Supply System as listed in Exhibit IV and the Seattle Transmission System as listed in Exhibit V together comprise the Seattle Water System.

Sub-regional Facilities. Any facilities owned and operated by Seattle that are not identified as Existing Supply System (Exhibit IV), Existing Transmission System (Exhibit V), or Cascade Sub-regional System (Exhibit VII).

ARTICLE III - SUPPLY

- 3.1 Each calendar year from the effective date of this Agreement through December 31, 2023, Seattle shall make available to Cascade 30.3 MGD Average Daily Demand (the "Cascade Block") based on the current Membership of Cascade as set forth in Exhibit III.
- 3.2 In the event the Firm Yield of the Seattle Supply System is reduced, the Cascade Block will be reduced in proportion to such reduction in Firm Yield only if the Firm Yield is reduced by order of a State or Federal regulatory agency with appropriate jurisdiction or as the result of updated climatic data utilized in the hydraulic model used to calculate Firm Yield. Cascade shall be notified of any potential change in Firm Yield as far in advance as possible, but in no event less than 180 days prior to the effective date of an adjustment to Firm Yield that affects the Cascade Block.
- 3.3 Seattle will supply the Cascade Block during the Peak Season and Peak Month as follows below and will be adjusted proportionately in relation to the decreases identified in Section 3.4:
- A. During the Peak Season Cascade demand shall not exceed 41.0 MGD
 - B. During the Peak Month Cascade demand shall not exceed 51.2 MGD
- 3.4 The Cascade Block shall be adjusted in accordance with the following schedule:
- A. Beginning January 1, 2024 through December 31, 2029 Seattle shall make available to Cascade 25.3 MGD Average Daily Demand;
 - B. Beginning January 1, 2030 through December 31, 2034 Seattle shall make available to Cascade 20.3 MGD Average Daily Demand;
 - C. Beginning January 1, 2035 through December 31, 2039 Seattle shall make available to Cascade 15.3 MGD Average Daily Demand;
 - D. Beginning January 1, 2040 through December 31, 2044 Seattle shall make available to Cascade 10.3 MGD Average Daily Demand;
 - E. Beginning January 1, 2045 through the termination date of this Agreement Seattle shall make available to Cascade 5.3 MGD Average Daily Demand.
- 3.5 At the conclusion of this Agreement, Cascade shall have the right to purchase up to 5.3 MGD for the sole purpose of serving Cascade Members that cannot be economically served by any other means than the Seattle Transmission System. The right to purchase up to 5.3 MGD shall be exercised by Cascade upon a minimum of one year's written notice to Seattle prior to the expiration of the Agreement, specifying the Block of water from zero to 5.3 MGD and the Cascade Members to be served by that Block.

- 3.6 All water supplied to Cascade under this Agreement is for the purpose of re-sale to Cascade Members and other customers of Cascade; provided that all water supplied under this Agreement must be used within the designated place of use of Seattle's water certificates, permits, or claims.
- 3.7 A. Before December 31, 2011, if an agency identified in Exhibit III becomes a Cascade Member, Seattle will release that agency from its obligations under its existing water supply contracts with Seattle in accordance with the provisions of such contract and the Cascade Block will be increased by the allocated amount of water identified in Exhibit III, with corresponding proportional increase to the adjusted Cascade Block in Sections 3.3 and 3.4. If that agency takes delivery of all or a portion of its water through a Sub-regional Facility, Cascade and Seattle shall enter into a Management Agreement for the costs of such facility prior to increasing the Cascade Block.
- B. Before December 31, 2011, if a Cascade Member, previously a Seattle wholesale customer, withdraws from Cascade and contracts for water supply directly with Seattle, Cascade will release that Member from its Membership Agreement in accordance with the provisions of such Agreement, and the Cascade Block will be decreased by the amount of allocated water identified in accordance with the provisions of such Agreement in Exhibit III, with corresponding proportional decrease to the adjusted Cascade Block in Sections 3.3 and 3.4. If that agency takes delivery of all or a portion of its water through a Cascade Sub-regional System Facility, Cascade and Seattle shall enter into a Management Agreement for the costs of such facility prior to decreasing the Cascade Block.
- 3.8 For the purpose of determining the consecutive 30-day period, which constitutes the Peak Month, a daily average delivery may be calculated so long as meter readings occur no fewer than 26 days apart. In such cases, daily average delivery shall be calculated by dividing the total deliveries by the actual number of days between meter readings. Periods less than 26 days shall not be applicable for determining the Peak Month.
- 3.9 Daily average delivery during the Peak Season may be calculated using meter readings taken closest to June 1 and September 30 each year and dividing the total delivery during such time by the actual number of days between meter readings. Periods less than 110 days shall not be applicable for determining the Peak Season.
- 3.10 Seattle shall endeavor to read the meters at all Points of Delivery on the same day. In the event that meters at all Points of Delivery cannot be read on the same day, all meter reads for that metering period shall be considered to occur on the day on which the meters measuring the majority of the Cascade volume for that metering period were read.
- 3.11 Normal operation of the water system includes the periodic shutdown of various facilities for routine maintenance, rehabilitation and replacement. Seattle and Cascade shall cooperate in the timing of such activities. Cascade shall not use such activities as evidence of the unavailability of supply or transmission services provided by Seattle under this Agreement so long as Seattle proceeds in good faith to restore such facilities to service.

- 3.12 Nothing in this Agreement, including, but not limited to, any penalties for exceedance of the Cascade Block, shall be construed to require Seattle to sell or deliver water in excess of the following amounts:
- A. Total deliveries during a calendar year in the amount of the Cascade Block multiplied by 365 days (366 in leap years);
 - B. Total deliveries during the Peak Season in the amount of the Cascade Block multiplied by 165 days;
 - C. Total deliveries during the Peak Month in the amount of the Cascade Block multiplied by 51 days;
 - D. Total deliveries during any consecutive 30-day period from October 1 to May 30 in the amount of the Cascade Block multiplied by 30 days;
 - E. Total deliveries during any consecutive 7-day period in the amount the Cascade Block multiplied by 13 days;
 - F. Total deliveries within any one-day period in the amount of the Cascade Block multiplied by 2 days.

Upon notice by Seattle of exceedance of these limits, Cascade must immediately reduce its deliveries of Seattle water. Upon the failure of Cascade to reduce its demand, Seattle may install and operate devices that limit deliveries to Cascade to these amounts, all at Cascade's expense.

ARTICLE IV - TRANSMISSION

- 4.1 Each calendar year during the term of this Agreement, Seattle shall sell to Cascade and Cascade shall purchase from Seattle capacity in the Seattle Transmission System according to the following terms and conditions:
- A. Seattle shall provide capacity sufficient to supply the Cascade Block to Cascade at Cascade's Points of Delivery. Adjustments in the Cascade Block shall result in an equivalent adjustment in Seattle's Transmission capacity commitment. The specific Points of Delivery that are to be adjusted and the adjustment for each Point of Delivery shall be determined by Management Agreement so long as a determination is made that there is no adverse impact on the overall Seattle Water System.
 - B. Points of Delivery are identified in Exhibit II. The location, hydraulic gradient and instantaneous flows at each Point of Delivery may be changed by Management Agreement.
 - C. Seattle shall supply water at the inlet side of each Point of Delivery meter at a hydraulic gradient no less than the minimum identified in Exhibit II provided that the instantaneous flow does not to exceed that set forth in the same exhibit. Seattle may change the minimum hydraulic gradient at any Point of Delivery once during any fifteen-year period, provided that four years prior notice is given to Cascade. Under emergency conditions or other unusual short-term operating situations Seattle shall not be obligated to meet minimum hydraulic gradients.

- D. Cascade may request additional Points of Delivery from the Seattle Transmission System, which Seattle may approve or reject at its sole discretion. Seattle shall establish the minimum hydraulic gradient for any new Point of Delivery at its sole discretion, after consultation with Cascade. Changes in Points of Delivery shall be determined by Management Agreement.
- E. No provision of this Agreement shall be construed to require Seattle to provide flows greater than those identified in Exhibit II. Upon notice by Seattle, Cascade shall immediately reduce Cascade deliveries at a Point of Delivery to not more than those identified in Exhibit II. In the event that Cascade is unwilling or unable to reduce deliveries as required under this provision, Seattle may install and operate flow restricting devices at non-compliant points of delivery, all at Cascade expense.
- 4.2 Cascade is served, in part, by transmission facilities referred to as the Cascade Sub-regional System listed in Exhibit VII. The costs of operating, maintaining, repairing and replacing these facilities shall be the responsibility of Cascade as outlined in Sections 8.6 and 8.7 below.
- 4.3 Nothing herein shall restrict Cascade's authority to construct an independent water transmission system for its own water supply.
- 4.4 Cascade Members have interties, listed in Exhibit I, with adjacent water utilities that are non-Cascade members. Any existing agreements related to the billing and meter reading arrangements for these interties are assumed as a part of this Agreement. If new interconnections between Cascade or Cascade Members and non-Cascade members require similar billing and meter reading arrangements, such arrangements shall be defined in an agreement to be entered into by Cascade, Seattle and the non-Cascade member.

ARTICLE V - WATER QUALITY

Seattle shall be responsible for water quality within the Seattle Water System, and it shall supply water to Cascade, that meets or exceeds federal and state drinking water quality standards, as those standards may change from time to time.

ARTICLE VI - CONSERVATION

Each Party is committed to the principles of water conservation and each intends to achieve its anticipated savings by implementing water conservation programs either unilaterally or in partnership with other agencies.

ARTICLE VII - PLANNING AND SHORTAGE MANAGEMENT

- 7.1 Each Party recognizes its obligation to plan for water supply and distribution in compliance with the State Department of Health water system planning regulations. Each Party shall develop a water system plan for its service area and the Parties shall coordinate those elements of overlapping responsibilities.

- 7.2 Cascade and Seattle shall coordinate the development, adoption and implementation of their respective Water Shortage Management Plans. Before invoking its Water Shortage Management Plan, the Parties shall communicate with each other concerning current and projected water supply conditions.
- 7.3 Seattle has negotiated agreements with federal agencies, state agencies and tribes for the long term preservation and enhancement of watersheds and in-stream beneficial uses and habitat. Such agreements have direct bearing on decisions to curtail the amount of water available for municipal and industrial water supply in any given season. Any water use restrictions imposed under the terms of such agreements shall be borne proportionately by Seattle, its other wholesale customers, and Cascade with respect only to the size of the Cascade Block at the time curtailment is required.

ARTICLE VIII - COST RECOVERY

- 8.1 The provisions of this Article shall apply to the establishment of fees and charges for water supply and related services beginning January 1, 2004. Prior to that date, the pricing provisions of each Cascade Members' individual water supply contract with Seattle shall be maintained.
- 8.2 For the purposes of allocating costs of water supply, there shall be two water supply cost pools consisting of an existing Seattle water supply assets cost pool ("Existing Supply Cost Pool") and a new Seattle water supply assets cost pool (the "New Supply Cost Pool").
- A. Existing Supply Cost Pool. The costs of infrastructure, including operation, maintenance, repair and replacement of Seattle Supply System Facilities listed in Exhibit IV shall be included in the Existing Supply Cost Pool
- B. New Supply Cost Pool. The costs of water supply resources developed in the future ("New Supply Resources") that expand the capacity of the Seattle Supply System, including the costs of the 1% conservation program from January 1, 2004 through 2010 shall be included in the New Supply Cost Pool. If any portion of a New Supply Resource project enhances reliability of Existing Supply Resources, the costs thereof may be allocated to the Existing Supply Cost Pool by Management Agreement.
- 8.3 For purposes of determining the cost of the transmission of water to the Wholesale Customers there shall be three transmission cost pools consisting of an existing transmission cost pool ("Existing Transmission Cost Pool"), a new transmission cost pool ("New Transmission Cost Pool"), and a Cascade transmission cost pool ("Cascade Sub-regional System Cost Pool").
- A. Existing Transmission Cost Pool. Costs to be allocated to the Existing Transmission Cost Pool shall consist of the following: operation, maintenance, repairs and replacements to the Seattle Transmission System Facilities listed in Exhibit V. Costs incurred for purposes of transmission reliability may be included in the Existing Transmission Cost Pool by Management Agreement.

- B. New Transmission Cost Pool. The cost of new transmission facilities shall be included in the New Transmission Cost Pool. A portion of the renewal, replacement or modification of existing transmission facilities which create an expansion of transmission capacity may be allocated to the New Transmission Cost Pool.
- C. Cascade Sub-regional System Cost Pool. The costs of operating, maintaining, repairing and replacing the Cascade Sub-Regional System Facilities owned by Seattle and listed in Exhibit VII shall be included in the Cascade Sub-regional System Cost Pool, in an amount proportionate to the use of the facilities by Cascade, together with any other costs Cascade and Seattle agree to include by Management Agreement. In the event that Cascade ceases to receive water through one or more of the facilities in the Cascade Sub-regional System, these facilities may be decommissioned at Seattle's sole discretion, and Cascade shall pay Seattle for the remaining Net Book Value of the decommissioned facilities in an amount proportionate to the use of the facilities by Cascade together with any decommissioning costs.

8.4 A. If Seattle determines that changing the location of a Cascade Point of Delivery is required for the improved operation of the Seattle Transmission System then such costs shall be included in the Existing Transmission Cost Pool. Seattle shall notify Cascade of any proposed changes to a Cascade Point of Delivery and consult with Cascade to ensure minimal impact on the affected Cascade Member's distribution system and appropriate coordination of operation and construction activities.

B. The costs of replacing, relocating, maintaining or improving Cascade Points of Delivery for any other reason than Section 8.4.A. shall be borne by Cascade regardless of the cause provided that such cause is consistent with AWWA and safety standards and practices. Costs will be invoiced and due in 30 days upon receipt or as otherwise provided for by Management Agreement. Seattle shall notify Cascade of any proposed improvements to a Cascade Point of Delivery and consult with Cascade to ensure minimal impact on the affected Cascade Member's distribution system and appropriate coordination of operation and construction activities.

8.5 Seattle shall maintain a cost accounting system consistent with the provisions of this Agreement and generally accepted accounting principles consistently applied in developing the financial information for determining the costs of construction, replacement, maintenance and operation of the facilities in each cost pool.

A. Asset Accounts. An asset account shall be maintained for each facility and within that account Seattle shall record the original cost of that facility plus betterments and less retirements.

B. Depreciation. Facilities shall be depreciated according to Standard Water System Asset Lives and a record of life-to-date depreciation shall be maintained for each facility. No depreciation shall be recorded in the first calendar year of operation of a facility. A full year's depreciation shall be recorded in every subsequent year.

- C. Net Book Value. The net book value of any facility shall be its original cost plus betterments and less retirements as recorded in its facility asset account, less life-to-date depreciation.

8.6 Costs in each cost pool shall be calculated as follows:

- A. Infrastructure Costs. Each cost pool shall include the infrastructure costs for its respective facilities, calculated on a utility, cash or other basis depending upon the facility and the cost pool as set forth below.
1. Utility Basis. The utility basis shall be used to calculate the infrastructure costs for all Existing Supply Facilities, all Existing Transmission Facilities, and all Cascade Sub-Regional System facilities, as well as their replacements and betterments. Under the utility basis, the infrastructure cost for a facility in any year shall be the sum of (i) the annual depreciation expense recorded for that facility and (ii) the product of the net book value of that facility and the Rate Of Return On Investment. At Seattle's discretion, interest costs may be considered current infrastructure costs during the construction of a facility. However, any such interest costs must then be considered contributions in aid of construction, and not included in the Net Book Value of the facility for purposes of calculating Utility Basis costs in future years.
- B. Operations Costs. The costs of operating the assets assigned to a cost pool shall be included in the cost pool. The annual operations costs of a cost pool shall be the labor, materials, equipment and other direct costs required for the operation and maintenance of the facilities in that cost pool, together with any net profit or expense from the disposition of facilities in that pool. Operations costs shall include the cost of general and administrative overhead applied in a manner consistent with its application to facilities construction projects.
1. Existing Supply Operations Costs. The parties agree that an efficient way of handling operations costs for the Existing Supply Cost Pool shall be as follows: The Operations Cost base in the Existing Supply Cost Pool for the year 2001 shall be \$17,780,262.00. In each succeeding year, the amount from the previous year shall be adjusted by the percentage change in the total cost of all the supply cost centers identified in Exhibit VI, except that the increase in treatment operations costs caused by the first full year start-up of the Cedar Treatment Plant at Lake Youngs in or around 2005 shall not be included in the percentage adjustment. Any increase in Cedar Treatment operations costs for the first full year of operation of the plant shall instead be added directly to the Operations Cost total from the prior year as adjusted by the index. For each year after the first full year of operation, increases in Cedar Treatment operations costs shall be included in the adjustment index.
 2. Existing Transmission Operations Costs. The parties agree that an efficient way of handling operations costs for the Existing Transmission Cost Pool shall be as follows: the Operations Costs base in the Existing Transmission Cost Pool for the year 2001 shall be \$4,531,931.00. In each succeeding year, the amount of these

costs from the previous year shall be adjusted by the percentage change in the total cost of all the transmission cost centers identified in Exhibit VI.

3. Cascade Sub-regional System Cost Pool Operating Costs. Cascade Sub-regional System Cost Pool Operating Costs shall include: (i) the actual costs of operating the facilities listed in Exhibit VII in proportion to the actual use of such facilities by Cascade; (ii) the electricity costs paid by Seattle after the effective date of this Agreement, in accordance with certain contracts effective on or before January 1, 2002 identified in Exhibit I, for pump stations owned and operated by Cascade Members and connected to the Tolt East Side Supply Line; and, (iii) any other costs approved by Management Agreement shall be Cascade Sub-regional System Cost Pool Operating Costs.

C. Disposition Costs. The costs of disposing of assets within a cost pool shall be included in the cost pool. Net disposition costs shall be calculated as follows:

1. Disposition under the Utility Basis. The net book value of the facility, less any sales, salvage, or other revenues derived from the disposition of that facility.

8.7 The costs in cost pools shall be allocated to Cascade as follows:

- A. Allocation of Existing Supply Cost Pool. Cascade shall pay one hundred two percent (102%) of the product of the Cascade Block and the costs in the Existing Supply Cost Pool divided by the Firm Yield.
- B. Allocation of New Supply Cost Pool. Cascade shall pay none of the costs in the New Supply Cost Pool.
- C. Allocation of Existing Transmission Cost Pool. Cascade shall pay one hundred two percent (102%) of the product of the Cascade Block and the costs in the Existing Transmission Cost Pool divided by the Firm Yield.
- D. Allocation of New Transmission Cost Pool. Cascade shall pay none of the costs in the New Transmission Cost Pool.
- E. Allocation of the Cascade Sub-regional System Cost Pool. Cascade shall pay costs in the Cascade Sub-regional System Cost Pool as follows:
 1. 100% of the costs associated with all facilities listed in Exhibit VII.A.
 2. A proportionate share of those facilities listed in Exhibit VII.B. based on flows of Cascade Members. Costs will be allocated based on Peak 7 Day flows through each segment. In the event that Peak 7 Day flow data is not available, Peak Month flows may be substituted.

8.8 Cascade shall pay the costs of penalties for exceeding the Cascade Block, as defined in Section 8.10 and any other costs requiring invoice by Seattle within 30 days of invoice by Seattle.

- 8.9 Cascade shall pay the annual costs allocated to Cascade in accordance with Section 8.7 as follows:
- A. Prospective Cost Estimate. Seattle may conduct a cost estimating study to revise estimates of the annual costs allocable to Cascade upon 120 days notice to Cascade. Cascade shall pay Seattle according to the estimated annual costs in such study, provided that not more than five years has elapsed from the time a study is conducted to the year in which the estimates from that study are used. Each study shall estimate the annual costs for not less than the five following years.
- B. Statement of Annual Costs. On or before December 1st of each year, Seattle shall notify Cascade of Cascade's annual cost for the next year. Such annual cost shall be the sum of the prospective cost estimate determined in accordance with Section 8.9A and the amount of excess or deficit identified in the most recent cost audit performed in accordance with Section 8.9D. On or before October 1st of each year Seattle shall provide Cascade with its best, non-binding estimate of the annual cost for the next year.
- C. Payment Distribution. On or before the last day of each month, Cascade shall pay Seattle that portion of Cascade's annual cost for that year, calculated pursuant to Section 8.9B, according to the following schedule:

January 5%
 February 5%
 March 6%
 April 6%
 May 6%
 June 12%
 July 13%
 August 15%
 September 13%
 October 7%
 November 6%
 December 6%

Overdue balances shall bear interest at the rate of 1% per month. In no event shall Cascade be required to pay Seattle a monthly payment during a year until at least 30 days after Seattle provides Cascade with a statement of annual costs for that year, and such payments shall not be considered overdue, until 30 days after such statement is provided to Cascade.

- D. Cost Audit. No later than August 1 of each year, Seattle shall provide a statement of actual costs allocated to each cost pool and other costs and revenues received during the prior year, which statement shall be examined by an external auditor in an "agreed-procedures" engagement. In addition, Cascade may have the statement audited by an external auditor of its choice, solely at Cascade's expense. This statement shall clearly identify the amount by which payments made by Cascade during the prior year were in excess of, or insufficient to meet the actual costs allocable to Cascade for the prior year.

This surplus or deficit shall earn interest at the Rate of Return on Investment, and shall be reduced in accordance with Section 8.9B. No later than December 31 of the year following the termination of the contract, any remaining surplus or deficit balance shall be paid in cash by the party owing the balance to the party to whom the balance is owed.

- E. Payment from Gross Revenues. Cascade shall pay the charges out of its gross revenues. Cascade's payments to Seattle pursuant to this Agreement and payments otherwise required or provided for by this Agreement shall be maintenance and operation expenses of Cascade, payable prior to and superior to any charge or lien of any revenue bond issued by Cascade that are payable from the revenues of Cascade. Cascade shall establish rates and collect fees and charges for wholesale water service sufficient to pay for the maintenance and operation of its Water Supply System, including payments to Seattle, and the principal and interest on any and all Cascade revenue obligations that constitute a charge against the revenue of Cascade.
- F. Emergency Surcharge. In the event of a catastrophe or other extraordinary condition that requires emergency expenditures to maintain a sufficient water supply, Seattle may impose an emergency surcharge proportionately on all of its retail and wholesale customers, including Cascade in order to pay for such expenditures. Any such emergency surcharge shall be presented to Cascade prior to adoption by Seattle. Seattle shall consider Cascade's comments but shall nevertheless have the full authority to adopt the charge.
- 8.10 A. Charges will be imposed for exceeding the Cascade Average Annual, Peak Season or Peak Month Block limitations. These charges will be determined through the application of multipliers to the Cascade Volume Charge. The charge for exceeding the Cascade Block, Peak Month or Peak Season shall be calculated by (1) multiplying the Cascade Volume Charge by the appropriate factor in the following table, (2) multiplying by the amount of the exceedance (in MGD) and (3) multiplying by the actual number of days in the year, Peak Month or Peak Season, whichever is applicable.

Category	0 to 1 MGD	>1 to 3 MGD	>3 MGD
Annual Average Daily Demand	1.0	1.1	1.2
Peak Month Demand	1.5	9.1	16.7
Peak Season Demand	1.5	3.1	4.7

- B. In the event that the Cascade Block, Peak Season or Peak Month limitations are exceeded in 2 or more years during any consecutive five-year period, the following charges apply:

Category	0 to 1 MGD	>1 to 3 MGD	>3 MGD
Annual Average Daily Demand	1.0	1.2	1.2
Peak Month Demand	1.5	16.7	16.7
Peak Season Demand	1.5	4.7	4.7

C. In the event of a charge for exceeding the block occurs in more than one category in either a single year or in multiple years during any consecutive five-year period, only the category that results in the highest charge will be assessed.

8.11 Except in the case of an emergency, the provisions of Section 8.10 shall be applied reciprocally to Seattle to calculate credits to Cascade, should Seattle fail to deliver the Cascade Block as required by this Agreement.

ARTICLE IX - ADMINISTRATION

- 9.1 Seattle shall own and maintain appropriate metering devices to measure the water flowing from the Seattle Water System to each Point of Delivery. At Cascade's request and sole expense, Seattle will install and maintain equipment selected by Cascade and approved by Seattle to transmit signals to recording equipment of Cascade or its Members (located elsewhere) of the amount of water delivered, as measured by Seattle's meters.
- 9.2 As of the end of the calendar year immediately following the effective date of this Agreement and following a change in Cascade Membership through 2011, Seattle shall prorate the balances in the Purveyor Balance Accounts among its contract Purveyors (1982 Water Purveyor Contract, Version A or B) and transfer to Cascade the pro rated balance of each Purveyor that is a Cascade Member, provided that such transfer shall occur only once for each Cascade Member.
- 9.3 Seattle shall keep full and complete books of accounts for the Seattle Water Supply System and Seattle's retail distribution system in compliance with current standards required by the State Auditor. Cascade, at its own expense, may at any time audit Seattle's book of accounts using the services of a public accounting firm and Seattle shall make the books and records of the Seattle Water System and Seattle's retail distribution system available to such auditors during reasonable business hours upon reasonable notice at the place where such records are normally kept. Seattle shall provide adequate facilities; i.e., room and workspace, so the audit can be performed. Seattle shall have reciprocal rights to audit Cascade books and accounts.
- 9.4 This Agreement shall be interpreted according to the laws of the State of Washington and the venue for any litigation between the Parties concerning its terms shall be in the Superior Court of King County at Seattle. The Parties shall be entitled to specific performance of the terms of this Agreement.
- 9.5 This Agreement shall inure to the benefit of and be binding upon successors of interest and assigns of the Parties. Neither this Agreement nor obligations to perform hereunder may be voluntarily assigned by either Party without the other Party's written consent, which shall not be unreasonably withheld; provided however, that a change in Cascade's corporate form; e.g., from interlocal organization to another form of organization authorized by Washington law, shall not be considered an assignment. Seattle may not convey the Seattle Water System or its component parts without providing for an assumption of this Agreement and the obligations contained herein by the conveyee. The Parties do not intend

to confer rights or benefits upon any third party. Only a writing executed by the Parties may modify this Agreement.

- 9.6 All notices relating to this Agreement shall be sent to the following addresses, certified mail, return receipt requested, unless the other Party is previously notified in writing of a change in recipient or address:

To Seattle:	To Cascade:
Director	General Manager
Seattle Public Utilities	Cascade Water Alliance
700 Fifth Avenue, 49 th Fl.	1400 112th Ave SE, Suite 220
Seattle, WA 98104	Bellevue, WA 98004

- 9.7 If any provision of this Agreement or its application is determined by a court of law to be illegal, invalid, or void without rendering performance of this Agreement impossible or infeasible, then the Parties intend that the validity of the remaining provisions of this Agreement or their application shall not be affected and shall continue in full force and effect.
- 9.8 This Agreement is a contract for the purchase and sale of water and transmission services related to that water and no provision hereof shall be construed to make the Parties partners or joint ventures. Neither Party is the agent of the other nor shall either Party be held liable for the acts of the other on a theory of agency or any other representative capacity.
- 9.9 In the event of default of any provision of this Agreement, the non-defaulting Party shall issue written notice to the other Party setting forth the nature of the default. If the default is for a monetary payment due hereunder, the defaulting Party shall have thirty (30) days to cure the default. In the event of other defaults, the defaulting Party shall use its best efforts to cure the default within ninety (90) days. If such default cannot be reasonably cured within such ninety (90) day period, the defaulting party shall, upon written request prior to the expiration of the ninety (90) day period be granted an additional sixty (60) days to cure the default.
- 9.10 In the event of a default in payment by Cascade, Seattle shall have the right to compensation from the constituent Cascade Members up to the proportionate share of each Member's use of the Cascade Block which in the first 15 months of the Agreement shall be established by Exhibit III, and thereafter by the most recent annual report of Cascade Member's proportionate use of the Cascade Block, which proportionate use shall total 100 percent of the Cascade Block. Cascade's annual proportionate use report shall be completed and delivered to Seattle no later than March 31 of each year. Each Cascade Member must acknowledge and accept this individual, contingent liability to Seattle in writing at the time that Cascade enters into this Agreement. Those agencies that later join Cascade in accordance with Section 3.4A shall convey such written acknowledgment to Seattle within one month of joining Cascade. Should any Cascade Member required to do so fail to convey such written acknowledgement, Seattle shall have the unilateral right, upon written notice to Cascade, to reduce the Cascade Block by the amount allocated to such Cascade Member as set forth in Exhibit III, or by Cascade's most recent annual proportionate use report, until such written acknowledgement is provided to Seattle.

- 9.11 Upon entering into this Agreement, or upon later becoming a Cascade Member, each water utility that is listed in Exhibit III thereby relinquishes its then existing Seattle wholesale contract and the terms and conditions of that contract shall have no further force or effect as to those utilities that are or become Cascade Members.

ARTICLE X - TECHNICAL COMMITTEE

Technical Committees comprising Seattle staff and other affected parties will address day to day operational issues related to the Seattle Water System. Finance cost and rate issues will be addressed independently between the Director of Seattle Public Utilities and the General Manager of Cascade Water Alliance, or their respective designees as provided for in written notice to the other. It is recognized that daily operation of the Seattle Water System may require direct communication between Seattle staff and the staff of the Cascade Members.

ARTICLE XI - DISPUTE RESOLUTION

- 11.1 Cascade and Seattle shall make good faith efforts to resolve by informal discussion any dispute arising under or in connection with this Agreement. If at any time a Party to a dispute determines that such informal discussions will not result in a resolution, such Party may initiate non-binding mediation of any dispute arising under or in connection with this Agreement. Within ten (10) days of receiving written notice of initiation of non-binding mediation by one or both Parties, each Party shall designate in writing not more than five (5) candidates it proposes to act as a non-binding mediator. The Parties shall within an additional five (5) days select one of the mediators from either list to serve as mediator. Should the parties be unable to agree upon a mediator, a mediator shall be chosen from one of the two lists by the presiding judge of the King County Superior Court at Seattle. Upon selection of the mediator, the Parties shall use reasonable efforts to resolve the dispute within thirty (30) days with the assistance of the mediator. The cost of mediation shall be shared by Cascade and Seattle equally.
- 11.2 If mediation fails to resolve the dispute within thirty (30) days of selection of the mediator, the Parties may thereafter seek redress in court.
- 11.3 Pending the decision in any mediation or litigation process pursuant to this section, the Parties to such process shall continue to fulfill their respective duties under this Agreement.

ARTICLE XII - EMERGENCY EVENTS

- 12.1 The Parties recognize that unforeseen and unavoidable events may occur which would require Seattle to act unilaterally for what it deems to be in the best interest of the general public served by the Seattle Water System; including water shortages resulting from drought circumstances and temporary reduction in water supply associated with turbidity events. Upon the occurrence of an unforeseen or unavoidable event, Seattle shall, to the extent practicable, treat its wholesale and retail customers equally and any curtailment of supply shall be imposed proportionately among those customers. This authority to act

unilaterally carries with it a unilateral responsibility of Seattle to restore, expeditiously, the Seattle Water System to its pre-emergency capability to supply the region.

12.2 Upon occurrence of an unforeseen or unavoidable event that adversely impacts the Cascade Water System, Cascade may request Seattle to temporarily modify or suspend operational or supply provisions of this Agreement and Seattle shall make reasonable efforts to grant such request. Cascade will act expeditiously to restore the Cascade Water System to its pre-emergency capability.

12.3 The time periods for Seattle's performance under any provisions of this Agreement shall be extended for a reasonable period of time during which Seattle's performance is prevented, in good faith, due to fire, flood, drought, turbidity events, earthquake, lockouts, strikes, embargoes, acts of God, war and civil disobedience. If this provision is invoked, Seattle agrees to immediately take all reasonable steps to alleviate, cure, minimize or avoid the cause preventing such performance.

ARTICLE XIII - EXHIBITS

Exhibits I through VII are attached hereto and are hereby incorporated by reference into the Agreement as if set forth in full herein.

ARTICLE XIV - COMPLETE AGREEMENT

This Agreement represents the entire agreement between the parties concerning the subject matter hereof. This Agreement may not be amended except as provided in Section 9.5.

THE CITY OF SEATTLE, a municipal corporation

By: Charles Olanich
DIRECTOR, SEATTLE PUBLIC UTILITIES

DATE: 12/15/03

THE CASCADE WATER ALLIANCE, a nonprofit corporation

BY: [Signature]
CHAIR, BOARD OF DIRECTORS

DATE: 12/17/03

EXHIBIT I**Other Agreements**

- A. List of documents, commitments, adjustments, reductions, agreements, and/or written approvals by Seattle regarding the supply, purchase and/or resale of water according to Section 4.4 of this Agreement:
1. Interties and associated agreements with other agencies as referenced in Section 4.4:
 - a) Redmond/Union Hill Water Association Water Service Agreement
 - b) Redmond/Union Hill Water Association Agreement for Water System Interties
 - c) Redmond/Woodinville Water District Interlocal Agreement
 - d) Redmond/Woodinville Water District Agreement for Water System Interties
 - e) Redmond/Northeast Sammamish Water & Sewer District Agreement for Water System Interties
 - f) Skyway / WD 25
 - g) Bellevue/Coal Creek
 2. Other pertinent Agreements:
 - a. List of electric contracts for pump stations owned and operated by Cascade Members and connected to the Tolt Eastside Supply Line according to Section 8.6.B.3 of this Agreement:
 1. Between the City of Bellevue and the City of Seattle, effective August 1983, pursuant to Ordinance #111276 for SE 28th pumping station (50% / 50%) and N.E. 8th pumping station (Bellevue 60% / Seattle 40%)

**POINTS OF DELIVERY, MINIMUM HYDRAULIC GRADIENTS, AND MAXIMUM
FLOW RATES OF WATER SUPPLIED**

METER SERVICE				MINIMUM HYDRAULIC GRADIENT AT STATION UPSTREAM OF METER (FEET NAVD-88 Datum)	FLOW UP TO WHICH THE MINIMUM HYDRAULIC GRADIENT IS GUARANTEED (gpm)
LOCATION	STATION NUMBER (1)	PIPELINE SEGMENT NUMBER(1)	SIZE OF METER (IN.)		
Bellevue (* Redmond)					
132 nd Ave. SE & SE 26 th Street	59	8	8	425	1,300
128 th Ave. SE & Newport Way	56	8	8	435	850
Mercer Is. Pipeline & 108 th Ave. SE	66	9	8	420	700
140 th Ave. NE & 40 th Street	65	2	10	500	3,500
132 nd Ave. NE & NE 14 th St.	62	2	12	470	4,500
132 nd Ave. NE & NE 24 th Street	63	2	10	455	4,500
152 nd Ave. NE & NE 8 th Street	61	2	24	460	3,500
145 th Pl. SE & SE 28 th Street	58	3	12	470	3,000
14509 SE Newport Way (2)	60	3	10	525	4,600
14509 SE Newport Way (6)(7)	TBD	3	10	525	2,900
128 th Ave SE & SE 56 th ST (3)	47	8	8	440	Backup to Sta. 55 (3)
128 th Ave SE & Newport Way (3)	55	8	6	435	800
120 th Ave SE & SE 35 th ST (3)	46	9	6	425	Backup to Sta. 124 (3)
1-90 & Lake Washington Boulevard (3)	50	9	6	425	Fire flow backup only
124 th Ave SE & SE 38 PL (3)	124	9	8	425	1,500
128 th Ave SE & SE 70 th ST (4)	52	8	12	445	1,020

METER SERVICE					MINIMUM HYDRAULIC GRADIENT AT STATION UPSTREAM OF METER (FEET NAVD-88 Datum)	FLOW UP TO WHICH THE MINIMUM HYDRAULIC GRADIENT IS GUARANTEED (gpm)
LOCATION	STATION NUMBER (1)	PIPELINE SEGMENT NUMBER (1)	SIZE OF METER (IN.)			
Kirkland / Redmond						
132 nd Ave. NE & NE 113 th Street	74	1	10		555	4,500
132 nd Ave. NE & NE 85 th Street	75	1	16		535	4,080
140 th Ave. NE & NE 70 th Street	72	2	12		520	1,240
Redmond						
160 th Ave NE & NE 104 th Street	165	28	10		515	1,000 (combined with following planned new location)
NE 172 nd Street & Toit Pipeline No. 2	TBD	28	TBD		515	planned new location
Trilogy Parkway NE & NE 125 Street	164	26	10		610	2,000 (combined with following planned additional meter)
Trilogy Parkway NE & NE 125 Street	TBD	26	10		610	Planned additional meter
Skyway						
84 th Ave. S & S 134 th Street	1	10	6		455	210
Beacon Ave S & S 124 th Street	5	10	8		455	720
Cornell Ave S & S 112 th Street	172	4	6		375	Backup service
Tukwila						
39 th Ave S & S 112 Street	11	15	10		460	Backup service
South Center Parkway & Tukwila Parkway	13	13	10		460	2,200
West Valley Hwy & S 162 nd Street	14	13	8		460	Backup emergency service
Christensen Rd. & Baker Rd	15	13	8		460	480

METER SERVICE				MINIMUM HYDRAULIC GRADIENT AT STATION UPSTREAM OF METER (FEET NAVD-88 Datum)	FLOW UP TO WHICH THE MINIMUM HYDRAULIC GRADIENT IS GUARANTEED (gpm)
LOCATION	STATION NUMBER (1)	PIPELINE SEGMENT NUMBER⁽²⁾	SIZE OF METER (IN.)		
53 rd Ave S & S 160 th Street	16	13	6	460	20
E Marginal Way & S 112 th Street	168	15	12	445	810
51 st Ave S & S Leo Street	169	12	8	455	60
W. Marginal Place & s 102 nd St.	170	5	12	300	80
47 th Ave S & S Victor Street	173	12	6	425	Backup service
TOTAL:					50,070

Notes:

- (1) Station and Pipeline Segment Numbers pertain to the Demand Metering program.
- (2) Assumes existing 16-inch sonic meter is replaced with a 10-inch Protectus meter as planned.
- (3) These stations to be fully transferred from Coal Creek Utility District to Bellevue.
- (4) This station supplies to Coal Creek Utility District directly. Assumes Coal Creek sub-meters 40 percent of total flow (average, peak) through this station to Bellevue.
- (5) Maximum combined flow of primary and backup stations shall not exceed the flow for the primary station as shown on this Exhibit.
- (6) Assumes a new 10-inch Protectus meter is installed as planned.
- (7) If another supply source of equal or higher capacity is provided into the Issaquah - Sammamish Plateau area by any party other than Seattle to serve Cascade members, Seattle's supply obligation at this station will terminate. Seattle's delivery obligation at this station is not transferable to any other station.

EXHIBIT III

BLOCK ALLOCATIONS BY INDIVIDUAL WATER UTILITIES
As Measured at the Meter (Net of 2% Transmission Losses)

	Annual Block	Peak Season Factor	Peak Season Block	Peak Month Factor	Peak Month Block
CWA	30.3		41.0		51.2
Existing Purveyors	30.28		41.02		51.23
Bellevue	17.67	1.35 a, b	23.85	1.70 f, b	30.04
Kirkland	4.40	1.35 a, b	5.94	1.70 f, b	7.48
Redmond	4.56	1.35 a, b	6.16	1.70 f, b	7.75
Skyway	0.48	1.12 a, c	0.54	1.32 f, c	0.63
Tukwila	3.17	1.43 a	4.53	1.68 f	5.33
New Purveyors	0.00		0.00		0.00
Covington	0.00	1.24 e	0.00	1.45 e	0.00
Issaquah	0.00	1.24 e	0.00	1.45 e	0.00
Sammamish Plateau	0.00	1.24 e	0.00	1.45 e	0.00
NON-CWA					
Existing Purveyors	42.38		54.86		68.30
Bothell	1.62	1.42 a	2.30	1.78 g	2.88
Cedar River	2.83	1.45 a	4.10	2.08 f	5.89
Coal Creek	0.94	1.42 a	1.33	1.90 f	1.79
Duvall	0.83	1.34 a	1.11	1.66 f	1.38
Edmonds	0.00	1.00	0.00	1.00	0.00
Highline	6.89	1.22 a	8.41	1.45 f	9.99
Mercer Island	2.15	1.44 a	3.10	1.86 f	4.00
Northshore	6.05	1.31 a	7.93	1.64 f	9.92
Olympic View	1.02	1.14 a	1.16	1.53 f	1.56
Shoreline	1.91	1.24 a	2.37	1.55 f	2.96
Soos Creek	4.62	1.17 a	5.41	1.27 f	5.87
Woodinville	5.57	1.42 a	7.91	1.84 f	10.25
WD 20	2.73	1.22 a, d	3.33	1.47 f, d	4.01
WD 45	0.30	1.22 a, d	0.37	1.47 f, d	0.44
WD 49	1.39	1.22 a	1.70	1.39 f	1.93
WD 85	0.11	1.22 a, d	0.13	1.47 f, d	0.16
WD 90	0.93	1.27 a	1.18	1.67 f	1.55
WD 119	0.42	1.16 a	0.49	1.62 f	0.68
WD 125	2.07	1.22 a, d	2.53	1.47 f, d	3.04

- Notes:**
- Based on water purchased from Seattle in 1998, which was the year in the period from 1994 to 2000 with the highest total system peak season factor. Billing data from May 22-Sept 22, 1998, was used to compute the factors.
 - Total average peaking factor for Bellevue, Kirkland and Redmond, since Redmond purchases Seattle water from Bellevue and Kirkland.
 - Based on total from Bryn Mawr and Skyway, which merged in 2001.
 - Total average peaking factor for W.D. 20, 45, 85, and 125, since these water districts operate as a consortium.
 - System average
 - Based on water purchased from Seattle in 1998, which was the year in the period from 1994 to 2000 with the highest total system peak month factor. Demand Metering data and Allocation Factor calculations for July 17-August 15, 1998, was used to compute the factors.
 - Because of possible metering errors during the peak month for Bothell in 1998, peak month factor is based on August purchases from Seattle in 2000.

EXHIBIT IV**Seattle Supply System Facilities****1. Cedar Source**

- All roads, buildings, structures, water supply facilities, recreational and educational facilities, and fisheries enhancement and mitigation facilities located within or close to the Cedar River Hydrographic Watershed boundary as defined by Seattle land ownership, including the land itself, and any capitalized studies related to the above. Excepted are facilities solely owned by Seattle City Light for the purpose of power generation. Facilities shared by Seattle City Light and Seattle Public Utilities shall be part of the Seattle Supply System only to the extent of SPU share or responsibility.
- All facilities located within the Lake Youngs Reservation as defined by Seattle ownership of the land except for conveyance facilities used to transport finished water during non-emergency operation
- All facilities located within the Lake Youngs Aqueduct, the Landsburg Tunnel, and the Lake Youngs Supply Lines right-of-way, including the right-of-way itself
- Existing Morse Lake Floating Pump Stations

2. Tolt Source

- All roads, buildings, structures, water supply facilities, recreational and educational facilities, and fisheries enhancement and mitigation facilities located within or close to the South Fork Tolt River Hydrographic Watershed boundary as defined by Seattle land ownership, including the land itself, and any capitalized studies related to the above. Excepted are facilities solely owned by Seattle City Light for the purpose of power generation. Facilities shared by Seattle City Light and Seattle Public Utilities shall be part of the Seattle Supply System only to the extent of SPU share or responsibility.
- Tolt Treatment Facility

3. Highline Wellfield

- Riverton Wells, including all pumping and treatment equipment, original yard piping, to the connection to CRPL4, and the low flow piping to Riverton Reservoir
- Boulevard Well, including all pumping and treatment equipment, and all piping up to the connection to CRPL4

4. Other

-
- One Percent Conservation Program through December 31, 2003
- Commercial Incentive Program through December 31, 2003
- Commercial Toilet Retrofit Program through December 31, 2003
- Showerhead retrofit Program through December 31, 2003
- The Seattle Forecasting Model (SEAFM Model)
- GIS Projects related to facilities identified herein as part of the Seattle Supply System

EXHIBIT V**Seattle Transmission System Facilities****1. Pipelines**

- Tolt Pipeline No. 1 from the outlet of the Tolt Treatment Facility (TTF) to Lake Forest Reservoir, including any transfer and ancillary small diameter parallel pipes (*Note: Includes TPL1 and TPL2 between the Reg. Basin and TTF in Supply!*)
- Tolt Pipeline No. 2 (where constructed), including any transfer and ancillary small diameter parallel pipes
- Tolt Tieline
- Tolt Eastside Supply Line (from TESS Junction to the intersection of SE 16th ST and 145th Place SE)
- Tolt Eastside Line Extension (from the intersection of SE 16th ST and 145th Place SE to Eastside Reservoir)
- The 540 head Pipeline from Maple Leaf Reservoir to Lake Forest Reservoir
- Lake Youngs Bypass No. 4 from the outlet of each of the Cedar Treatment Facility clearwells to Control Works
- Lake Youngs Bypass No. 5 from the outlet of each of the Cedar Treatment Facility clearwells to the Lake Youngs Tunnel
- The Lake Youngs Tunnel (from the original lake outlet to Control Works)
- The Maple Leaf Pipeline (from the intersection of 18th Avenue E. and E. Prospect Street to Maple Leaf Reservoir)
- Cedar River Pipeline No. 1 from Control Works to the intersection of 18th Avenue E. and E. Prospect Street
- Cedar River Pipeline No. 2 from Control Works to the intersection of 12th Avenue E. and E. Olive Street
- Cedar River Pipeline No. 3 from Control Works to the intersection of 18th Avenue E. and E. Prospect Street
- 30" intertie between Cedar River Pipelines 2 and 3 in east Olive Street
- Cedar River Pipeline No. 4 from Control Works to the West Seattle Pipeline
- Cedar Eastside Supply Line (from the Cedar Wye to the intersection of SE 16th St and 145th Place SE)
- West Seattle Pipeline from Augusta Gatehouse to Cedar River Pipeline 4
- The 8th Avenue S. Pipeline between S. 146th Street and S. 160th Street
- The Bow Lake Pipeline (between 8th Avenue S. and CRPL 4, and as relocated outside runways at Seatac Airport)
- The Burien Feeder (in S. 146th Street between 8th Avenue S. and CRPL 4)
- The Fairwood Line (between Fairwood Pump Station and Soos Reservoirs)
- The 24-inch discharge pipeline of Lake Youngs Pump Station up to Soos Reservoirs
- The 12-inch discharge pipeline of Lake Youngs Pump Station up to Soos Reservoirs
- The 630 head pipeline between Lake Youngs Pump Station and the Cedar River WSD pump station at the eastern boundary of the Lake Youngs Reservation

EXHIBIT V (cont.)

2. Reservoirs, Tanks, and Standpipes, including overflow pipes, all valves, appurtenances, and disinfection facility located on the premises of each storage facility, unless otherwise noted

- Lake Forest Reservoir
- Eastside Reservoir
- Riverton Reservoir
- Maple Leaf Reservoir (excluding Roosevelt Way Pump Station and its suction and discharge piping, Maple Leaf Tank and 520 zone piping, except where solely serving the disinfection facility)
- Soos Reservoirs

3. Pump Stations, Major Valve Structures, and other Facilities

- TESS Junction Pump Station
- Lake Hills Pump Station
- Maplewood Pump Station
- Maple Leaf Pump Station
- Bothell Way Pump Station
- Fairwood Pump Station
- Lake Youngs Pump Station
- The Control Works
- Augusta Gatehouse
- Eastgate Pump Station

The facilities include the appurtenances to the transmission lines including but not limited to rights of way, line valves, system meters and remote automation devices. The facilities also include the existing meters, vaults and related equipment at all wholesale points of delivery to the extent that the costs of such meters, vaults and related equipment were unamortized as of December 31, 2003. New and replacement meter installations shall be treated consistent with Section 8.4B.

EXHIBIT VI**Cost Centers Used for Operations Cost Indices**

The following costs centers or successor cost centers that capture the direct costs of operation of Existing Supply Facilities, Existing Transmission Facilities and the 1% Program shall be used as the indices for operations cost in the Existing Supply Cost Pool, Existing Transmission Cost Pool and for the 1% Program in the New Supply Cost Pool.

Supply

Program	Project	Project Name	Activity
Communications	N1203	Communications Activity Group	N120304 Purveyor Relations
Audit & Accounting	N3303	Customer Audit	N330303 Purveyor Audit
Watershed Management	N5401	Program Management	N540194 Department Support
Watershed Management	N5401	Program Management	N540195 General Expense
Watershed Management	N5401	Program Management	N540196 General Management
Watershed Management	N5401	Program Management	N540197 Training
Watershed Management	N5401	Program Management	N540198 Safety
Watershed Management	N5401	Program Management	N540199 Personnel
Watershed Management	N5401	Program Management	N540289 Capital Purchase
Watershed Management	N5403	Support Services	N540301 Modified Duty
Watershed Management	N5403	Support Services	N540302 Procuring/Paying/Receiving
Watershed Management	N5403	Support Services	N540303 Vehicle Equipment Downtime
Watershed Management	N5404	Watershed Protection	N540401 Hydrological Data Collection
Watershed Management	N5404	Watershed Protection	N540402 Fire Protection
Watershed Management	N5404	Watershed Protection	N540403 Inspection
Watershed Management	N5404	Watershed Protection	N540404 Boundaries
Watershed Management	N5405	Facility Management	N540501 WS Grounds
Watershed Management	N5405	Facility Management	N540502 WS Buildings
Watershed Management	N5405	Facility Management	N540503 WS Facilities & Roads
Watershed Management	N5406	Watershed Road Maintenance	N540601 Grade/Gravel/Ditching
Watershed Management	N5406	Watershed Road Maintenance	N540602 Bridges/Streams Culvert
Watershed Management	N5406	Watershed Road Maintenance	N540603 Roads/Row/Vegetation Cutting
Watershed Management	N5406	Watershed Road Maintenance	N540604 Tolt Roads & Streams
Watershed Management	N5407	Watershed Operations Support	N540701 Veh/Equipment Management
Watershed Management	N5407	Watershed Operations Support	N540702 Veh/Equip/Tool Repair
Watershed Management	N5408	Water Quality & Hydrology	N540801 Water Quality Monitoring
Watershed Management	N5408	Water Quality & Hydrology	N540802 Hydrological Monitoring
Watershed Management	N5409	Public/Cultural Programs	N540901 Recreation Planning
Watershed Management	N5409	Public/Cultural Programs	N540902 Management & Research
Watershed Management	N5409	Public/Cultural Programs	N540903 Watershed Education
Watershed Management	N5409	Public/Cultural Programs	N540904 Watershed Public Information
Watershed Management	N5410	Wildlife & Fisheries Programs	N541001 Program Planning & Evaluation
Watershed Management	N5410	Wildlife & Fisheries Programs	N541002 Interagency/Public Involvement
Watershed Management	N5410	Wildlife & Fisheries Programs	N541003 Ecological Monitoring & Research
Watershed Management	N5410	Wildlife & Fisheries Programs	N541004 Habitat & Species Inventory
Watershed Management	N5410	Wildlife & Fisheries Programs	N541005 Habitat Enhancement/Restoration
Watershed Management	N5411	Resource Information Mgmt	N541101 Program Plan/Evaluation
Watershed Management	N5411	Resource Information Mgmt	N541102 Information Maintenance
Watershed Management	N5411	Resource Information Mgmt	N541103 Information Services
Watershed Management	N5412	Special Projects	N541202 Silviculture
Watershed Management	N5412	Special Projects	N541205 Land Exchanges/Acquisitions

50-Year Declining Block Water Supply Agreement

Program	Project	Project Name	Activity
Watershed Management	N5415	Cedar HCP	N541501 ASSESS OF EXPAND FOREST STAND
Watershed Management	N5415	Cedar HCP	N541502 ASSESS EXPAND FOREST ATTRIBUTE
Watershed Management	N5415	Cedar HCP	N541503 AUGMENT FOREST HABITAT INV
Watershed Management	N5415	Cedar HCP	N541504 LONG-TERM FOREST HABITAT
Watershed Management	N5415	Cedar HCP	N541505 OLD-GROWTH CLASSIFICATION
Watershed Management	N5415	Cedar HCP	N541506 RIPARIAN RESTOR PROJECT MONIT
Watershed Management	N5415	Cedar HCP	N541507 UPOLAND FOREST RESTOR PROJ MONT
Watershed Management	N5415	Cedar HCP	N541515 GIS DATA COMPATIBILITY STUDY
Watershed Management	N5415	Cedar HCP	N541516 FOREST HABITAT MODELING
Watershed Management	N5415	Cedar HCP	N541517 SPECIE HABITAT RELATION MODEL
Watershed Management	N5416	Cedar HCP	N541601 CRHCP GIS SUPPORT
Watershed Management	N5416	Cedar HCP	N541603 CRHCP TECHNICAL SUPPORT
Watershed Management	N5417	Cedar HCP	N541701 ROAD MAINTENANCE
Watershed Management	N5418	Cedar HCP	N541801 EXPERIMENTAL STREAM MONITORING
Watershed Management	N5418	Cedar HCP	N541802 LONG-TERM STREAM MONITORING
Watershed Management	N5418	Cedar HCP	N541803 AQUATIC RESTORATION MONITORING
Watershed Management	N5418	Cedar HCP	N541804 BULL TROUT SURVEYS (ADULT)
Watershed Management	N5418	Cedar HCP	N541805 BULL TROUT SPAWNING SURVEY
Watershed Management	N5418	Cedar HCP	N541806 BULL TROUT FRY/JUVENILE SURVEY
Watershed Management	N5418	Cedar HCP	Riparian Zone Studies
Watershed Management	N5418	Cedar HCP	N541809 BULL TROUT STREAM DISTRIBUTION
Watershed Management	N5418	Cedar HCP	N541810 BULL TROUT REDD INUNDATION STU
Watershed Management	N5418	Cedar HCP	N541811 COMMON LOON MONITORING
Water Quality & Supply	N5503	Water System Operations	N550301 Water Management
Water Quality & Supply	N5503	Water System Operations	N550302 Water System Control
Water Quality & Supply	N5503	Water System Operations	N550303 Anadromous Fishery Mgmt
Water Quality & Supply	N5503	Water System Operations	N550304 SCADA Management
Water Quality & Supply	N5503	Water System Operations	N550305 Highline Well Field
Water Quality & Supply	N5503	Water System Operations	N550306 Morse Lake PS
Water Quality & Supply	N5503	Water System Operations	N550307-SAFETY PROCESS MGMT COMPLIANCE
Water Quality & Supply	N5503	Water System Operations	N550308-EPA RISK MGMT COMPLIANCE
Water Quality & Supply	N5504	Water System Analysis	N550401 Eng Analysis/Modeling
Water Quality & Supply	N5504	Water System Analysis	N550402 Water Rights Mgmt
Water Quality & Supply	N5504	Water System Analysis	N550403 DEMAND METERING
Water Quality & Supply	N5505	Surface Water Trtmnt Rule	N550501 Monitoring, Reporting & Admin
Water Quality & Supply	N5505	Surface Water Trtmnt Rule	N550502 Chlorination Facilities O&M
Water Quality & Supply	N5505	Surface Water Trtmnt Rule	N550503 Watershed Management
Water Quality & Supply	N5506	Total Coliform Rule Compl.	N550601 Monitoring, Reporting & Admin

50-Year Declining Block Water Supply Agreement

Program	Project	Project Name	Activity
Water Quality & Supply	N5508	Lead & Copper Rule Compl.	N550801 Monitoring, Reporting & Admin
Water Quality & Supply	N5508	Lead & Copper Rule Compl.	N550802 Corrosion Trtmt Facil O&M
Water Quality & Supply	N5509	Fluoridation Program	N550901 Fluoridation Program O&M
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551001 Otr Reg/Operational Analysis
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551002 Disinfection By-Product Rule
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551003 Limnology
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551005 WQ Lab
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551006 DW Reg Dev & App Research
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551007 Public Information/Notification
Water Quality & Supply	N5511	Special Projects	N551104 LIMS & QA/QC
Water Quality & Supply	N5512	Cedar HCP	N551201 INTERIM CHINOOK COHO
Water Quality & Supply	N5513	Cedar HCP	N551301 HCP STREAMFLOW GAUGING
Water Quality & Supply	N5513	Cedar HCP	N551302 SWITCHING CRITERIA STUDY
Water Quality & Supply	N5513	Cedar HCP	N551303 STEELHEAD REDD MONITORING
Water Quality & Supply	N5513	Cedar HCP	N551304 CHINOOK STUDIES
Water Quality & Supply	N5513	Cedar HCP	Salmonid Studies
Water Quality & Supply	N5514	WQ Monitoring	N551403 DRINKING WATER QUALITY MONITOR
Water Quality & Supply	N5515	HCP Fisheries	N551501 FRY CONDITION AT RELEASE
Water Quality & Supply	N5515	HCP Fisheries	N551502 FRY MARKING & EVALUATION
Water Quality & Supply	N5515	HCP Fisheries	N551503 FRY TRAPPING & COUNTING
Water Quality & Supply	N5515	HCP Fisheries	N551504 FISH HEALTH
Water Quality & Supply	N5515	HCP Fisheries	N551505 SHORT-TERM FRY REARING
Water Quality & Supply	N5515	HCP Fisheries	N551506 LAKE WASHINGTON PLANKTON STUDY
Water Quality & Supply	N5515	HCP Fisheries	N551508 ADULT SURVIVAL DISTRIBUTION
Water Quality & Supply	N5515	HCP Fisheries	N551509 PHENOTYPIC & GENETIC STUDY
Water Quality & Supply	N5516	Tolt DBO	N551601-CONTRACTOR PAYMENTS
Water Quality & Supply	N5516	Tolt DBO	N551603-MANAGEMENT COSTS
Resource Planning	N5609	Water Resource & Habitat Issues	N560903-ESA

Transmission

Program	Project	Project Name	Activity
Water Operation	N6540	WT - Headwork/Storage	N654001 Program Maintenance
Water Operation	N6540	WT - Headwork/Storage	N654002 Event Driven Repairs
Water Operation	N6541	WT - Transmission Pipeline Maint	N654101 Program Maintenance
Water Operation	N6541	WT - Transmission Pipeline Maint	N654102 Event Driven Repairs
Water Operation	N6542	WT - Value Op/Maint - Water Tran	N654201 Program Maintenance
Water Operation	N6542	WT - Value Op/Maint - Water Tran	N654202 Event Driven Repairs
Water Operation	N6543	WT - Grounds/Roads/ROW	N654301 Grade/gravel roads - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654302 Grade/gravel roads - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654303 Bridges/culverts - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654304 Bridges/culverts - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654305 Fences/gates - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654306 Fences/gates - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654307 Mow ROW - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654308 Mow ROW - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654309 Mow Other
Water Operation	N6544	WT - Facility Maintenance	N654401 Program Maintenance
Water Operation	N6544	WT - Facility Maintenance	N654402 Event Driven Repairs
Water Operation	N6545	WT - Castings	N654501 Casting Adjustments
Water Operation	N6546	WT - Customer Services	N654601 Communications/Dispatch
Water Operation	N6546	WT - Customer Services	N654602 Locating/Marking
Water Operation	N6547	WT - Damage by Others	N654701 P/L/ROW/Facility
Water Operation	N6548	WT - Transmission Shops	N654801 Shops/Fabrication
Water Operation	N6549	WT - General Expenses	N654905 Tools/small equipment
Water Operation	N6549	WT - General Expenses	N654906 Standby
Water Operation	N6549	WT - General Expenses	N654907 Truck Inventory
Water Operation	N6549	WT - General Expenses	N654908 Downtime - Job Related
Water Operation	N6549	WT - General Expenses	N654909-DISASTER-EMERG RESPONSE

1% Program

Program	Project	Project Name	Activity
Community Services	N5303	Resource Conservation	N530301 1% Conservation

EXHIBIT VII**Cascade Sub-regional System**

The facilities included in this Exhibit incorporate all appurtenances including but not limited to rights of way, line valves, system meters, and remote automation devices.

A. Facilities used by Cascade:

- The NE 8th Street Feeder, from the Cedar Eastside Supply Line to the Bellevue pump station near the intersection of 151st PL NE and NE 8th Street
- The Bel-Red Road Feeder, from the Cedar Eastside Supply Line to the Bellevue Point of Delivery at the intersection of Bel-Red Road and 132nd Ave NE
- The NE 24th Street Feeder, from the Cedar Eastside Supply Line to the Bellevue Point of Delivery near the intersection of NE 24th Street and 132nd Ave NE

B. Other Sub-regional Transmission Facilities used in part by Cascade:

- SEGMENT 1 – Includes use by Bellevue, Coal Creek, Mercer Island, and Seattle and consists of:
 1. The portion of the of the original Mercer Island Pipeline from the tee off the Cedar Eastside Supply Line in Factoria Boulevard SE to the west flange of the main line tee at the east end of the 16-inch Mercer Slough Bridge Pipeline (30-inch).
- SEGMENT 2 – Includes use by Bellevue, Mercer Island, and Seattle and consists of:
 1. The portion of the of the original Mercer Island Pipeline from the west flange of the main line tee at the east end of the 16-inch Mercer Slough Bridge Pipeline to the west flange of the 20-inch valve west of the Enatai service to Bellevue (30-inch).
 2. The entire 16-inch Mercer Slough Bridge Pipeline (16-inch).
- SEGMENT 3 – Includes use by Tukwila and Seattle and consists of:
 1. The 20-inch pipeline in West Marginal Way from the West Seattle Pipeline to South Director Street.

Seattle may from time to time eliminate facilities from this list provided that it secures the written consent of Cascade in the event that Cascade is served by a tap or meter installation on the facility being eliminated. Seattle shall provide Cascade with 180 days prior written notice of any proposed change.

CASCADE WATER SUPPLY COMMITMENT

**APPENDIX N
CASCADE WATER ALLIANCE
WATER SUPPLY COMMITMENT**

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Colman W. City + Co.



CASCADE WATER ALLIANCE
-- DRAFT --
WATER SUPPLY COMMITMENT
(For inclusion in Members' Comprehensive Plans)

Cascade Interlocal Contract and Supply Commitment

The Cascade Water Alliance (Cascade) was created on April 1, 1999 as a public body and an instrumentality of its Members, which exercises essential governmental functions on behalf of its Members as authorized by the Interlocal Cooperation Act (RCW 39.31) [the Interlocal].

Cascade is governed by a Board of Directors (Board) consisting of one individual representative appointed by Resolution of each Member's legislative authority. Each Board Member must be an elected official of a Member.

Cascade's policies and directives are set by the Board and implemented by Cascade. Cascade, in consultation with the Board, shall examine and investigate water supplies suitable and adequate to meet the present and reasonable future needs of its Members. Cascade shall be the lead agency and primary planning authority for the purposes of fulfilling its obligations to provide for the Full Water Requirements¹ of its Members.

Cascade's purpose includes only those related to water resources and do not include the provision of other general services to the public, and are to:

- provide a safe, reliable and high quality drinking water supply to meet the current and projected demands of its Members serving the Central Puget Sound Region and for non-Members as determined by Cascade, and to carry out this task in a coordinated, cost-effective and environmentally sensitive manner;
- develop, contract for, manage, acquire, own, maintain and operate Water Supply Assets including, without limitation, surface water supplies, groundwater supplies, reclaimed water supplies and other water supply resources as determined by the Board;
- contract with Seattle Public Utilities (SPU) to purchase water and to modify Seattle's rights and duties with respect to Seattle Contract Purveyors;

¹ All of a Member's water supply needs, as projected in the Member's lawfully adopted water supply plan, shall be met from the Supply System, net of independent supply and subject to the other limitations established in this agreement on an equal parity with all other Full Supply Commitments and with a guaranteed priority no lower than for any other Supply Commitment made by Cascade, provided that no Member is guaranteed any given amount of supply or capacity.

- contract for, or assume certain contractual rights and duties related to the Tacoma Second Supply Pipeline project (TSSP);
- purchase and provide water supply, transmission services, treatment facilities and other related services;
- provide conservation programs to promote the wise and efficient use of resources;
- carry out emergency water supply and shortage management programs for its Members when demands exceed available supply;
- coordinate and plan cooperatively with other regional or local water utilities and other entities to maximize supply availability and to minimize system costs;
- develop a Transmission and Water Supply Plan (TSP) addressing the needs of its Members and help develop a regional water supply plan with other water providers as Cascade may find convenient or necessary to meet regional, State, and federal planning requirements, and to take a leadership role in developing and coordinating those supply plans;
- share costs and risks among Members commensurate with benefits received; and
- carry out, or to further other water supply purposes that Members determine, consistent with the provisions of this Contract.

Cascade shall prepare and adopt a Transmission and Supply Plan for acquiring water supplies in a timely fashion. The plan shall provide for the lands, waters, water rights and easements necessary therefore, and facilities for retaining, storing and delivering such waters, including dams, reservoirs, aqueducts and pipelines to convey such waters throughout the Cascade water service area (aggregate service area of the Cascade Members).

In preparing or adopting the plan, Cascade shall consider as possible alternatives or additional water supply sources the acquisition of water from sources controlled and/or developed by individual water utilities, legally constituted groups of water utilities and utilities which are not presently supplied by Cascade. Cascade has final responsibility for the plan and for fulfilling the obligations of the Interlocal between Cascade and its Members.

The Interlocal requires Cascade to supply the full water requirements of its Members to meet the needs of their present and future water demands within each Member's service area (as that service area is defined in terms under which the Member was admitted) as shown in the Members' and/or Cascade's water comprehensive plan or demand projections developed by Cascade in concurrence with its Members. The demand projections are or will be based on accepted employment forecasts, regional growth patterns, historic trends, and assumed efficiencies resulting from demand management programs.

Cascade will supply water to its Members except for the quantity of water presently obtained by a Member from its Independent Supply² or other sources, or committed to be obtained from other sources. Members may use other sources of supply such as interconnections with other purveyor's system or development of wells subject to the provisions of the Interlocal.

In the event a Member acquires additional service area that is: 1) located outside the service area identified in its comprehensive water system plan(s); and 2) which is not already served with Cascade water, then Cascade shall supply the water requirements of the additional service area subject to a) Cascade's ability to serve the area, and b) adherence to the urban growth boundaries, and c) other provisions defined in the Interlocal.

Demand Forecasts

The policy of Cascade is to supply wholesale water to its Members at the twenty-four hour average flow rate (Annual Average Demand [AAD] and Maximum Day Demand [MDD]). Members are expected to provide storage for peaking above such average flow rates.

The Cascade demand forecast is a composite of its Members' demand forecasts. The demand forecasts were developed by each Member and are included in their Washington Department of Health (DOH) approved Water Supply Plan or pending Draft Water Supply Plan(s). Table 1 lists the supplies available to Cascade.

**TABLE 1
NEAR-TERM SUPPLY VS DEMANDS**

66.0	137.0	53.0	134.0

1. Supplies include: Independent, Contracted and Pending Contract of 15 and 20 MGD AAD and MDD, respectively from TPU.
2. Aggregate Demand forecast. 2020 forecasted AAD & MDD demands are 57 MGD and 134 MGD, respectively. The demand forecast does not consider the use of reclaimed water. The TSP will include a demand forecast of seasonal and annual demands that are potential levels of use for reclaimed water.

Table 1 illustrates that Cascade has more than sufficient supplies to meet its Members' forecasted AAD and MDD water supply needs through the next fifteen years. The Cascade TSP identifies several potential water supply sources including Lake Tapps, to address potential

² A Member's Water Supply Assets that are not owned by Cascade.

demand shortfalls beyond fifteen years and provides strategies and recommendations for effective water supply management. It also includes the specific tasks and milestones for implementation of the recommendations.

To ensure that demands do not outpace the supply available to Cascade, starting in 2005 Cascade will track the total monthly water consumption of its Members using a database of the monthly water production data from Members including wholesale meter records, well pumping records from Member independent supplies, and the SPU wholesale supply data. The quantity of water supplied to Cascade from SPU is currently tracked monthly. Cascade anticipates updating its demand projection in the next two/three years or revising the existing demand projections to comply with House Bill 1338 (HB 1338) when adopted.

Shortages and Emergency

Any Full Supply Commitment shall be subject to water shortages, to Cascade's ability to implement the Plan, and to the portion of each Member's needs that can be served by the audited capacity of its Independent Supply. If the needed supply is not available, the shortage shall be shared by all Members in accordance with conditions of the Interlocal and pending Cascade Water Shortage Contingency Plan (expected to be complete in 2005).

In the event of emergency supply conditions or water shortage, Cascade has adopted the Seattle Public Utilities' (SPU) Water Shortage Contingency Plan (until the Cascade Water Shortage Contingency Plan is completed) to assure that basic water service is met and that the burden of the shortage is borne equitably among all customer groups. A Member may also adopt its own emergency plan if it believes it is prudent to do so.

The SPU Water Shortage Contingency Plan³ is divided into two principle sections: Drought Curtailment Plan and an Emergency Curtailment Plan. It provides a tailored approach to water shortages with the responses becoming more aggressive as the conditions become progressively worse.

The steps included in the Drought Curtailment Plan are:

- Advisory Stage – Implementation of supply management options that forestalls or minimizes the need for more stringent management actions in the future.
- Voluntary Stage – To maintain or reduce demand to meet target consumption levels through voluntary actions.
- Mandatory Stage – The restriction of certain defined water uses in order to meet target consumption goals.

³ SPU Water Comprehensive Plan

- Rationing Stage – The rationing of water. Customers are allocated a set amount of water and pay substantial surcharges for excess water above their allocation.

The Emergency Curtailment Plan outlines the strategies for dealing with unanticipated water shortages due to infrastructure failure, natural disasters, etc.

During a shortage, Cascade shall reduce or halt Interruptible Supply before invoking the Shortage Management Plan with respect to all Members with a Full Supply Commitment. However, the Board may, by 65% Dual Majority Vote⁴, continue service in the amounts it deems appropriate to one or more Members receiving Interruptible Supply.

In the event of a Cascade-wide water shortage, Members with Independent Supply⁵ may, without penalty, decline to participate in the shortage management program for that shortage by foregoing all supply from Cascade for the duration of the emergency or shortage.

To avoid shortages resulting from emergencies or the inability to develop sufficient supplies, the Board may, by 65% Dual Majority Vote, establish moratoria on connections or additional commitments for future water services by the Members. A moratorium may be discontinued by a Dual Majority Vote of the Board.

The extensive number of existing inter-jurisdictional agreements among Members provides Cascade the ability to move water to its Members through existing interties⁶ and interconnections⁷. The numerous interties and interconnections increase reliability and efficiency between Members.

Cascade Regional Water Supply Options

Wholesale water to Member utilities is currently supplied via 36 interties with SPU's water distribution system. Additional interties with the Tacoma Public Utilities' (TPU) water distribution system are anticipated prior to 2008, and other water utilities as defined in the pending Cascade Water Comprehensive Plan (2004/2005). Each Member has at least three service connections with the SPU water system, with most of the utilities having many more. The supply meters were sized to provide the required level of service.

⁴ Board approval of a proposal on the basis of a 65% supermajority vote of all Members, allowing one vote per Member, together with 65% supermajority vote of all Members on the basis of each Member's Weighted Vote. A "supermajority" means 65% of all Members, not just the Members present and voting.

⁵ A supply of all or part of a Member's water needs from the Supply System on an as-available basis on a lower priority than any Full Supply Commitment. The Supply Commitment for a Member shall be defined by the Interlocal Contact, the terms and conditions of Membership, and the Supply Commitment Resolution. The Supply Commitment for a non-Member shall be defined by the terms and conditions of a specific contract between Cascade and the non-Member.

⁶ Metered connection between Members

⁷ Metered connection between the SPU system and Cascade

Cascade will receive the majority of its potable water supply from SPU and TPU for the next 15 to 20 years. Cascade then anticipates transitioning to Lake Tapps and other sources of supply (included in the TSP) with continuing, although declining, supply commitments from SPU and TPU.

Prior to the formation of Cascade, a number of Members had purveyor contracts with SPU through which SPU provided the utility's full requirements or met demands above the utility's other supply sources. After the formation of Cascade, Members relinquished their individual contracts with SPU in lieu of having one agreement between Cascade and SPU.

Members continue to have contracts with other adjacent water systems to purchase water. Many of these agreements were developed to provide emergency supply and are not actively used on a daily basis. However, Covington and Skyway have contracts in place with adjacent water utilities that allow them to receive a continuous supply of potable water.

Listed below are the existing and potential water supply agreements and options available to Cascade:

- 50-Year Declining Block Water Supply Agreement with SPU (effective January 1, 2004), the Block Contract
- Pending Wholesale Water Supply Agreement with TPU
- Pending purchase from Second Supply Project Partners and/or other utilities
- Lake Tapps Water Reservoir
- Reclaimed Water
- Conservation
- Additional purchases from SPU and/or TPU if necessary and reasonable, subject to negotiation in the future
- Purchases from other regional sources developed in the future and/or development of alternative new sources of supply by Cascade in the future, if necessary and reasonable

A Block Contract between Cascade and SPU for the sale and purchase of potable water was reached in 2003 with an effective date of January 1, 2004. The quantity of water SPU is obligated to provide (and Cascade is obligated to purchase) through December 31, 2023 (the Cascade Water Supply and Transmission Plan 20-year planning period) is 30.3 MGD on an Average Annual Day (AAD) basis (up to 41 MGD Peak Season; 51.2 MGD Peak Month). Water in excess of these amounts may be supplied by SPU at a surcharged rate. The surcharge may be passed directly on to the Member(s) exceeding its projected demand. However, SPU does have the option to refuse Cascade's request for additional supply.

An agreement between Cascade and TPU for the sale and purchase of potable water is being negotiated in accordance with the April 2003 Agreement in Principle (AIP). TPU would supply Cascade approximately 15 MGD AAD (20 MGD Peak) beginning in 2008 and through December 2025. Available volume would decline after 2005. TPU anticipates final completion of its Second Supply Project (TSSP) in 2008. Cascade and TPU are also evaluating near-term (prior to 2008; possibly utilizing existing interconnections) water supply options. The signing of the TPU and Cascade contract is expected to take place in the next three to six months.

Cascade is developing long-term transmission alternatives to convey the pending contracted water supply from TPU throughout the Cascade water service area. The design and construction of new, large transmission, pumping and storage projects is expected to be completed by fall 2008.

Additional supply over the 20-year planning period is also anticipated from TSSP via Covington or other TSSP partners.

Puget Sound Energy (PSE) and Cascade are jointly pursuing the issuance of water rights to allow development of the Lake Tapps Reservoir as a public water supply. The permit granted to PSE by the Washington Department of Ecology (DOE) on June 30, 2003 was appealed and remanded back to DOE by the Pollution Control Hearings Board (PCHB) in July 2004. The water rights are expected to be reissued in the next two to four months.

Cascade and PSE are negotiating the terms under which Cascade would acquire the water rights and other assets necessary to put the water rights to beneficial use following final issuance of the permits. The terms of the existing water rights would allow for the consumptive use of up to 65 MGD AAD after the construction of the necessary water supply infrastructure. Cascade views the Lake Tapps Reservoir as a supply option that may or may not be required by Cascade within the 20 year planning period depending on variables such as Expansion of Cascade Membership and actual population growth, the ability to effectively and economically utilize reclaimed wastewater, and effectiveness of the implemented conservation measures.

King County Metro has developed capacity for producing reclaimed water that could be made available for non-potable uses. Cascade anticipates the use of reclaimed water where it is cost-effective and appropriate as an alternative source for existing and future water utility customers. Tukwila currently receives reclaimed water from Metro's Renton Wastewater Treatment Plant and uses it for irrigating athletic fields. There is potential for Tukwila to receive additional reclaimed water in the future. There is also potential for development of satellite treatment plants to produce additional supplies of reclaimed water for use in other Member service areas. Use of reclaimed water can offset demand for potable supplies, particularly during the summer peak season. Therefore, development of additional opportunities for reclaimed water supply will be considered in the Cascade Plan. King County Metro has commissioned a study to evaluate potential avenues of use for reclaimed water. Cascade and King County Metro will jointly explore opportunities for the beneficial and economically viable use of reclaimed water.

Water conservation is viewed as an essential part of Cascade's overall strategy. Cascade regional activities are intended to supplement and complement, not fully replace individual Member conservation programs. On May 26, 2004, the Cascade Board approved the Transition

Water Conservation Program with a budget of \$459,000 which provides for development of a long-term (through 2010) Cascade Conservation Program. The transition program includes: 1) public education, communications and promotions; 2) incentive (rebate) programs; 3) technical assistance (audits); and 4) monitoring and evaluation. The Cascade Conservation Plan is expected to be completed and adopted by the Board in 2005.

Coordination of WSP Updates

The Washington State Department of Health (DOH) requires that an updated water system plan be submitted for review every six years. All Members have either recently submitted a WSP or will be submitting a WSP to DOH in 2005. The Cascade WSP will also be submitted to DOH in 2005.

While DOH requires that a WSP be updated a minimum of every six years, there are additional items to which Cascade needs to monitor and respond. For example, Cascade will need to actively monitor and evaluate the evolution of other plans and policies that may influence the implementation of Cascade's WSP. Exhibit B lists a proposed schedule to synchronize the coordination and submittal of Cascade and individual Members' WSPs. The schedule is designed to allow for the submittal of all Members' WSP in the same calendar year. The steps listed below will be followed to achieve the schedule:

- Cascade would provide key pieces (as identified in the Table) to Members no later than one year before the Members' WSP is to be updated and submitted to DOH (2004, 2008/2009).
- Members would update and deliver their respective WSPs to DOH in the same calendar year (2010).
- Cascade will use the information developed in Members' WSPs to complete the development of its WSP and submit the plan to DOH no later than one year after submittal of Members' WSP (2011).

EXHIBIT A**AMOUNT OF WATER TO BE SUPPLIED**

Cascade shall plan for and construct facilities to supply the water requirements of its Members and as forecasted by each Member or developed by Cascade in concurrence with each Member. The specified amount of water to be supplied by Cascade and purchased by each Member will be:

- All water requirements of the Member as conditioned by the Interlocal.

List of documents, commitments, adjustments, reductions, agreements and/or written approvals regarding the supply, purchase and/or resale of water according to the Interlocal:

ITEM	DATE
1.	
2.	
3.	
4.	

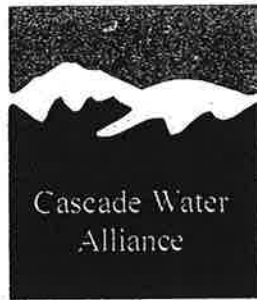
EXHIBIT B

**COORDINATION OF TIME SEQUENCING
BETWEEN THE DEVELOPMENT OF CASCADE'S WSP AND MEMBERS' WSP**

Cascade Member	Date of Most Recent Accepted WSP	Next Scheduled WSP Submittal (Year)	Time Sequencing Submittal of WSP (Coordinated WSP Submittal) (Year)	Time Between Most Recent Submittal and Coordinated WSP Submittal (Year)
Bellevue	December 1998	2005	2010	5
Covington	February 1994	2005	2010	5
Issaquah	2002	2008	2010	8
Kirkland	March 1998	2005	2010	5
Redmond	March 2003	2009	2010	7
Sammamish Plateau	October 2000	2006	2010	4
Skyway	1999	2004	2010	6
Tukwila	February 1999	2005	2010	5
Cascade	N/A	2005	2011	6
<i>Key Components of Cascade WSP submitted early to Members</i>				
▪ Demand Projections ¹	N/A	2005	2008/2009	3-4
▪ Water Supply Evaluation ²	N/A	2004	2008/2009	3-4
▪ Policy ³	N/A	2005	2008/2009	3-4

1. Includes a comprehensive demand projection for Members
2. Supply agreements, Supply commitments, development of sources, asset development and acquisitions
3. Amendments to the Interlocal, local or state policies, etc.

CASCADE WATER ALLIANCE INTERLOCAL CONTRACT



INTERLOCAL CONTRACT

Amended and Restated

December 15, 2004

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CASCADE WATER ALLIANCE

INTERLOCAL CONTRACT

Recitals

WHEREAS, the Cascade Water Alliance, an intergovernmental organization created by Interlocal Contract effective April 1, 1999 (as amended July 2000 and November 2002) to further the interests of its Members with respect to water supply and to work cooperatively with other water supply entities in the region; and

WHEREAS, Members of the Cascade Water Alliance have determined to amend the Cascade Water Alliance's Interlocal Contract to better facilitate the purposes of the Cascade Water Alliance;

NOW, THEREFORE, it is agreed as follows:

ARTICLE 1. Agreement

The Cascade Interlocal Contract, effective April 1, 1999, and entered into under authority of the Interlocal Cooperation Act, Chapter 39.34 RCW is amended and re-stated as provided herein.

ARTICLE 2. Definitions

"Asset Transfer Agreement" means an agreement between Cascade and a Member by which the Member transfers title to Water Supply Assets to Cascade, with or without monetary consideration, to be operated and maintained as part of the Cascade Water System.

"Authorized Issuer" means either: (a) Cascade (or a successor entity); or (b) a Member or other entity authorized to issue Bonds for the benefit of Cascade and approved by Resolution of the Board.

"Board" means the Board of Directors of Cascade.

“Bonds” means short-term or long-term bonds, notes, warrants, certificates of indebtedness, or other obligations issued by, or on behalf of Cascade.

“ByLaws” means the ByLaws of Cascade, as adopted and amended by the Board.

“Cascade” means the Cascade Water Alliance.

“Cascade ERUs” (“CERUs”) means equivalent residential units, calculated according to the Regional Capital Facilities Charge Methodology.

“Cascade Source Exchange Program” means a program adopted by Resolution of the Board for the replacement of all or a portion of a public water systems existing water supply to benefit stream flow and fish without serving growth or increasing that system’s water supply. A program utilizing Lake Tapps Water Supply shall include the terms and conditions for source exchange contained in the Lake Tapps’ Water Right Report of Examination.

“Cascade Source Exchange Program Agreement” means an agreement between Cascade and a Member or another public water supplier to implement the Cascade Source Exchange Program.

“Cascade Supply Date” means the date for the Founding Members and each new Member, established by Resolution of the Board, upon which Cascade undertakes a Supply Commitment.

“Contract” means this Cascade Water Alliance Interlocal Contract.

“Demand Share” means either a Member’s current share of water provided through the Supply System, or estimated share of water to be provided through the Supply System, whether Full Supply or Interruptible Supply, expressed in millions of gallons per day. Demand Share is calculated according to the Rate Calculation Methodology.

“Dual Majority Vote” means Board approval of a proposal on the basis of a simple majority of all Members, allowing one vote per Member, together with a simple majority of all Members on the basis of each Member’s Weighted Vote. A “simple majority” means a majority of all Members of Cascade, not just the Members present and voting.

“65% Dual Majority Vote” means Board approval of a proposal on the basis of a 65% supermajority of all Members, allowing one vote per Member, together with 65% supermajority of all Members on the basis of each Member’s Weighted Vote. A “supermajority” means 65% of all Members of Cascade, not just the Members present and voting.

“Founding Member” means the City of Bellevue, Covington Water District, the City of Issaquah, the City of Kirkland, the City of Redmond, Sammamish Plateau Water and Sewer District, Skyway Water and Sewer District, and the City of Tukwila.

“Gross Cascade Revenue” means all of the earnings and revenues received by Cascade from any source whatsoever including but not limited to: (a) Member Charges; (b) revenues from the sale, lease or furnishing of other commodities, services, properties or facilities; (c) the receipt of earnings from the investment of money in any maintenance fund or similar fund; (d) and withdrawals from any rate reserve or rate stabilization fund or account.

However, Gross Cascade Revenue shall not include: (a) principal proceeds of Bonds or any other borrowings, or earnings or proceeds from any investments in a trust, defeasance or escrow fund created to defease or refund obligations relating to the Water Supply System (until commingled with other earnings and revenues included in Gross Cascade Revenue) or held in a special account for the purpose of paying a rebate to the United States Government under the Code; (b) taxes and other income and revenue which may not legally be pledged for revenue bond

debt service; (c) improvement district assessments; (d) federal or state grants allocated to capital projects; (e) payments under Bond Insurance or other credit enhancement policy or device; (f) insurance or condemnation proceeds used for the replacement of capital projects or equipment; (g) earnings in any construction fund or bond redemption fund; (h) deposits to any rate reserve or rate stabilization fund or account; or (i) any revenues generated by any Independent Supply except those amounts that are payable to Cascade pursuant to this Contract or another interlocal agreement.

“Independent Supply” or **“Independent Supplies”** means a Member’s Water Supply Assets that are not part of the Supply System.

“Member” or **“Members”** means one or more member agencies of Cascade.

“Member Charges” means all payments that Cascade Members are required by this Contract to make to Cascade, including but not limited to all Rates and Charges, RCFCs, dues, assessments and other payments from Members.

“Net Cascade Revenue” means Gross Cascade Revenue less Operations and Maintenance Costs.

“Non-Member” means any person or agency that is not a party to this Contract.

“Operations and Maintenance Costs” or **“O&M Costs”** means all expenses incurred by Cascade to operate and maintain the Supply System in good repair, working order and condition, including without limitation, payments made to any other public or private entity for water or other utility service. Except as approved by the Board, Operations and Maintenance Costs shall not include any depreciation, capital additions or capital replacements to the Supply System.

“Rates and Charges” means the rates and charges (not including RCFCs) chargeable to each Member using the Rate Calculation Methodology plus any late payment or other charge that may be due.

“Rate Calculation Methodology” means the method of setting Rates and Charges adopted by the Board in accordance with Section 7.5.

“Regional Capital Facilities Charges” (“RCFCs”) means the charges to each Member for new CERUs connected to that Member’s water distribution system.

“Regional Capital Facilities Charge Methodology” (“RCFC Methodology”) means the method of determining the RCFCs adopted by the Board in accordance with Section 5.5.

“Satellite Systems” means water supply facilities identified as such by the Board, including but not limited to facilities that serve a portion of a Member’s customers but that are not part of the Member’s main water system.

“Seattle Contract Purveyor” or **“Seattle Contract Purveyors”** means a Member that is or was a party to The City of Seattle Water Purveyor Contracts, Version A or Version B, dated November 1981 (as amended) executed prior to July 1, 1998.

“Supply Commitment” means the obligation undertaken by Cascade, established by Resolution of the Board to supply water to a Member. With respect to Members, that obligation shall be characterized as **“Full Supply Commitment,”** or an **“Interruptible Supply Commitment”** defined as follows:

“Full Supply Commitment” for any or all of a Member’s water needs means that those needs, as projected in the Member’s lawfully adopted water supply plan, shall be met from the Supply System, net of independent supply and subject to the other limitations established in this

agreement, on an equal parity with all other Full Supply Commitments, and with a guaranteed priority no lower than for any other Supply Commitment made by Cascade; provided that no Member is guaranteed any given amount of supply or capacity.

“Interruptible Supply Commitment” means a supply of all or part of a Member’s water needs from the Supply System on an as-available basis on a lower priority than any Full Supply Commitment.

The Supply Commitment for a Member shall be defined by this Interlocal Contact, the terms and conditions of membership, and the Supply Commitment resolution.

“Supply System” means the Water Supply Assets owned or controlled by Cascade.

“Water Supply Assets” means tangible and intangible assets usable in connection with the provision of water supply, including without limitation, real property, physical facilities (e.g., dams, wells, treatment plants, pump stations, reservoirs, and transmission lines), water rights, capacity and/or contractual rights in facilities or resources owned by other entities, and investments in conservation programs and facilities.

“Watershed Management Plan” means a plan adopted by Cascade for purposes of regional water supply, water transmission, water quality or protection, or any other water-related purpose, including but not limited to the plans identified in RCW 39.34.190 (3).

“Water Supply Plan” means the Cascade Regional Water Supply Plan (which may include the Cascade Watershed Management Plan) adopted by the Board as provided in Section 8.1 and 8.2.

“Weighted Vote” means a vote in which each Member’s vote is counted according to the Member’s Demand Share, but no Member shall have a Weighted Vote of less than one.

ARTICLE 3. Formation of Entity; Purpose and Powers

Section 3.1 Formation. The Cascade Water Alliance was created on April 1, 1999 as a public body and an instrumentality of its Members, which exercises essential governmental functions on its Members' behalf as authorized by the Interlocal Cooperation Act (RCW 39.34). Cascade is incorporated under RCW 39.34.040(3) as a public nonprofit corporation in the manner set forth in RCW 24.03 or 24.06 and it may, with Board approval, be incorporated as a partnership in the manner set forth in RCW 25.04, or the Board may organize the form of Cascade in any other manner permitted by law. In addition to its status under any other applicable law, Cascade shall constitute a "watershed management partnership" as provided in Chapter 39.34 RCW. The Board may approve the filing of Articles of Incorporation or similar documents in connection with incorporating Cascade or organizing it in some other manner.

Section 3.2 Membership. Subject to restrictions on future Cascade water rights, or to limitations upon water's place of use imposed by contract or permit, any municipal water utility serving within the Central Puget Sound Region may be admitted to Cascade. The decision to admit new Members rests with the sole discretion of the Board, which shall determine whether to extend a membership offer taking into consideration the audit findings, Cascade water resources, and any other factors the Board deems advisable.

When a municipality applies for membership, Cascade shall conduct a water supply audit according to the methodology and within the period determined by the Board. Audit results shall be provided to the Board and to the applicant.

If a membership offer is extended, it shall address the nature of the Water Supply Assets being transferred or retained and the "value" of those assets in terms of the calculation of an

applicant's Demand Share, RCFCs and other matters relating to the rights and obligations of the applicant and Cascade, which must be recorded in the form that the Board determines and which will constitute, along with this Contract, the conditions under which an applicant becomes a Member of Cascade. An applicant for membership shall be admitted by adoption of a Resolution of the Board accepting the application for membership and incorporating the terms and conditions of membership.

Each membership application must be accompanied by a nonrefundable application fee based on the cost of the audit and other costs related to the admission of a new Member or a request for new supply. The Board shall set the application fee for each applicant based on the estimated cost of processing the application, including the cost of the audit.

As a condition of membership, each new Member admitted to Cascade shall, in addition to any other applicable fees, rates, charges or assessments, pay to Cascade the membership fee, as established by the Board.

If an applicant's planning process or plans are materially out of compliance with the requirements of the Growth Management Act, the Board may condition an offer of membership upon the applicant's compliance with that act.

Section 3.3 Conversion to Municipal Corporation Status. In accordance with Section 10.4, Cascade may be converted into a separate municipal corporation if, and as permitted by law. Upon the creation of such a separate municipal corporation, all Cascade rights and obligations and all Member rights and obligations under this Contract shall transfer to that new municipal corporation.

Section 3.4 Purposes. Cascade's purposes include only those related to water resources, and do not include the provision of other general services to the public, and are to:

- a. provide a safe, reliable and high quality drinking water supply to meet the current and projected demands of Cascade Members serving the Central Puget Sound Region, and for Non-Members as determined by Cascade, and to carry out this task in a coordinated, cost-effective, and environmentally sensitive manner;
- b. develop, contract for, manage, acquire, own, maintain and operate Water Supply Assets, including without limitation, surface water supplies, groundwater supplies, reclaimed water supplies, and other water supply resources as determined by the Board;
- c. contract with Seattle to transfer to Cascade and to modify Seattle's rights and duties with respect to Seattle Contract Purveyors;
- d. contract for, or assume certain contractual rights and duties related to the Tacoma Second Supply Pipeline project;
- e. purchase and provide water supply, transmission services, treatment facilities and other related services;
- f. provide conservation programs to promote the wise and efficient use of resources;
- g. carry out emergency water supply and shortage management programs for its Members when demands exceed available supply;
- h. coordinate and plan cooperatively with other regional or local water utilities and other entities to maximize supply availability and to minimize system costs;
- i. develop a Water Supply Plan addressing the needs of its Members and develop a Watershed Management Plan serving the needs of its Members and Cascade itself and develop a regional water supply plan with other water providers as Cascade may find convenient or necessary to meet regional, state and federal planning requirements, and to take a leadership role in developing and coordinating those supply plans;
- j. share costs and risks among Members commensurate with benefits received; and
- k. carry out, or to further other water supply purposes that the Members determine, consistent with the provisions of this Contract.

Section 3.5 Powers. To further its purposes, Cascade has the full power and authority to exercise all powers authorized or permitted under RCW 39.34 and any other laws that are now, or in the future may be, applicable or available to Cascade and to engage in all activities incidental or conducive to the attainment of the purposes set forth in Section 3.4 of this Contract, including but not limited to the authority to:

- a. acquire, construct, receive, own, manage, lease and sell real property, personal property, intangible property and other Water Supply Assets;
- b. operate and maintain facilities;
- c. enter into contracts;
- d. hire and fire personnel;
- e. sue and be sued,
- f. exercise the power of eminent domain (through its Members at their individual discretion, unless and until Cascade has that power under applicable law);
- g. impose, alter, regulate, control and collect rates, charges, and assessments,
- h. purchase and sell water and services within and outside the geographical boundaries of its Members;
- i. borrow money (through its Members or other entities at their individual discretion or as authorized by Chapter 39.34 RCW now or in the future), or enter into other financing arrangements;
- j. lend money or provide services or facilities to any Member, other governmental water utilities, or governmental service providers;
- k. invest its funds;
- l. establish policies, guidelines, or regulations to carry out its powers and responsibilities;
- m. purchase insurance, including participation in pooled insurance and self-insurance programs, and indemnify its Members, officers and employees in accordance with law;
- n. exercise all other powers within the authority of, and that may be exercised

individually by all of its Members with respect to water supply, conservation, reuse, treatment and transmission, or any of the other purposes set forth in Section 3.4;

- o. exercise all other powers within the authority of, and that may be exercised individually by all its Members with respect to watershed planning and management; and
- p. exercise all other corporate powers that Cascade may exercise under the law relating to its formation and that are not inconsistent with this Interlocal Contract or with Chapter 39.34 RCW or other applicable law.

ARTICLE 4. Organization Structure; Board

Section 4.1 Composition, ByLaws and Meetings. Cascade is governed by a Board of Directors consisting of one individual representative appointed by Resolution of the Member's legislative authority. Members may similarly appoint Alternate Board Members. Each Board Member and each Alternate Board Member must be an elected official of the Member.

The Board shall adopt ByLaws consistent with this Interlocal Contract that specify, among other matters, the month of Cascade's Annual Meeting, Board powers and duties and those of the Executive Committee, Standing Committees, Officers and employees.

The Board shall meet as required by the ByLaws, but no less than quarterly.

Section 4.2 Powers of the Board. The Board has the power to take all actions on Cascade's behalf in accordance with voting provisions set forth in Section 4.3. The Board may delegate to the Executive Committee or to specific Cascade Officers or employees any action that does not require Board approval under this Contract.

Section 4.3 Voting. All Board actions must be approved by Dual Majority Vote of all Members, except where this Contract requires either a 65% Dual Majority Vote, as provided in Sections 5.2, 5.5, 7.1, 7.3, 8.3, 10.3, 10.4, and Article 11; or ratification by the Members'

legislative authority, as provided in Section 10.4 and Article 11. The Board may act by voice votes, as set forth in the ByLaws. Any Member may require a recorded tabulation of votes either before or immediately after a voice vote is taken. Although voting is, in part, based on Weighted Vote, the Members expressly agree that there is only one class of voting membership, and voting occurs within that single class.

Any Member that has been declared to be in default of its obligations under this Interlocal Contract by the Board shall lose its right to vote until the Board has declared the default to be cured.

Section 4.4 Officers and Committees. Cascade Officers shall include a Chair, a Vice Chair, a Secretary and a Treasurer. The Chair serves as the chair of the Board (and may be known as the "President", if the ByLaws so designate) and performs those duties set forth in the ByLaws.

The Vice Chair shall perform the duties of the Chair in the Chair's absence and shall perform other duties as set forth in the ByLaws. The Secretary shall be responsible for Cascade records and performs other duties as set forth in the ByLaws. The Treasurer shall be responsible for Cascade accounts and financial records and performs other duties as set forth in the ByLaws.

Consistent with the provisions of this Contract, the Board may, in the ByLaws, establish additional Officers and set forth their duties.

The Board may create and appoint Members to Standing Committees and special committees as it deems appropriate. Committee Members need not be elected officials or employees of Members, but Standing Committee Chairs must be Board Members or Alternate Board Members.

Section 4.5 Executive Committee. The Chair, Vice Chair, Secretary, Treasurer and chairpersons of Standing Committees together constitute Cascade's Executive Committee. The Chair (or acting Chair) shall vote on matters before the Executive Committee only if necessary to break a tie. The Executive Committee's duties and responsibilities are set forth in the ByLaws.

The Executive Committee shall not have the power to:

- a. approve any contract for a term longer than three years;
- b. approve any contract involving expenditure by, or revenue to Cascade in excess of such amounts and under such circumstances as set forth in the ByLaws;
- c. retain or dismiss the chief executive officer or determine the chief executive officer's compensation; or
- d. take any actions expressly reserved to the Board by this Contract or the ByLaws.

The Executive Committee shall have the authority, if necessary, to avoid default on any Bond, to withdraw from any capital reserve fund or rate stabilization fund, an amount equal to the amount necessary to avoid a default and to authorize payment of that amount to avoid default.

Section 4.6 Staff, Consultants and Contractors. Cascade staff shall consist of a chief executive officer and other positions established by the Board. The Board shall appoint, designate the title of, and establish the compensation range of the chief executive officer. The Board shall hire or retain legal counsel and independent accountants and auditors for Cascade. The authority to hire other consultants may be delegated to the Executive Committee. The chief executive officer appoints persons to fill other staff positions, and those appointments may be subject to ratification by the Board or the Executive Committee if the ByLaws so provide. The Board may also provide that administrative, professional or technical services be performed by contract.

Section 4.7 Budget; Dues; Financial Management. The Board must approve an annual budget determining Cascade's revenues and expenditures no later than sixty (60) days before the beginning of the fiscal year in which that budget will be in effect. The budget will be developed and approved according to a schedule established by the ByLaws. The budget must identify the levels of Member Charges on which revenue projections are based. The Board may amend the budget.

Each Member must pay annual dues to defray part of Cascade's administrative costs based on the number of CERUs served by its water system, regardless of water usage or capacity, and regardless of whether those units are served by the Supply System or by Independent Supply. Total dues collected from all Members may not exceed the greater of \$1,000,000.00 or 5% of Cascade's annual revenue requirement, less debt service. The Board may establish minimum annual dues per Member and may provide that less than all of a Member's CERUs be taken into account in establishing dues.

All Cascade books and records shall be open to inspection by the Washington State Auditor.

ARTICLE 5. Asset Development and Supply Commitment

Section 5.1 Property Acquisition, Ownership and Disposition. Cascade may construct, purchase, rent, lease, manage, contract for, or otherwise acquire and dispose of Water Supply Assets and other assets. Cascade may control and manage both the assets it owns and the assets that are owned by Members that have transferred control and management of those assets to Cascade. This Contract does not vest in Cascade any authority with respect to Members' other facilities or assets, such as Water Supply Assets retained by Members as Independent Supply.

Subject to Cascade's agreement, a Member may transfer to Cascade its title to, or operational control and management of Water Supply Assets. Water Supply Assets may also be fully retained by Members as Independent Supply, subject to the provisions of Article 6. At the discretion of the Board, Cascade may accept title to, or operational control and management of Water Supply Assets offered by Members or accept supply assets that constitute all or part of a Member's Satellite System(s). The Board may accept supply assets subject to the terms and conditions arranged between Cascade and the Member, based on the result of the audit process and mutual needs.

Cascade may enter into Asset Transfer Agreements which shall provide for the terms and conditions of: (a) Cascade's operation of the transferred Water Supply Asset with respect to the Member transferring the asset; (b) Cascade's operation, maintenance and replacement of the Water Supply Asset as part of the Supply System; (c) return or disposition of the Water Supply Asset if Cascade terminates its existence or the Member withdraws; (d) continuation of service (if appropriate) to Members or former Members by the Member receiving the Water Supply Asset at reasonable rates and charges or payment to Cascade of the cost of replacing the Water Supply Asset; and (e) such other conditions as the Board and the Member agree upon.

Members shall not be deemed to hold legal ownership rights in any Water Supply Assets owned by Cascade, whether those Water Supply Assets have been developed by, purchased by, or transferred to Cascade, and regardless of the accounting treatment of RCFC payments and other payments made to Cascade.

Section 5.2 Supply Commitment

Section 5.2.1 Commitment to Members. Beginning on the Cascade Supply Date, Cascade shall provide a Full Supply Commitment to each Founding Member. Thereafter, Cascade shall provide a Full Supply Commitment to meet all current and future water supply needs of a Member that joins with Water Supply Assets sufficient to provide for its needs during the following fifteen (15) years (whether or not those Water Supply Assets are transferred to Cascade or retained as Independent Supply) commencing on the Member's Cascade Supply Date. When a supply contract is negotiated with Seattle, any Member that is a Seattle Contract Purveyor shall relinquish its rights under its Seattle Water Purveyor Contract to Cascade and execute such documents as may be necessary to transfer those rights to Cascade. Cascade shall accept those rights and a corresponding obligation to provide a Full Supply Commitment (net of Independent Supply). The approval of a contract with the City of Seattle providing for the initial acquisition of rights to substantial Water Supply Assets, and any material amendment to that contract, shall be effective upon a 65% Dual Majority Vote.

Any Full Supply Commitment shall be subject to water shortages, to Cascade's ability to implement the Water Supply Plan, and to the portion of the Member's needs that can be served by the audited capacity of its Independent Supply. If the needed supply is not available, the shortage shall be shared by all the Members in accordance with Cascade's shortage management plan, except as otherwise provided in Section 5.5. Cascade is not obligated to provide water supply to service area expansions in or outside the urban growth boundary, unless Cascade agrees to such expanded service area. However, Cascade shall be obligated to provide water supply to the entire service area of each Member (as that service area is defined in terms under which the Member was admitted), whether or not some of that service area is within the Member's current

jurisdictional boundaries and/or within the current urban growth boundary. Cascade is not obligated to provide increased water supply to any Member if it is determined that the Member's planning process or plans are materially out of compliance with the requirements of the Growth Management Act.

A Member that joins with Water Supply Assets insufficient to provide for its needs for fifteen (15) years receives the Full Supply it desires only if, when, and to the extent it is available within reliability standards determined by Cascade's system reliability methodology. If sufficient Full Supply is not available within reliability standards determined by Cascade's system reliability methodology, the Member receives partial Full or Interruptible Supply, and Full Supply must be provided within fifteen (15) years. Cascade shall then undertake to include in Cascade's Water Supply Plan, and to acquire the facilities or other assets necessary in the Board's determination to provide for that deficit. If Cascade fails to develop sufficient assets to timely provide the increased Full Supply, the commitment becomes a Full Supply Commitment at the end of that fifteen- (15) year period, and any shortage shall be shared by all Members in accordance with Cascade's shortage management plan.

If multiple Members request new Full Supply, requests must be honored in the order received (i.e., in the order in which application is made accompanied by the application fee). With respect to new Members, requests for Full Supply "vest" no earlier than the date that membership is effective. In cases of conflict or ambiguity, the Board may determine the order of requests.

Section 5.2.2 Additional Rules for Members Retaining Independent Supply.

Whenever Cascade has a Supply Commitment to a Member that retains Independent Supply, Cascade shall provide Full Supply for all of that Member's water supply needs minus the amount

of water that an audit determines may be provided by that Member's Independent Supply. Members are not required to share shortages resulting from the loss of all or part of Independent Supply, although Cascade may make Interruptible Supply available to a Member that loses Independent Supply at prices that are consistent with the price of Interruptible Supply being made available to others at that time. Cascade may at any time and at its cost and expense carry out audits of a Member's Independent Supply.

A Member requesting an additional Full Supply Commitment due to loss of Independent Supply shall make that request by Resolution of the requesting Member's legislative authority. When and as determined by the Board, the Member shall pay an amount equal to the RCFCs allocable to the number of CERUs that can be served by the replacement supply provided or to be provided by Cascade. Cascade shall then include the supply in its Water Supply Plan, and provide the supply when it becomes available, but in any event within fifteen (15) years. If, within fifteen (15) years the supply is not available, Cascade's commitment becomes a Full Supply Commitment and any shortage with respect to that supply must be shared by all the Members in accordance with the Shortage Management Plan, except as otherwise provided in Section 7.3.

Section 5.2.3 Additional Rules for Source Exchange. The Board may, at its sole discretion, authorize a Cascade Source Exchange Program Agreement with a Member or Non-Member. The terms and conditions of a Cascade Source Exchange Program Agreement shall be developed from a source exchange proposal submitted to the Board. The agreement shall identify: (a) the water right (instantaneous and annual) to be augmented or replaced; (b) the Water Supply Assets to be utilized; (c) mechanisms and arrangements for delivery of regional water; (d) characteristics of supply obligation (for example, peak and average quantities, seasonal or annual

delivery, duration, interruptibility and shortage management); (e) reporting requirements; (f) changes in operation needed to benefit stream flow and fish; (g) rates and charges; and (h) such other conditions as the Board and the Member or public water supplier agree upon. The agreement may or may not provide for adjustments to a Member's RCFC payments or credits and whether or not the source exchange is a loss of a Member's Independent Supply that would be subject to the provisions of Section 5.2.2.

Section 5.3 Financing of Assets. The acquisition of new capital facilities and other Water Supply Assets may be financed using RCFCs, transfers of Water Supply Assets, Rates and Charges, the issuance of revenue Bonds and such other sources as the Board may deem appropriate.

Section 5.3.1 Issuance of Bonds. An Authorized Issuer may issue Bonds payable from and secured solely by all or a portion of Net Cascade Revenue, evidencing indebtedness up to an amount approved by Resolution of the Board in order to provide financing or refinancing to acquire, construct, receive, own, manage, lease or sell real property, personal property, intangible property and other Water Supply Assets, to establish debt service reserves, to provide for capitalized interest and to pay the costs of issuance of, and other costs related to the issuance of the Bonds. Such Bonds shall be payable solely from all or a portion of the Net Cascade Revenue or (if the Authorized Issuer is other than Cascade) from payments to be made by Cascade out of all or a portion of Net Cascade Revenue, and such Bonds shall not pledge the full faith and credit or taxing power or, except as expressly provided by contract, the revenue, assets or funds of any Member.

Members serving as Authorized Issuers may conduct the financing through "separate

systems” permitted by their applicable bond resolutions, or in some other appropriate manner, and Cascade may compensate those Members for all costs associated with the financing. Bond-related documents of Authorized Issuers other than Cascade must expressly permit the Bonds to be refunded or prepaid without penalty prior to their stated maturity, on and after such dates as are approved by the Authorized Issuer and the Board, to allow for a transfer of the obligation to Cascade or to Cascade’s successor entity, including without limitation a joint operating agency or similar entity, as may be permitted by law.

Section 5.3.2 Pledge of Revenues. For as long as any Bonds payable from Net Cascade Revenue (or any portion thereof) are outstanding, Cascade irrevocably pledges to establish, maintain and collect all Member Charges in amounts sufficient to pay when due the principal of and interest on the Bonds (and, if the Authorized Issuer is other than Cascade, in addition to the foregoing pledge, to pledge to make timely payments to that Authorized Issuer for the payment of principal of and interest on the Bonds), together with amounts sufficient to satisfy all debt service reserve requirements, debt service coverage requirements, and other covenants with respect to the Bonds.

Each Member hereby irrevocably covenants that it shall establish, maintain and collect rates, fees or other charges for water and other services, facilities and commodities related to the water supply it receives from Cascade and/or its water utility at levels adequate to provide revenues sufficient to enable the Member to: (a) make the payments required to be made under this Contract; and (b) pay or provide for payment of all other charges and obligations payable from or constituting a charge or lien upon such revenues. Each Member hereby acknowledges that this covenant and its covenant in Section 7.9 of this Contract may be relied upon by Bond

owners, consistent with this Contract.

Each Member shall pay the Member Charges imposed on it whether or not the Water Supply Assets to be financed through the issuance of Bonds are completed, operable or operating, and notwithstanding the suspension, interruption, interference, reduction or curtailment in the operation of any Water Supply Assets for any reason whatsoever, in whole or in part. Member Charges shall not be subject to any reduction, whether by offset or otherwise, and shall not be conditioned upon the performance or nonperformance of any Member, or of any entity under this or any other agreement or instrument. However, credits against future RCFCs and Rates and Charges described in Sections 5.5 and 7.5, respectively, for development or addition of excess capacity that is either transferred to Cascade or retained as Independent Supply, shall not be considered "offsets" or "reductions" for the purposes of this Section.

If, in connection with the issuance of obligations, any Member establishes a new lien position on revenues relating to its water utility, that Member shall covenant in the relevant documents that the amounts to be paid to Cascade as Member Charges shall be treated either: (a) as part of that Member's internal operation and maintenance costs payable prior to debt service on those obligations; and/or (b) for any portion of those Member Charges that is allocable to capital costs, as a contract resource obligation payable prior to debt service on those obligations. If any Member has existing outstanding revenue obligations relating to its water utility, it shall include substantially similar "springing covenants" in the documents relating to any new parity obligations.

Section 5.3.3 Continuing Disclosure. To meet the requirements of United States Securities and Exchange Commission ("SEC") Rule 15c2-12(b)(5) (the "Rule") as applicable to a

participating underwriter for any Bonds and any obligation of each Member as an “Obligated Person” under the Rule, Cascade and each Member agree to make an appropriate written undertaking, respectively, for the benefit of holders of the Bonds consistent with the requirements of the Rule.

Section 5.3.4 Preservation of Tax Exemption for Interest on the Bonds. Each Member covenants that it will take all actions necessary to prevent interest on tax-exempt Bonds from being included in gross income for federal income tax purposes, and it will neither take any action nor make or permit any use of proceeds of tax-exempt Bonds or other funds treated as proceeds of those Bonds at any time during the term of those Bonds that will cause interest on those Bonds to be included in gross income for federal income tax purposes.

Section 5.3.5 Additional Certificates. Each Member further agrees to provide such certificates or verifications as are reasonably requested by an Authorized Issuer in connection with the issuance of Bonds under this Section.

Section 5.4 Supply Expansions and System Extensions. Cascade must provide for Supply System expansions and extensions to meet the needs of additional water customers of Members, subject to consistency with applicable growth management plans and comprehensive plans, Cascade’s water supply plan, orderly asset development, reasonable cost and financing capacity. The Board shall establish a water supply development process, including criteria governing the evaluation of new projects, and that process must promote equality of costs and services (other than direct local services), regardless of geographic location. The results of the water supply planning process must be reflected in Cascade’s Water Supply Plan. The Board shall have the authority to undertake new projects identified in Cascade’s Water Supply Plan for the

expansion of Water Supply Assets and regional transmission system extensions to meet Members' projected needs. To reduce costs, Cascade may, to the extent that the Board deems advisable, enter into agreements with Members to wheel water through their existing systems. When facilities are constructed that are used partially by Cascade for wheeling water and partially by Members or other entities for their purposes, the Board may determine an appropriate Cascade contribution to the cost of those facilities. Existing arrangements among Members (and between Members and Non-Members), in place when a Member joins Cascade, remain unaffected except as otherwise agreed between Cascade and the other entities concerned.

Section 5.5 Regional Capital Facilities Charges. To allocate growth costs to those Members that require capacity increases, each Member shall pay to Cascade an RCFC for each new CERU connected to its water distribution system. Growth in water usage by existing CERUs is not subject to RCFCs unless that growth constitutes a CERU increase as provided in the RCFC Methodology. Members with a supply deficit must pay an RCFC commensurate with that deficit. To the extent that a Member transfers to Cascade or retains as Independent Supply water supply in excess of its needs, it receives a corresponding credit against future RCFCs.

Subject to the provisions of Section 5.2.2, a Founding Member pays no RCFCs with respect to the number of CERUs served as of January 31, 2003, or other such later date as determined by Resolution of the Board.

A new Member with adequate supply shall commence paying RCFCs fifteen (15) years prior to the date that its Water Supply Assets are projected to be insufficient to provide for its needs as determined by the Board (taking into consideration the results of the Water Supply Audit).

A Member that joins with Water Supply Assets that are projected to be insufficient to provide for its needs for fifteen (15) years shall immediately pay RCFCs for the number of CERUs representing the deficit as determined by the Board.

RCFCs shall be calculated according to the RCFC Methodology, which shall define the analytical steps required to calculate the RCFCs according to the greater of: (a) the incremental difference between the average unit cost of expanding the system (i.e., the marginal cost of new capacity) and the average unit cost of the existing system; or (b) the average unit cost of past construction of the existing system plus then-planned Supply System improvements. The methodology shall provide for an annual escalator, recalculation and update not less frequently than every fifth year, and a methodology for determining CERUs. The RCFCs shall be imposed on the Member for each new CERU of that Member in accordance with the terms of this Contract. Amendments to the RCFC Methodology shall require a 65% Dual Majority Vote.

If a Founding Member owns Water Supply Assets or transfers Water Supply Assets to Cascade under Section 5.1, to the extent the audited capacity of those assets (including Seattle Contract Purveyor rights) exceeds the Member's needs, that Member shall receive a credit against future RCFCs. If a Member seeks to transfer assets substantially in excess of its foreseeable needs, Cascade may negotiate appropriate compensation arrangements for the transfer.

Members that develop new Independent Supply that is approved by the Board in accordance with Article 6, similarly receive a credit effective when the Independent Supply is placed in service as determined by the Board.

A Member that accepts ownership of a Satellite System that Cascade agrees to serve shall pay an RCFC for the amount of supply needed to serve that system in excess of its rated capacity.

Members that experience a net reduction in the number of CERUs served shall receive a CERU-for-CERU credit against future RCFCs.

RCFC credits may not be transferred among Members without Board approval.

Members shall not be required to pass RCFCs to their customers as capital facilities charges, but may provide for the payment of RCFCs in whatever manner they deem appropriate.

For Members joining with an unmet net supply need, Cascade may, under circumstances determined by the Board, require the prepayment of RCFCs allocable to the full amount of the requested supply, i.e., when funds are needed to begin the construction of facilities immediately.

Section 5.6 Transfer Upon Mergers, Consolidations and Assumptions. If: (a) two or more Members merge or consolidate; (b) a Member or a Non-Member assumes jurisdiction of part or all of a Member; or (c) a Member assumes jurisdiction of part or all of a Non-Member, the jurisdictions' water supply rights from and obligations to Cascade must be transferred or assumed under applicable law and consistent with the requirements of this Contract and the obligations of Cascade.

ARTICLE 6. New Independent Supply

Members may not bring new Water Supply Assets on-line as Independent Supply without Board approval. That approval may be granted or denied following an evaluation process, based on whether the Board determines that development of the proposed Independent Supply will benefit or be adverse to the interests of the Members as a whole. Recognizing that in certain circumstances the acquisition of additional Independent Supply might benefit (or cause no material harm to) the Members, new supplies under one (1) MGD may be approved by the Board regardless of the provisions of the Water Supply Plan and without a formal evaluation process.

New supplies in amounts greater than one (1) MGD must be described in and be consistent with the Water Supply Plan.

Members that have invested in the development of new Independent Supply assets may offer to sell their interest in such assets to Cascade. Cascade may, in its sole discretion and subject to mutually agreeable terms and conditions, purchase the Member's interest in such Independent Supply asset by reimbursing or otherwise compensating the Member for its investment in the project to the extent that investment has been capitalized. Once Cascade has purchased a Member's interest in a project, the project will be considered a Water Supply Asset of Cascade and be incorporated into the Water Supply Plan.

ARTICLE 7. Asset Management

Section 7.1 Supply System Management. Cascade is responsible for managing, on behalf of all Members, the Supply System. Cascade is not responsible for managing Independent Supply unless it has expressly agreed to do so. Supply System management responsibilities shall be governed by Cascade's system management plan adopted by the Board. Cascade's system management plan concerns, without limitation, matters such as daily system operations and maintenance, interface with other supply providers, contractual obligations, water quality, billing, management and administration. Cascade may delegate and/or contract out its Supply System responsibilities.

Cascade must manage the Supply System in compliance with applicable laws, regulations and Cascade's minimum service standards. Adoption and amendments to the minimum service standards shall require a 65% Dual Majority Vote.

Section 7.2 Conservation. Cascade shall develop and carry out, and Members must participate in, water conservation programs that are uniform among Members. The Board shall develop and implement a Cascade conservation management plan that provides a mandatory base conservation program that functions to reduce both average and peak demands and may establish a charge or assessment to fund development and implementation of the program. Members may implement additional conservation programs. The Board may adopt wholesale charges in addition to normal Demand Share charges to encourage resource conservation. The Board may also provide or contribute to additional local conservation programs that are not offered to all Members, and these local programs may be locally funded or funded by Cascade. Members that fail to comply with base programs as set forth in Cascade's conservation management plan may be required to assume a disproportionate reduction in water supply or to pay penalty charges, or both.

Section 7.3 Shortages and Emergency.

Section 7.3.1 Shortages. Members must respond to water shortages in a collective, shared fashion under a Cascade shortage management plan adopted by the Board. Resources must be shared in a manner that reduces the risk of severe shortages to each Member. Cascade's shortage management plan may include without limitation, a definition and classification of shortages, a shortage contingency plan including mandatory programmatic actions among all Members in the event of shortages, allocation of authority for determining and responding to shortages, and a communications and outreach program for the public. Members shall not be required to implement Cascade's shortage management plan in areas not served by the Supply System.

In the event of shortages, Cascade shall reduce or halt Interruptible Supply before invoking the Shortage Management Plan with respect to all Members with a Full Supply Commitment. However, the Board may, by 65% Dual Majority Vote, continue service in the amounts it deems appropriate to one or more Members receiving Interruptible Supply.

The Board may require that Members failing to comply with mandatory shortage management programs implemented under Cascade's shortage management plan assume a disproportionate reduction in supply or pay penalty charges, or both.

In the event of a Cascade-wide water shortage, Members with Independent Supply may, without penalty, decline to participate in the shortage management program for that shortage by foregoing all supply from Cascade for the duration of the emergency or shortage.

To avoid shortages resulting from emergencies or the inability to develop sufficient supplies, the Board may, by 65% Dual Majority Vote, establish moratoria on connections or additional commitments for future water services by the Members. A moratorium may be discontinued by a Dual Majority Vote of the Board.

Section 7.3.2. Emergency. The Board shall include in Cascade's shortage management plan policies and procedures for addressing short-term disruptions of water supply, transmission or water quality, and it may delegate to the General Manager authority to address such disruptions according to such policies and procedures.

Section 7.4 Water Quality. Cascade shall be responsible for water quality that meets or exceeds all federal or state requirements at the point of delivery from Cascade to the Member, consistent with applicable laws and regulations. Cascade assumes source water quality responsibility and liability with respect to Water Supply Assets under its ownership or control

(including water wheeled to a Member through another Member's facilities). Cascade is also responsible for preparing and carrying out water quality activities compatible with the water quality requirements of regional water suppliers integrated with Cascade's system (e.g., Tacoma, Everett and Seattle).

Cascade may, in its sole discretion, determine and adjust the appropriate method and level of treatment of water that it supplies, so long as that water meets applicable state and federal requirements. If water that it supplies meets those requirements, Cascade shall not be obligated to adjust the method or level of treatment so that the water can be more readily blended with a Member's Independent Supply or more readily transmitted through a Member's internal system. Each Member shall remain responsible for water quality within its respective distribution system, assuming that adequate water supply quality is provided by Cascade at the point of delivery from Cascade.

Each Member shall be responsible for all costs related to making water supplied by Cascade compatible with that Member's internal system, including but not limited to, costs of additional treatment.

Section 7.5 Water Supply Rates and Charges. The Board shall set Rates and Charges according to a Rate Calculation Methodology adopted from time to time by the Board. The Rate Calculation Methodology for Members' Supply Commitment shall provide for the definition and calculation of Demand Shares and for a uniform pricing structure with a commodity charge and fixed charges allocated by Demand Share.

Cascade may sell water to a Non-Member under terms and conditions established by the Board. The terms and conditions shall not be more favorable than the terms and conditions under

which water is sold to Members. Revenue received from the sale of water to Non-Members shall be used to offset or reduce Rates and Charges to Members to the extent practicable, except that such revenue need not be treated as reducing or offsetting those amounts that are necessary for the payment of debt service on Bonds and for the provision of reserve and coverage requirements for the Bonds.

A Member shall be assigned a Demand Share based on the Board's best estimate of capacity to be used by that Member. Initially, the Board may base its estimate on a Seattle Contract Purveyor's use of water from Seattle. For a Member that joins without a supply history as a Seattle Contract Purveyor, or for a Member that has received only part of its water from Seattle, the Demand Share shall be established based on an audit of that Member's past three (3) years of water use. After three (3) years as a Member, the baseline demand and capacity obligation for that Member shall be fixed based on actual experience as a Member. Specific Demand Shares may be set by the Board to account for circumstances, such as (by way of example and not by limitation) costs of extending the Supply System to a Member, or when Independent Supplies affect regional demand patterns. When water supply from Cascade is wheeled through a Member to another Member, Cascade may presume that the first Member receiving the water is the "User" for calculation of Demand Shares unless the Members concerned instruct Cascade to use a different allocation. Rate credits for Water Supply Asset transfers are not deducted in the calculation of Demand Shares but are applied to reduce what a Member would otherwise pay.

The Board must set Member Charges at levels it determines to be sufficient, together with other available revenue sources, to provide adequately for Operation and Maintenance Costs,

Bond debt service, coverage and other covenants, replacement and renewal of facilities, reserves and other costs that the Board deems appropriate. The Board may provide that a Member's failure to participate in the planning process may result in penalty charges.

A Member that has transferred Water Supply Assets shall receive a credit, determined when those assets are audited and transferred, based on the useful life of those facilities and on the Member's use of the water produced by those assets or an amount of water equivalent to the amount of supply from them.

The Board may implement wholesale charges (additional to Demand Share-based charges and variable commodity charges) to reduce extreme peak use (e.g., "peaking-off of the pipe").

Water Rates and Charges must be the same for all Members receiving the same class of service (subject to credits, surcharges and penalty charges).

Section 7.6 New Water Surcharge.

A new water surcharge of \$0.75 per 100 cubic feet (ccf) shall be imposed, effective on the Cascade Supply Date, and continue through December 31, 2011. It shall be applicable to all water purchased by Members over and above each Member's Old Water Allowance in the Seattle Purveyor Contract, if applicable, or to all water purchased by non-Seattle Purveyor Members. New water surcharge revenues shall be used to offset or reduce Rates and Charges to Members to the extent practicable, except that such revenue need not be treated as reducing or offsetting those amounts that are necessary for payment of debt service on Bonds and for the provision of reserve and coverage requirements for the Bonds.

Section 7.7 Franchises and Easements. Except to the extent otherwise required by state law, each Member shall provide franchises and rights of way on, under or across that

Member's streets or other property, to Cascade and to other Members for Water Supply Assets, without charging any fees, rent or charges other than the customary and usual right-of-way permit and inspection fees.

Section 7.8 Sales of Water to Non-Members. Unless approved by the Board, a Member shall not sell water, including source exchange water, supplied by Cascade, nor shall a Member sell Independent Supply offset by water supplied by Cascade, to a Non-Member. Notwithstanding the foregoing, any Member may sell water supplied by Cascade to a Non-Member to the extent required by a contract in effect as of the date the Member joins Cascade.

Section 7.9 Payment Procedures; Default; Step-Up Provisions.

Section 7.9.1 Invoice and Payment.

(a) Cascade shall provide each Member with periodic invoices showing the Member Charges payable by that Member for the billing period and the due date. Invoices shall be provided monthly or on other such periodic schedule as determined by the Board, but no more frequently than monthly nor less frequently than once every six months. The Board will determine a due date for all invoices.

(b) Payment of any and all invoices shall be due and payable on or before the due date, and shall be made by wire transfer or such other means as are agreed to by Cascade and the Member. If a treasurer, trustee, fiscal agent or escrow agent is appointed in connection with the issuance of Bonds, Cascade may require, and specify on the invoice, that certain amounts be provided directly to that person or entity, and the Member shall pay those amounts in the manner and to the person so specified.

(c) If full payment of any invoice is not received on or before the due date, such payment shall be considered past due and a late payment charge shall accrue for each day that the invoice remains unpaid. The late payment charge shall equal the product of the unpaid amount and an interest rate established by the Board. Late payment charges shall continue to accumulate until the unpaid amount of the invoice and all late payment charges are paid in full. Further, if an invoice or any portion thereof remains unpaid for more than sixty (60) days after the due date, Cascade may pursue any legally available remedy at law or equity for the unpaid amount, including without limitation, specific performance and collection of the late payment charge. Cascade's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. Furthermore, upon written notice, Cascade may reduce or suspend delivery of water until the invoice and late payment charges are paid.

(d) If any Member disputes all or any portion of an invoice, it shall notify Cascade immediately upon receipt. If Cascade does not concur, the Member shall remit payment of the invoice in full, accompanied by written notice to Cascade indicating the portions of the invoice that the Member disputes and the reasons for the dispute. The Member and Cascade shall make a good faith effort to resolve such dispute. If the Member fails to remit payment of the invoice in full pending resolution of the dispute, the prevailing party in an action relating to the collection of that invoice shall be entitled to reasonable attorney fees and costs.

Section 7.9.2 Default and Step-Up.

(a) If any Member fails to make any payment in full for more than fifty (50) days past the due date, Cascade shall make written demand upon that Member to make payment in full within ten (10) days of the date that the written demand is sent by Cascade. If the failure to pay is not

cured within the ten (10) day period, the Member shall be deemed to be in default.

(b) Upon an event of default as described in subsection 7.9.2(a), the other Members shall pay Cascade (in addition to Member Charges otherwise due) the defaulting Member's Member Charges in proportion to each remaining Members' Demand Share in accordance with a schedule established by Resolution of the Board.

(c) The payment of a proportionate share of the existing defaulted Member's Member Charges by Members shall not relieve the defaulting Member of its liability for those payments. Cascade shall have a right of recovery from the defaulting Member on behalf of each Member. Cascade may commence such suits, actions or proceedings at law or in equity, including but not limited to suits for specific performance, as may be necessary or appropriate to enforce the obligations of this Contract against any defaulting Member. Cascade's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. Amounts recovered by Cascade as payment of amounts due shall be passed through to each Member in proportion to the share that each assumed, in cash or in credit against future Member Charges as the Board shall determine.

(d) The prevailing party in any such suit, action or proceeding, shall be entitled to recover its reasonable attorney fees and costs against the defaulting Member.

ARTICLE 8. Planning

Section 8.1 Water Supply Plan. Cascade must plan for its Members' water supply needs. That planning shall be to be compatible with the equivalent planning responsibilities of other wholesale water providers and with state, county and city planning responsibilities under the Growth Management Act. The Board must adopt, and may from time to time amend, a Water

Supply Plan that must be based on no less than a twenty- (20) year planning horizon. Cascade shall coordinate its planning effort with local and regional utilities and other appropriate agencies and work to encourage cooperative region-wide planning and coordination.

Each Member shall actively participate in Cascade's water supply planning and shall provide to Cascade accurate data regarding its facilities and operations together with good-faith estimates of future needs and a description of any involvement in the development of new Independent Supplies. Each Member's water comprehensive or system plan shall be consistent with any plans adopted by Cascade, and shall be consistent with applicable requirements of the Growth Management Act and comprehensive plans.

Section 8.2 Watershed Management Plan. Cascade may adopt Watershed Management Plans, as appropriate, for the watersheds within its service area provided that a Watershed Management Plan may take the place of, or may be incorporated into a Cascade Water Supply Plan. In fulfilling its responsibilities for watershed management, Cascade may enter into interlocal agreements with Non-Member municipalities to engage in watershed management, including development of Watershed Management Plans and the implementation and financing of such plans.

Section 8.3 System Reliability Methodology. Cascade shall develop and adopt a system reliability methodology for planning, operation and management purposes. Adoption and amendments to the system reliability methodology shall require a 65% Dual Majority Vote.

ARTICLE 9. Filings

This Contract must be filed with the King County Office of Records and Elections or with any other applicable county auditor, in accordance with RCW 39.34.040, and must be submitted

for review by the Washington State Department of Health and the Washington State Department of Ecology, in accordance with RCW 39.34.050.

ARTICLE 10. Duration and Dissolution; Withdrawal

Section 10.1 Duration. Except as provided in Section 10.3, Cascade shall remain in existence for the longer of the following: (a) the period it holds any assets; (b) the period during which Bonds are outstanding; or (c) the period it continues to include Members.

Section 10.2 Withdrawals. A Member may notify Cascade of its intent to withdraw by delivery to Cascade of a Resolution of its legislative authority expressing such intent. Upon receipt of such Resolution, the Member shall lose its right to vote and the Board shall determine: (a) the withdrawing Member's allocable share of the cost of the then-existing obligations of Cascade; and (b) the withdrawing Member's obligations to Cascade. "Then-existing obligations of Cascade" means obligations or costs incurred by Cascade as of the date the Member's withdrawal notice is received, including but not limited to Bond obligations, contract obligations and cash financed capital projects; provided that a withdrawing Member's allocable share shall in no event include an obligation for future expenses for which Cascade has not incurred a legal obligation; and provided further, that to the extent the Member's obligation (with respect to such costs) is re-paid over time, the Member shall be entitled to a credit for supply abandoned by the Member and is otherwise used by Cascade. A "withdrawing Member's obligation to Cascade" includes but is not limited to, the Member's share of fixed operating costs, any other expenses contained in Cascade's adopted budget for that year, and any assessments or other similar charges lawfully imposed by Cascade. For purposes of the preceding sentence, "fixed operating costs" shall be determined in the year of withdrawal, and the Member's obligation with respect to such

costs shall be limited only to that amount required to pay for supply abandoned by the Member and not otherwise used by Cascade.

The allocable share of cost or obligations shall be determined by the Board, taking into consideration as deemed applicable by the Board: (a) the ratio of the Member's Demand Share to total Member demand; (b) the ratio of the Member's contribution to Cascade revenue to total Cascade revenue including RCFCs; (c) the cost or a portion of the cost of capital projects or facilities specially benefiting the Member; and (d) and any other factor the Board deems appropriate to consider. The Member's withdrawal shall be effective on payment of such allocable share or provision for arrangements to pay such allocable share that are satisfactory to the Board. Until the effective date of withdrawal, the Member shall continue to comply with all applicable provisions of this Interlocal Contract.

Upon withdrawal, except as provided in an Asset Transfer Agreement, the withdrawing Member shall have no right to, or interest in any Water Supply Assets owned by Cascade. The withdrawing Member shall be deemed to have abandoned any and all rights to service, to the use of Cascade Water Supply Assets or other rights with respect to Cascade (except as otherwise expressly provided in this Contract).

Notwithstanding the provisions of this Section 10.2, Cascade will, upon the withdrawal of a Member that has transferred operational control and management of (but not title to) an Independent Supply Asset to Cascade under Section 5.1, return operational control of such asset to the withdrawing Member. Return of operational control and management will be subject to: (a) continued use by Cascade, to the extent and for such time as the Board deems such use necessary for Cascade to continue providing service to its Members; and (b) payment or provision for

payment of any Cascade costs, including but not limited, to those associated with the withdrawing Member's Independent Supply Asset.

The Board may establish additional generally applicable conditions and requirements for withdrawal.

Section 10.3 Dissolution. Cascade may be dissolved by a 65% Dual Majority Vote. Upon dissolution, except as provided in an Asset Transfer Agreement, Cascade's assets initially shall be held by its then current Members as tenants in common. Each Member's ownership interest must be based on that Member's Demand Share as of the time of the dissolution. Cascade's liabilities (including Bonds and other contractual obligations) initially shall be distributed based on Members Demand Shares as of the time of the dissolution. Assets and liabilities must be distributed in accordance with agreement or contract, under a voluntary mediation process, or by a court of law. A court may appoint an arbitrator or special master. Distribution shall be based on the best interests of efficient and economic water supply in the entire area served by the Members, subject to a rebuttable presumption that Water Supply Assets will be returned to the Member that originally transferred them to Cascade. That presumption may be overcome by a showing that another asset distribution is in the best interests of efficient and economic water supply. The proceeds of any sale of assets must be distributed among the then current Members based on the Demand Shares at the time of dissolution.

Section 10.4 Successor Entity. Notwithstanding the provisions of Section 10.3, upon a 65% Dual Majority Vote (ratified within one hundred and twenty (120) days by 65%), as measured by Dual Majority Vote of the Members' legislative authorities, all assets, liabilities, and obligations of Cascade may be transferred to any successor entity (including without limitation, a

joint operating agency or other municipal corporation, as permitted under state law), and all obligations of Members and parties contracting with Cascade become obligations to the successor entity.

ARTICLE 11. Amendments.

Amendments to this Contract shall be effective upon approval by 65% Dual Majority Vote (ratified within one hundred and twenty (120) days by 65%), as measured by Dual Majority Vote of the Members' legislative authorities.

ARTICLE 12. Applicable Law and Venue.

This Contract is governed by the laws of the state of Washington. The venue for any legal action arising from a dispute under this Contract is the Superior Court for King County.

ARTICLE 13. No Third Party Beneficiaries.

There are no third-party beneficiaries to this Contract except for the rights of Bond owners as provided in Section 5.3.2, no person or entity other than an agency signatory to this Contract shall have any rights hereunder or any authority to enforce its provisions, and any such rights or enforcement must be consistent with and subject to the terms of this Contract.

ARTICLE 14. Severability.

If any provision of this Contract or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this Contract or its application to other entities or circumstances shall not be affected. The remaining provisions continue in full force and effect, and the parties' rights and obligations must be construed and enforced as if the Contract did not contain the particular invalid provision. But if the invalid provision or its application is found by a court of competent jurisdiction to be substantive and to

render performance of the remaining provisions unworkable and infeasible, is found to seriously affect the consideration, and is inseparably connected to the remainder of the contract, the entire Contract is deemed void.

ARTICLE 15. Entire Agreement.

This Contract constitutes the entire and exclusive agreement between the parties relating to the specific matters covered in this Contract. All prior or contemporaneous verbal or written agreements, understandings, representations or practices relative to the foregoing are superseded, revoked and rendered ineffective for any purpose. This Contract may be altered, amended or revoked only as set forth in Article 11. No verbal agreement or implied covenant may be held to vary the terms of this Contract, any statute, law, or custom to the contrary notwithstanding.

Cascade Water Alliance:

By: [Signature]

Title: Chair Date: December 15, 2004

Attest: [Signature]

Title: General Manager Date: December 15, 2004

Authorized by: Resolution No. 2004-18

Date: December 15, 2004

Cascade Water Alliance

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: ER Berg

Title: Deputy City Manager Date: 04/15/2005

Attest: Myrna X. Basel

Title: City Clerk Date: 04/15/2005

Authorized by: Res. No. 7165
(Resolution or Ordinance)

Date: 4/4/2005

Approved as to form:

Patricia C. Cole
Assistant City Attorney

City of Bellevue

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: Sup Hornsby

Title: Board President Date: 4-6-05

Attest: Judith Nelson, General Mgr.

Title: General Manager Date: 4-6-05

Authorized by: Unnumbered Resolution on 4-6-05
(Resolution or Ordinance)

Date: 4-6-05

Covington Water District

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: Ara Frisinger

Title: MAYOR Date: April 4, 2005

Attest: Christine Jones

Title: CITY CLERK Date: 4-4-2005

Authorized by: AB 5266 / Motion
(Resolution or Ordinance)

Date: 3-21-2005

City of Issaquah

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: [Signature]

Title: Assistant City Manager Date: 3/18/05

Attest: LYNN STAKESBARY

Title: ASSISTANT CITY MANAGER Date: 3/18/05

Authorized by: Resolution #14493

(Resolution or Ordinance)

Date: 3/18/05

City of Kirkland

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency *John Clark*
 By: *JANE CHRISTENSEN*
 Title: *ASSISTANT TO THE Mayor* Date: *2-11-05*
 Attest: *Bonnie Mattson*
 Title: *City Clerk* Date: *2/14/05*
 Authorized by: *motion*
(Resolution or Ordinance)
 Date: *2/1/05*

City of Redmond

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: M. P. Skelton V.P. -

Title: VICE PRESIDENT Date: 2/7/05

Attest: [Signature]

Title: Secretary Date: 2/7/05

Authorized by: RESOLUTION No 3282
(Resolution or Ordinance)

Date: 2/7/05

Samamish Plateau W&S District

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: [Signature]

Title: President Date: 3/2/05

Attest: [Signature]

Title: General Manager Date: 3/2/05

Authorized by: #05-03-418
(Resolution or Ordinance)

Date: 3/2/05

Skyway W&S District

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: JM FB Steven M Mullet
 Title: Mayor Date: 2/28/05
 Attest: Jane E. Cantu
 Title: City clerk Date: 2/28/05
 Authorized by: Council minutes - 2/22/05
(Resolution or Ordinance) or Minutes of Council Meeting
 Date: 2/22/05

City of Tukwila

**CITY OF SEATTLE WATER SHORTAGE
CONTINGENCY PLAN**



City of Tukwila

WATER SHORTAGE CONTINGENCY PLAN



This plan provides guidelines for Tukwila Public Works to manage water supply and demand in the event of a supply problem in accordance with the requirements of water system planning under WAC 246-290-100 (Group A Public Water Supplies, Guidance Document, DOH 331-301)

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

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**City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN**

City of Tukwila Water Utility



May 2014

By: Tukwila Public Works Staff

**SUPPLEMENT TO TUKWILA PUBLIC WORKS
2013 WATER SYSTEM PLAN**

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

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WATER SHORTAGE CONTINGENCY PLAN

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- Attachment A - Examples of Past Regional Drought Experiences
- Attachment B - Water Shortage Response Team and Water Shortage Advisory Group Membership and Roles
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City of Tukwila

WATER SHORTAGE CONTINGENCY PLAN

1.0 PURPOSE AND OBJECTIVES

1.1 Introduction

This plan provides guidelines for Tukwila Public Works to manage water supply and demand in the event of a supply problem in accordance with the requirements of water system planning under WAC 246-290-100 (Group A Public Water Supplies, Guidance Document, DOH 331-301). Such problems could include imminent supply disruptions resulting from a major pipeline failure in the Seattle wholesale supply system as well as forecasted water supply shortages due to droughts. “Water shortage” as is discussed in this document means that the City of Tukwila will not have the normal amount of water to provide to its customers. It is extremely improbable that Tukwila would ever run out of water. The stages noted in the plan will be implemented depending on the magnitude of the water shortage. This document supplements the *2013 Tukwila Water System Plan*, and updates any previous Water Shortage Contingency Plan (WSCP) as submitted previously as a member agency of the Cascade Water Alliance.

1.2 Objective of the WSCP

The objective of the WSCP is to establish actions and procedures for managing water supply and demand during water shortages. The plan is done in accordance with both the Seattle Public Utilities’ (SPU) WSCP and the Cascade Water Alliance Shortage Management Plan. This plan enables Tukwila’s Water Utility to maintain essential public health and safety and minimize adverse impacts on economic activity, environmental resources and the region's lifestyle.

1.3 Integration into Other Emergency Planning

A discussion of how Tukwila will respond to non-drought water emergencies is provided in Section 4 of this plan.

1.4 Relationship to Water System Plans

This plan provides further guidance on the resource management and conservation elements which are supplemental to the City of Tukwila Comprehensive Water Supply Plan. The City of Tukwila is a member of the Cascade Water Alliance and complies with the Cascade Shortage Management Plan (SMP). Activation of the plan will be identified through a communication from SPU (implementation of the SPU’s WSCP) indicating that a supply shortage may occur or is in progress.

Tukwila’s WSCP is ultimately guided by the Block Contract between Cascade and SPU to assist and support emergency curtailment measures required to manage demand during an emergency or shortage. This plan has been developed by Tukwila in consultation with the member agencies of Cascade and other wholesale customers. Tukwila’s WSCP is based on the premise that an effective demand management strategy must be regionally consistent. The following actions recommended by Cascade for Tukwila in the event SPU activates its plan are:

- If SPU initiates its **Advisory Stage**, Cascade will assess the situation to determine whether to activate its plan and recommend the same to its Members.

City of Tukwila

WATER SHORTAGE CONTINGENCY PLAN

- If SPU activates its **Voluntary or Mandatory Stages**, Cascade (and its Members) should again assess the situation and consider whether to rely more heavily on non-SPU sources (i.e. Emergency interties such as Kent or Highline).
- If SPU activates its **Emergency Curtailment Stage**, Cascade and its Members anticipate that Section 12.1 (Emergency Events) of the Block Contract would also be triggered. This permits SPU to curtail supplies on a proportional basis with its retail customers and other wholesale customers. Tukwila’s WSCP activation is needed in order to manage the situation effectively.
- Tukwila, like all regional wholesale customers, will have a key role via Cascade in the communications strategy during a regional water shortage. Tukwila will communicate with its own retail customers, neighboring jurisdictions, other stakeholders, and the local media using a unified message and approach. Public support and cooperation is likely to be higher if actions are equitable (i.e. all water users are experiencing the same service level and degree of hardship).

2.0 OVERVIEW OF DROUGHT MANAGEMENT STRATEGY

This Water Shortage Contingency Plan focuses on weather-related water shortages – generally referred to as “droughts.” Droughts are naturally occurring unpredictable weather events of varying frequency, duration and severity. In the region served by the Seattle Regional Water System, available data indicate a very low probability of a multi-year drought, but the region has experienced short-term droughts.

This region is generally faced with a relatively dry summer period. In the Seattle and South King County area, only about 5 of our 37 inches of annual precipitation fall during the summer months (based on National Weather Service data for 30-year average at SeaTac Airport). The Seattle Regional Water System operates with an annual refill and drawdown cycle of its water supply storage reservoirs. Highly unusual weather events affect this cycle and can cause water shortages.

2.1 Types of Droughts by Season

The types of droughts that affect the Seattle Regional Water System range from poor snowpack accumulation in the winter to delayed onset of rains in the fall. Since the nature of these droughts varies, Seattle’s response will also vary. The types of droughts the system has experienced can be categorized by season as follows:

2.1.1 Winter/Spring Drought

Low snowpack is the primary issue with winter/spring droughts. While a below normal snowpack may not lead to poor water supply conditions if ample spring rains occur, caution is used in managing the water supply in these situations because rainfall is inherently difficult to forecast. Below normal snowpack can occur during a winter when mountain temperatures are warm, when precipitation is below average, when intense rainfall events melt off low to mid-elevation snow cover, or through a combination of these factors. Tracking El Niño events, which are typified in the Pacific Northwest by warmer and drier than average winter conditions, can alert water managers to the increased potential of a winter/spring drought. Seattle’s use of the dynamic rule curve –

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varying reservoir storage targets based on real-time snowpack measurements and soil moisture estimates – in these types of droughts helps to ensure that our reservoirs are as close to full as possible at the start of the summer drawdown cycle.

When winter/spring drought conditions result in low water supply availability, water use restrictions may need to be imposed because the potential for water use reductions by customers is greater in the spring and summer, there is much uncertainty about impending summer weather which is so influential on demand, and weather forecasts of when the fall rains will begin are not reliable. These conditions generate uncertainty about whether water stored in the spring will be sufficient to meet demands until supplies are replenished in the fall. This can make the imposition of water use restrictions in the spring and summer necessary, despite the fact that in some years no water shortfall may ever really develop.

2.1.2 Summer/Fall Drought

In years in which reservoirs refill as normal in early summer, droughts can still develop over the summer and extend into the fall if summer demands are high and inflows to the reservoirs drop below normal levels for an extended period of time. Droughts such as these require careful monitoring of summer demands and water supply. Unfortunately, it is not possible to accurately predict in advance the timing and amount of the fall rains. When these types of droughts become apparent, and are significant, Tukwila will ask for curtailments.

2.1.3 Fall/Early Winter Drought

Fall is the time when demands for fish habitat needs are especially high and the ability for people to cut back on water is limited since little water is being used for landscape irrigation. These factors can make fall droughts particularly challenging. When the normal rainy season develops later than normal, storage reservoirs can be depleted to minimum levels. For this reason, the emergency pumping plants at Chester Morse Lake are maintained and available if needed to allow use of “dead storage” below the lake’s natural outlet. Other emergency supplies that may be activated in these types of droughts are discussed later in this WSCP.

Attachment A provides examples of past drought events that resulted in Tukwila activating its Water Shortage Contingency Plan.

2.2 Drought Management Strategy

Tukwila relies on Seattle’s strategy for dealing with the hydrologic uncertainty associated with drought management, a strategy that involves several components:

- Monitoring current conditions,
- Forecasting,
- Communication,
- Operational Adjustments,
- Curtailment Actions, and
- Alternative Water Supplies.

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During years in which precipitation is significantly below normal, Seattle expands and utilizes these management strategies as explained below.

2.2.1 Monitoring Current Conditions

To deal with hydrologic uncertainty in real-time and in longer term planning horizons, Seattle's water resource management team uses a number of available informational and data gathering sources. Seattle contracts with the U.S. Geological Survey (USGS) to provide continuous streamflow monitoring and data collection services. Strategic placement of USGS stream gauging stations provides real-time information for understanding the hydrologic state of the water supply and river systems. Seattle also contracts with the Natural Resources Conservation Service (NRCS) to provide real-time snow monitoring and weather data collection services.

2.2.2 Forecasting

Through the National Oceanic and Atmospheric Administration (NOAA), Seattle regularly monitors daily weather forecasts (National Weather Service Seattle Forecasting Office), mid-range weather forecasts (National Centers for Environmental Prediction), 30- and 90-day and multi-season climate outlooks (Climate Prediction Center), and daily hydro-meteorological forecasts (Northwest River Forecast Center in Portland, Oregon). The internet provides access to vast amounts of additional useful information to assist SPU in forecasting. For example, NOAA's web information on El Niño/La Niña provides a wealth of timely information on current and forecasted El Niño and La Niña conditions with enough lead time for water resource managers to prepare for such events.

Seattle uses a number of analytical tools for forecasting hydrologic conditions as they relate to water supply and fisheries including:

- Streamflow forecasts prepared by the USGS and NRCS.
- Weather, climate and river forecasts from NOAA.
- In-house reservoir management and streamflow forecasts using a computer model known as the Seattle Forecast Model, or SEAFM. This model is regularly updated with hourly meteorological and hydrological data, and simulates the current state of the watershed (including snowpack, soil moisture, aquifer storage, and streamflows) and water supply system. The model is used to analyze and assess various future reservoir operating scenarios, both in real time and in near- and long-term operational planning, based on probabilistic analysis of over 70 years of historic weather; and
- Seattle's Conjunctive Use Evaluation (CUE) model, which is a weekly time step simulation model used for calculating and evaluating the firm yield and reliability of Seattle's water supply system and potential future water supply projects. While not a forecast tool, per se, the model provides valuable insight into the hydrologic record.

2.2.3 Communication

SPU's Water Resources Management staff work closely with members of other city, local, state, federal and tribal resource agencies, including Seattle City Light, City of Renton, King County, Washington State Department of Ecology, Washington State Department of Fish and Wildlife, U.S. Army Corps of Engineers, U.S. Fish and Wildlife

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Service, National Marine Fisheries Services, Muckleshoot Indian Tribe and Tulalip Tribes.

The interagency Cedar River Instream Flow Commission established by the Cedar River Watershed HCP, convenes in regularly scheduled meetings once per month throughout the year to oversee Seattle's instream flow management on the Cedar River. Additional meetings, in person or by conference call, are scheduled on an as needed basis, especially during periods of water shortages

In addition to the communications noted above, throughout this plan are references to communication to customers, stakeholders and the media. What is in this plan regarding communications is guidance. It may be appropriate to do more or less communication depending on the particular circumstances of the water shortage.

2.2.4 Operational Adjustments

Specific operational actions that will be made to reduce all non-essential water use are provided in Section 3 for each WSCP stage. Below is a discussion of how Seattle's water supply reservoirs are managed for people and fish during droughts.

Management of Water Supply for People and Fish

Operational flexibility is key, with operating plans changing as conditions and forecasts change. SPU has developed "dynamic rule curves" to operate its mountain reservoirs in the winter season. These rules set target reservoir levels that vary with watershed snowpack and soil moisture conditions. At times when there is little snowpack and low soil moisture, the reservoir target will be set higher than normal flood control levels, and vice versa. Dynamic reservoir rule curves are used to adjust operations to actual watershed conditions and to help manage risk and uncertainty. Also, periodic salmon and steelhead redd surveys are undertaken during seasonal fish spawning events that enable informed management decisions to be made that seek to ensure adequate flow levels are provided during critical fish incubation and emergence periods.

2.2.5 Curtailment Actions

Customers will be asked to take actions to curtail their use of water during a shortage. Those actions will depend on the stage of the WSCP being implemented at the time. Examples of potential water saving actions are noted in Section 3.

Criteria for Curtailment During a Water Shortage

There are several criteria for deciding which curtailment measures are appropriate to reduce demand during a water shortage:

- Timing: Can the measures or actions produce results in the necessary timeframe?
- Magnitude of savings: Will the measures or actions result in enough savings to make a meaningful difference; i.e., reduce demand to the level the impaired water system can handle?
- Season: Are the actions or measures relevant to the time of year; i.e., banning lawn watering during the summer irrigation season vs. during non-irrigation season?

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- **Costs:** How severe are the cost implications of the measure to the customer, including local business and industry, relative to the need for action? Note: While there could be costs to certain customers, which would be considered, particular actions still may be necessary for public health and safety reasons.

2.2.6 Exit Strategy for WSCP Stages

As soon as actual and forecasted supply conditions substantially improve, Tukwila in conjunction with Cascade and SPU will either inform the public of the return to normal use of water, or inform them that the utility is moving from one stage to a lesser stage of this plan. This latter process would occur until there was a return to normal operations. Stages could be skipped in this process as conditions and forecasts warrant.

- **Chester Morse Lake "Dead Storage"** – Seattle’s primary storage reservoir has a natural, gravity fed outlet. When inflows to the reservoir are low, its water surface elevation can fall below the natural outlet, but still contain a substantial amount of high-quality water in what is called “dead storage.” In 1987, Seattle installed the first of two emergency pump stations to pump the water over the natural outlet and into the river, thereby augmenting both instream flows and water availability for customer use. The second Morse Lake Pumping Plant was installed in 1992. These pumping plants allow use of dead storage during drought emergencies.
- **Interties** - Since water supply problems will not affect all water suppliers in the region to the same extent, it is sometimes feasible for Tukwila to obtain water from other providers through emergency interties.
- **Reclaimed water** - Reclaimed water is highly-treated effluent that may be used instead of potable water for irrigation, street washing, construction purposes, etc., in order to reduce demand for potable water and lessen the impact of shortages on the community. Currently there are some significant constraints on the use of reclaimed water during a shortage, e.g., lack of availability, cost and safety of trucking or piping water over long distances. It is important to note, however, that if reclaimed water becomes more widely available in the region and becomes less expensive it may become prudent for Tukwila to draw on it as a limited back-up supply during water shortages, for non-potable uses only. If reclaimed water is used it would be in adherence with applicable state regulations governing reclaimed water use.

A key assumption of this plan is that abundance, shortage and risk must be shared among all beneficiaries of the regional water resource. Drastic measures are to be implemented only after human water consumption is curtailed. All of the options, information sources and communications outlined above, are needed for coordinating and applying decisions ancillary to concurrent real-time operations.

2.3 Water Shortage Contingency Plan Principles

Tukwila has learned a great deal over the years about how best to operate the utility during drought events, while minimizing impacts to customers. This knowledge is reflected in this Water Shortage Contingency Plan, and articulated in the following principles:

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- Given clear, timely and specific information on supply conditions and the necessary actions to forestall worsening conditions, customers prefer the opportunity to meet targeted demand reduction levels through **voluntary** compliance measures. The decision to move to mandatory restrictions is more acceptable if the voluntary approach has been tried first but has not resulted in enough demand reduction to ensure public health, safety and adequate streamflows through the projected duration of the shortage.
- Each drought or other shortage situation has enough unique characteristics that a plan cannot specifically define all the scenarios and specific supply and demand management actions. The usefulness of a Water Shortage Contingency Plan lies in planning the range of supply and demand management actions in advance of the situation, and in defining the communication mechanisms by which decisions will be made during the event.
- Given the highly-effective, Member-driven, long-term regional conservation program operated by Cascade, it is important to distinguish between the short-term **curtailment** measures necessitated by a water supply problem, and the **conservation** measures TUKWILA regularly promotes to its customers. Conservation focuses on long-term efficiencies which do not adversely affect customers' accustomed use of water, whereas curtailment measures involve short-term water use reductions that can create hardships.
- It is essential to closely monitor water quality during droughts and particularly during a warm weather drought. This applies to water quality in rivers as well as to the drinking water provided to customers. The Cedar Supply lines and water distribution system is designed to carry a large capacity of water during summer peak months. If demand is significantly lowered, water will not move through the system at the "design" rate. The slower moving water within the wholesale distribution system, coupled with higher summer temperatures will increase the likelihood that drinking water quality problems may arise.

3.0 PHASED CURTAILMENT PLAN

3.1 Overview of Plan Stages

This plan provides four stages of response based on increasing severity, as progressively more serious conditions warrant. This type of response would be appropriate for a drought or other long-range disruption. It is the role of the Director of Public Works advising the Mayor of Tukwila to officially activate the WSCP, when necessary. The four response stages include a variety of communications, internal operations, and supply and demand management strategies as appropriate, and are characterized as follows:

- **Advisory Stage** - The public is informed as early as meaningful data are available that a water shortage may occur.

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- **Voluntary Stage** - If supply conditions worsen, the plan moves to the Voluntary Stage which relies on voluntary cooperation and support of customers to meet target consumption goals. During this stage, specific voluntary actions are suggested for both residential and commercial customers.
- **Mandatory Stage** - If the Voluntary Stage does not result in the reduction needed, or supply conditions worsen, the Mandatory Stage would be implemented. This stage prohibits or limits certain actions, and may be accompanied by an enforcement plan which could include fines for repeated violation.
- **Emergency Curtailment** - This stage addresses the most severe need for demand reduction and includes a combination of mandatory measures and rate surcharges. This would be used as the last stage of a progressive situation, such as a drought of increasing severity, or to address an immediate crisis, such as a facility failure.

3.2 Preparation for Implementing WSCP Stages

Recommendations about implementing the WSCP are made to the Director of Public Works by the Cascade's Water Shortage Management Committee formed at the direction of Cascade's CEO. Suggested team membership is provided in Attachment B. The actual composition of the team may change at any time as requested by the Director. This team, involving key departmental staff, would meet as often as appropriate to consider many or all of the following factors in making its recommendations about entering into any stage of this WSCP and modifying its recommendations as conditions change:

- total supply availability, including groundwater, interties, and modified instream flow releases
- the rate of decline in total reservoir storage compared with typical rates
- short- and long-term weather and hydrologic forecasts
- computer modeling of streamflow and reservoir storage, for different weather and demand assumptions (see Attachment C for possible demand management scenarios)
- the trends and forecasts of the system's daily water demands
- recommendations from the Water Shortage Advisory Group (if it has already been formed, if not yet formed, move forward in creating this group, see Attachment B for suggested role of this group and membership)
- recommendations from the Cedar River Instream Flow Commission and the Tolt Fisheries Advisory Committee
- the estimated margin of safety provided by the demand reduction, compared with the level of risk assumed if no action is taken
- potential water quality issues
- increased operating costs of potential actions and the value of lost water sales revenue, compared with the increased margin of reliability (see Attachment D for estimated costs and revenue losses for different stages of the WSCP)
- consultation with elected officials, wholesale customer representatives, state resource agencies, the Army Corps of Engineers and Tribes

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- the length of time between stage changes (abrupt starts and stops are to be avoided, at least two weeks between stages is best to allow time to prepare)
- current events
- customer response, and
- water use consumption goals to be achieved, which may be revised as needed.

A Cascade Water staff member is to be identified by the SPU Director to lead the water shortage response effort before it is activated.

3.2.1 Preparation Between Plan Stages

When Tukwila via Cascade is considering moving from one stage of the plan to another the department evaluates the need for doing so using much of the same information as noted above. Prior to moving to different stages of the plan, Tukwila will plan to consult with key stakeholders. There are also a number of preparatory measures that need to occur prior to moving from one stage to another, including, but not limited to: modifying any communication materials including customer water saving measures for the given stage, and "Questions and Answers" for customer groups, the determination of any staffing reassignments needed, and estimated costs and plans for covering those costs.

3.3 Advisory Stage

3.3.1 Objectives

- Prepare the Department, City, relevant agencies and water users for potential water shortage thereby allowing all parties adequate planning and coordination time.
- Undertake supply management actions that forestall or minimize the need for more stringent demand or supply management actions.

3.3.2 Triggers

As presented earlier, there are a variety of weather and other conditions that may cause concern about water availability and a potential water shortage. Tukwila will enter the "Advisory Stage" if supply conditions and supply forecasts raise significant concerns about the utility's ability to meet supply needs later in the year.

3.3.3 Public Message

"Potential exists for lower than normal supply; conditions **may** return to normal, or later on, we may need to reduce consumption. Continue to use water wisely to help ensure sufficient supply for people and fish. We'll keep you informed."

3.3.4 Communication Actions

- Step-up and/or alter message of ongoing media education effort about the water system, particularly relationship of weather patterns to supply and demand; provide up-to-date data and implications for water use, if known.
- SPU is to initiate reports to Cascade and request that they trigger their WSCPs.
- Provide periodic updated information on supply and demand data to Tukwila's retail customers via the City of Tukwila web page, or other means.

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- Meet with landscape industry representatives to inform them of current and projected conditions; develop partnership programs and informational materials on the shortage, consumption goals, etc. for distribution by industry and utilities. Use landscape industry newsletter to communicate with industry members. As appropriate, communicate essential information via email by using Resource Conservation’s professional landscape industry database.
- Communicate with other special interests, e.g., large water users including parks, and major water using industries and provide periodic updated information to a variety of key customers (see Attachment E for a list of key contacts and Attachment F for potential Advisory Stage tips for saving water).
- Step-up communication and encourage cooperation of City departments and other public agencies, including: state and federal resource agencies, tribes, and other water suppliers, including the Cities of Kent and Renton, about water supply conditions and projections.
- Prepare and distribute public information materials explaining the Water Shortage Contingency Plan stages and communicate water use efficiency tips to customers (see Attachment F).

3.3.5 Operating Actions

- Increase data collection actions and monitoring weather forecasts.
- Identify and implement supply side management techniques to optimize existing sources.
- Assess current water main flushing and reservoir cleaning activities to determine whether they should be accelerated to be completed prior to the peak season or reduced to conserve supply; communicate strategy to wholesale customers.
- Assess water quality in reservoirs and distribution system to identify areas that may experience severe degradation with reduced consumption.
- Initiate planning and preparation for Voluntary Stage actions, including an assessment of potential staffing impacts, training needs, and communications strategies.

3.4 Voluntary Stage

3.4.1 Objectives

- Take necessary supply management actions to further stretch available supply.
- Maintain or reduce demand to meet target consumption levels by customer voluntary actions.
- Forestall or minimize need later for more stringent demand or supply management actions.

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- Minimize the disruption to customers' lives and businesses while meeting target consumption goals.
- Maintain the highest drinking water quality standards throughout the shortage.

3.4.2 Triggers

The "Voluntary Stage" will be implemented when one or both of the following factors applies: 1) supply conditions have not improved, or have worsened, 2) demand levels need to be reduced given supply conditions.

3.4.3 Public Message

"Demand needs to be reduced by ____%. Customers are responsible for determining how they will meet that goal. We are relying on support and cooperation of all water users to stretch the available water supply. If everyone cooperates, we may avoid imposing more stringent restrictions. In addition to meeting essential water needs of customers, meeting the needs of fish habitat and other environmental concerns is a priority."

3.4.4 Communication Actions

- Communicate regularly with customers and groups that may be especially impacted by the water shortage in collaboration with resource agencies.
- Continue to communicate with other City departments and other public agencies to inform them of conditions, and encourage their cooperation.
- Consult with the Cascade Water Alliance, throughout the shortage, to help develop public information messages and to obtain feedback on utility shortage actions.
- Develop and initiate a strategic public information, media and advertising campaign appropriate to the severity of the problem and the goal for demand reductions. This could include publishing consumption information in daily newspapers to communicate the goal and ways to reduce consumption.
- Establish routine timing for press releases (e.g., every Monday morning) that provide current status and outlook; present information in standardized format that becomes familiar to media and public.
- Provide recommendations for customer actions to reduce consumption. See Attachment G for a list of recommended actions for this stage. Encourage customers to visit the *savingwater.org* website for more details on reducing water use.
- Include drinking water quality information in public information so that if flushing is necessary, the public understands that it is essential for drinking water quality maintenance.
- Publicize the water supply conditions on the City's web page, which is updated regularly. Ensure the information provided covers the needs of all key interests: the public, news media and key customers.

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- Establish and promote "hotlines" or websites for customers to obtain additional water conservation information.
- Contact largest customers to request percentage reduction.
- Establish regular communication mechanism to keep Department employees up to date on goals, conditions, and actions, especially utility account representatives that are tracking costs associated with the water shortage.
- Respond to customer correspondence regarding the shortage as quickly as possible and acknowledge receipt of correspondence if information is not readily available.

3.4.5 Operating Actions

- Continue actions listed in the Advisory Stage.
- Increase drinking water quality monitoring.
- Assess revenue implications and potential remedies, including reprioritizing current revenue, reprioritizing water utility fund expenses, and checking budget impacts.

3.4.6 Supply and Demand Management Actions

Based on the consumption goal, some or all of the following actions will be taken. **Those actions that are asterisked (*)** will be considered initially for implementation if demand reductions more than 10 percent are necessary, or later if voluntary measures are not delivering targeted savings.

Supply Actions

- Eliminate all operating system water uses determined to be non-essential to maintain drinking water quality such as pipeline flushing, reservoir overflows.
- Investigate using any existing interties to increase supply availability.*

Demand Actions

- Restrict hydrant permits to essential purposes.*
- Request that Fire Department limit training exercises that use water.
- Attachment G provides many possible actions customers can take to reduce water use. The actual actions requested at the time will depend on the specific demand reduction goal and the possible savings that can be achieved at that time.
- Evaluate ability to accelerate or enhance or expand long-term conservation programs; implement as appropriate.

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3.5 Mandatory Stage

3.5.1 Objectives

- Achieve targeted consumption reduction goals by restricting defined water uses.
- Ensure that adequate water supply will be available for the duration of the situation to protect public health and safety.
- Minimize the disruption to customers' lives and businesses while meeting target consumption goals.
- Maintain the highest drinking water quality standards throughout the shortage.
- Promote equity among customers by establishing clear restrictions that affect all customers.

3.5.2 Triggers

The “Mandatory Stage” will be implemented if supply conditions have not improved, or the level of demand needs to be further reduced.

3.5.3 Public Message

"It is necessary to impose mandatory restrictions to reduce demand because the voluntary approach has not resulted in the necessary savings [*or conditions have continued to get worse and even more savings are needed*]. We are continuing to rely on the support and cooperation of the public to comply with these restrictions, but need the certainty and predictability of restricting certain water uses in order to ensure that throughout the duration of this shortage an adequate supply of water is maintained for public health and safety."

3.5.4 Communication Actions

- Inform the public about the nature and scope of the mandatory restrictions through a press conference, potentially paid advertising and other means. The enforcement mechanisms, rate surcharges (if the City determines that a surcharge should be implemented at this stage), target consumption goals, projections for how long restrictions will be in place and the reasons for imposing restrictions will also be identified, as will the possible consequences if goals are not met.
- Identify clearly any exemptions from restrictions.
- In communicating mandatory restrictions to the public, distinguish clearly between lawn/turf watering and watering gardens since lawns and turf can go dormant in the summer. The type and amount of watering allowed will be clearly defined.
- Urge customers who irrigate with private wells, reclaimed or recycled water to install signs to let the public know the type of water being used.

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- Continue and enhance communication actions from the Advisory and Voluntary stages.
- Prepare plans to move into the fourth stage - Emergency Curtailment - and begin preparatory measures, as appropriate.

3.5.5 Operating Actions

- Continue appropriate actions from previous stages.
- Increase drinking water quality monitoring as necessary to ensure the water supply and demand management strategies will not result in unacceptable drinking water quality.
- Make reclaimed water available to tanker trucks for street cleaning, construction projects, landscape irrigation, dust control, etc., by special agreement if practical.

3.5.6 Supply and Demand Management Actions

Supply Actions

- SPU may commence emergency pumping of Chester Morse Lake when water levels are several feet above the rim of the natural lake and gravity flow is no longer sufficient, if needed.
- If not already implemented, activate interties and any other alternative sources of supply, as feasible.

Demand Actions

- Finalize and implement procedures for exemptions from restrictions.
- Consider implementing rate surcharges to accelerate customer compliance with the restrictions, as authorized by the Director. These could potentially be implemented as outlined under the Emergency Stage of this plan.
- Adopt Council legislation on mandatory restrictions and on rate surcharges, if surcharges are to be implemented.
- Intensify communication of actions that customers should be taking that are identified in Attachment G, and modify if needed.
- If supply conditions continue to deteriorate and irrigation is still occurring, before moving to the Emergency Curtailment Stage, lawn watering will be restricted. Newly installed lawns may be watered according to certain guidelines, if procedures described in the section below are followed.
- Possible water restrictions are noted below. The nature of the restrictions used will depend on the severity and timing of the situation:
 - Prohibit all watering during the warmest hours of the day, for example between 10:00 a.m. and 7:00 p.m.

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- Limit all watering to a specific number of days per week or per month. This choice will depend on target consumption goals, the time of year and the extent to which watering is occurring, and how much demands have already decreased. For example, if demand has already been reduced by 15% through other measures, during July and August limiting turf watering to **two** days a week on a region-wide basis could further reduce average daily demand by as much as 15 million gallons. Limiting lawn or turf watering to **one** day a week could yield an additional average daily reduction of up to 15 to 20 million gallons.
- Ban lawn watering (see exemptions section below), with other watering prohibited during the warmest hours of the day, for example, between 10:00 a.m. and 7:00 p.m. Note: This should be considered only when the less stringent measures noted above have been tried and found inadequate; it would be best to consult with utility and landscape partners before taking this action.
- Other possible restrictions are noted below. Again, the nature of the restrictions used will depend on the severity and timing of the situation:
 - Prohibit use of any ornamental fountain using drinking water for operation or make-up water.
 - Rescind hydrant permits.
 - Prohibit washing of sidewalks, streets, decks or driveways except as necessary for public health and safety.
 - Limit pressure-washing of buildings to situations that require it as part of scheduled building rehabilitation project (e.g., painting).
 - Prohibit water waste including untended hoses without shut-off nozzles, obvious leaks and water running to waste such as gutter flooding and sprinklers/irrigation whose spray pattern unnecessarily and significantly hits paved areas.

Possible Exemptions from Water Use Restrictions

Categories of possible exemptions include: new lawns, new landscapes, sport fields and golf courses, ball fields and play fields, use of water for dust control at construction areas and other areas to comply with air quality requirements. The exemptions noted in Attachment H are possibilities for Tukwila Public Works to consider in creating actual exemptions at the time of the event.

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3.6 Emergency Curtailment Stage

At this stage, Tukwila recognizes that a critical water situation exists and that, without additional significant curtailment actions, a shortage of water for public health and safety is imminent. This type of situation has never occurred in the Seattle Regional Water System's history.

This stage is characterized by two basic approaches. First, increasingly stringent water use restrictions are established. Secondly, significant rate surcharges are used to increase customer compliance. A surcharge is a key component to the success of this stage.

3.6.1 Objectives

Strive to meet the water use goals established for this stage, recognizing that customers' lives and businesses may be significantly impacted in order to achieve necessary water savings.

3.6.2 Triggers

The water savings needed to ensure sufficient water is available for public health and safety throughout the water shortage are not being achieved, or conditions have worsened, therefore, more stringent measures are needed.

3.6.3 Public Message

“We are in an emergency water supply situation and need the immediate assistance of the public to achieve necessary water savings. We are imposing additional water restrictions and a rate surcharge to achieve the savings because the mandatory approach has not resulted in sufficient savings [*or* conditions have continued to get worse], and we need to ensure water will be available for public health and safety throughout this shortage.”

3.6.4 Communication Actions

- Continue and intensify all previous, applicable actions.
- Define the problem to the public as an emergency and institute formal procedures to declare a city emergency.
- Inform customers of the rate surcharge and how it will affect them. Provide information on an appeal process.
- Coordinate with police and fire departments requesting their assistance in enforcing prohibition of water waste, if authorized by the Director.
- Inform customers that taste and odor water quality problems may occur with system-wide reduced water consumption.
- Inform customers about possible pressure reductions and problems that may occur, if any, due to the emergency water supply situation.
- Define and communicate exemptions for medical facilities and other public health situations.

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3.6.5 Operating Actions

- Continue actions listed in prior stages.
- Curtail fire line testing unless it can be shown to be essential to protect the immediate public health and safety.
- Further enhance drinking water quality monitoring actions.

3.6.6 Supply and Demand Management Actions

Supply Actions

- Continue actions listed in prior stages.

Demand Actions

- Implement rate surcharges to accelerate customer compliance with the restrictions, as authorized by the Director. These could potentially be implemented as follows:

Commercial Customers – Commercial, Educational, and Industrial users would be asked to reduce water use by a set percentage of their consumption during the same period in the previous year. Emergency rate surcharges would be established by legislative action to provide an additional incentive to reduce water use.

Residential/Multi-family Customers – A specific rate structure would be implemented for residential customers (includes single-family dwellings and duplexes). While there are differences in household size, there is more similarity in residential domestic water use than there is in commercial water use.

Exemption from Rate Surcharge for Special Medical Needs - The utility will exempt customers with special medical needs such as home dialysis from a rate surcharge, provided individual customers notify the utility of such a need.

- Prohibit all lawn and sport field watering, with no exemptions.
- Require that all fire fighting agencies discontinue the use of water in training exercises until emergency is over.
- Rescind all hydrant permits.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

4.0 NON-DROUGHT WATER EMERGENCY CURTAILMENT PLAN

4.1 Introduction

Although many of the demand reduction measures employed would be similar to those used during a progressive, weather-related shortage, non-drought water emergencies are unique because of a lack of preparation time and the urgency of immediate, potentially large-scale demand reductions. Each emergency scenario is different, but many could require major curtailment actions by customers. Also, unlike droughts, some emergencies may be very localized, requiring demand reduction for only a limited geographic area within the Tukwila Water Utility service area.

In order to provide a frame of reference for future emergency situations, a short discussion of potential major water emergencies is provided here. This WSCP complements Tukwila's Emergency Response Plan. That plan is a supplement to the City of Tukwila CEMP and would be implemented in immediate emergencies such as in the examples provided below. Tukwila's emergency plan defines decision-making authority in emergencies and creates specific emergency action plans for a number of systems, security, and management procedures, including information. Furthermore, if needed, Tukwila Public Works has emergency water provisioning equipment and plans for implementation as described in the "Emergency Drinking Water Distribution Plan." This plan would be implemented to provide water if customers in an area, or areas, were unable to receive water through normal means.

4.2 Types of Potential Non-Drought Water Emergencies

4.2.1 Major Transmission Pipeline Break

One potential water supply emergency is a major SPU transmission line break from the Cedar River supplies. The potential impact on customers would depend on the location of the break, which Tukwila supply taps are affected, the amount of time needed for SPU to repair, the season it occurred, and where Tukwila can receive emergency water from Kent, Renton, Highline or Water District 125.

4.2.2 Major River Flooding Leading to High Turbidity

If substantial flooding occurred on the Cedar River, it could lead to high turbidity causing SPU to temporarily stop using that supply. If major flooding occurred at the same time that Lake Youngs was at or below normal minimum operating levels, high turbidity could lead to a temporary shutdown of that supply. In 1990 such an event occurred on the Cedar, when flooding exceeded the 100-year event.

4.2.3 Catastrophic Terrorist Act

In this scenario, Emergency Management Best Practices and the Tukwila CEMP will be implemented. Tukwila had completed a Vulnerability Assessment for the Water Utility which was submitted to the Federal EPA outlining the response to this event.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

4.3 Supply and Demand Management during Non-Drought Water Emergencies

No single strategy can be created which will meet the needs of the department for all non-drought water emergency scenarios. Strategies for dealing with emergencies have been developed based on lessons learned from previous water utility events, and other utility experiences. The criteria listed in Section 1 of this WSCP create a framework for decision-making. Non-drought emergencies listed in this section may initially require quick and immediate response based upon best practices for emergency response. An assessment of the ‘down time’ for restoration will be communicated according to the criteria in this WSCP.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment A

Examples of Past Regional Drought Experiences

The droughts that the Seattle regional water system has experienced in recent history were very different types of droughts. While Tukwila has changed how it operates the system based on the lessons learned from the past, it is useful to be aware of these past drought events and the actions taken to successfully manage both supply and demand.

Summer/Fall Drought

In 1987, storage reservoirs were at normal levels on June 1, but the summer weather was unusually warm and dry. To reduce demand, in early August lawn watering was restricted to no more than once every three days and customers were urged to voluntarily curtail other water uses. These actions reduced demand by approximately 10 percent. In early fall, an emergency pumping station was installed by SPU at the Chester Morse Lake reservoir to pump "dead storage" in case the reservoir level fell below the lake's natural outlet.

Throughout the fall, precipitation continued below normal; the water supply system was managed and adjusted to obtain the maximum supply available (e.g., relying on Lake Youngs more than normal). In November 1987 and January 1988, the Chester Morse reservoir was low enough to require pumping and it was not until February 1988 that rainfall began refilling the storage reservoirs.

Winter/Spring Drought

In 1992, the system experienced a very different type of drought. Because the winter was unusually warm, snowpack and flows into the storage reservoirs were at record low levels. In late February, it was evident that there was insufficient snowpack to fill the storage reservoirs and that the likelihood of recovery by June 1 due to rainfall was low. A number of measures were taken to maximize available supply (e.g., reducing system flushing, adjusting stream flow levels, etc.) and to reduce demand. In May, a number of mandatory curtailment actions were implemented in the Seattle service area, including a ban on lawn watering. This resulted in an average consumption reduction of 25 to 30 percent below normal throughout the summer. Tribes, state resource agencies and the Army Corps of Engineers played a significant role in cooperating to maximize available water supply. In addition, other measures were taken to increase available supply including initiating an intertie with Renton and accelerating the construction of a second pump plant for use of dead storage at Chester Morse Lake. The mandatory restrictions were rescinded in September as supply levels returned to normal along with fall rains.

In 2005, SPU watersheds experienced the lowest snowpack in 60 years, one of the driest winters on record and warmer than normal winter temperatures. Water managers responded by activating the Advisory Stage of the WSCP, reducing system water use and maximizing the amount of water held in storage using the dynamic rule curve. As a result of this active management and nearly average rainfall in the spring, Tukwila was able to return to normal operations by summer that year.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment B

**Water Shortage Response Team and Water Shortage Advisory Group
Memberships and Roles**

Water Shortage Response Team

Purpose: Tukwila's internal team whose role is to evaluate conditions along with advisement from the Cascade Water Alliance, provide recommendations to the the Public Works Director on supply and demand actions, and make assignments to staff as needed to respond to the shortage.

Membership: The Team is appointed by the Director and may include the following members to fill the roles indicated; however, the actual composition may change at any time as requested by the Director:

- TUKWILA Director – Overall direction on the response.
- Division Managers – Input to Director for response.
- Lead for Shortage Response – Issue coordination, information gathering and dissemination, key support staff assignments, role clarification, and communication with broad array of interested parties.
- Operations Manager – Overall guidance on supply management, drinking water quality and operations, status of non-revenue water, issues related to potential alternative supplies, and opportunities for use of non-potable water.
- Resource Conservation Coordinator –Water use reduction measures management and messaging, cost estimates to achieve savings, and communication with landscapers, nurseries and large water users (commercial and residential).
- Communications Director and PIO – Messaging, customer relations, media relations, press releases, key contact for interagency Public Information Officers (PIOs), agency communication, and coordination with wholesale customers, cities of Everett and Tacoma and Central Puget Sound Water Suppliers' Forum.
- Finance Staff Representative – Cost estimates for supply alternatives, increased messaging needs and additional water use reduction measures, expected lost revenue estimates, budgets and charge number set-up for shortage-related activities, and process necessary to access revenue stabilization fund, if needed.

Water Shortage Advisory Group

Purpose: To advise the TUKWILA Water Shortage Response Team in defining messages and providing feedback on utility water shortage response actions and programs.

Membership: As a member of Cascade, Tukwila will work in concert with the CEO of Cascade based on the type of water shortage and how widespread it is. The Tukwila Public Works Director and his/her designee will send out invitations to potential neighboring agencies along with those regional partners and members of Cascade.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment C

Possible Demand Management Scenarios

Note: Information developed during spring 2005.

Scenarios	% Savings	Savings (in mgd)				Residential Indoor	Residential Outdoor	General Commercial	Commercial Outdoor
		Apr-May	Jun-July	Aug.	Sept-Oct				
Pre and Stage 1 Advisory	<1%	1	2	4	2	full clothes and dish washing machine loads, check and repair leaks	sweep driveways & sidewalks, water wisely, drought proof new plantings, top dress, aerate and grasscycle lawns, mulch all planting beds, use commercial car wash that recycles water	check and repair leaks, encourage employee suggestions, sweep driveways and sidewalks, voluntary City facility reductions	check systems and repair real time ET controllers, central controls for multi-control systems, rain shut-offs, soaker hose or drip alternatives, top dress, aerate, and grasscycle lawns, drought proof new plantings, mulch all planting beds
Stage 2 Voluntary Curtailment	5-10%	5	10	15	10	push above measures harder, 1 or more less minutes per shower, reduce toilet flushing, install efficient fixtures & appliances	push above measures harder, water only between 7 p.m and 10 a.m., allow lawn to go dormant, avoid draining hot tubs & pools, defer car washing, reduce landscape watering, water planting beds infrequently, new landscapes exempt	push above measures harder, mandatory City facility reductions, defer washing vehicles, inspect cooling towers, water at restaurants by request only, hotel linen change by request only, install efficient fixtures, cost-effectively invest in efficient technologies, use reclaimed water, if practical	push above measures harder, curtail fountain use, no make up water, suggest watering restrictions including time of day (new lawns exempt, sports fields partially exempt)

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Scenarios (cont.)	% Savings	Savings (in mgd)				Residential Indoor	Residential Outdoor	General Commercial	Commercial Outdoor
		Apr- May	Jun- July	Aug.	Sept- Oct				
Stage 3 Mandatory Curtail- ment	10-20%	10	20	30	15	push above measures harder	push above measures harder, prohibit vehicle washing, prohibit sidewalk, driveway washing, watering restrictions including time and number of days, new landscapes still exempt, no pool or hot tub drain & filling, curtail power washing, no fountain make-up water	push above measures harder, prohibit vehicle washing, defer major uses if possible, use reclaimed water if practical	push above measures harder, prohibit sidewalk, driveway washing, ET limitations for auto irrigation use, prohibit fountain use, watering restrictions including time and number of days, sports fields may be partially exempt, new lawns may be partially exempt
Stage 4 Emergency Curtail- ment	>20%	20	30	40	20	push above measures harder	push above measures harder, lawn watering ban, new landscape watering restrictions/ban	push above measures harder, must use reclaimed water if practical	push above measures harder, lawn watering ban, no potable water for irrigation, new landscape watering restrictions/ban

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment D

Estimated Cumulative Costs and Revenue Losses for WSCP Stages (based on 2013 dollars?)				
Revenue & Cost Impacts	Stage 1 Advisory	Stage 2 Voluntary	Stage 3 Mandatory	Stage 4 Emergency
Revenue Loss	\$ 0	\$ tbd	\$ tbd	\$ tbd
Cost	<u>\$ xx</u>	<u>\$ xx</u>	<u>\$ xx</u>	<u>\$ xx</u>
Demand Management				
customer outreach		5,000	5,000	5,000
customer incentives				
Enforcement				
North Hill Pumping				
pumping costs		81,000	81,000	81,000
Total: Revenue loss & costs	<u> xx</u>	<u> xx</u>	<u> xx</u>	
Financial Tools Used to Mitigate Impacts (descriptions below table)				
Reprioritize Current Revenue	X	X	X	X
Reprioritize Expenses		X	X	X
Withdrawal from Revenue Stabilization Fund			X	X
Rate Surcharge			X*	X
Notes:				
1) Estimates were created in spring of 2005 for 2005 event. Actual future costs would vary depending on the season, and specific actions taken in a given event. In 2005 SPU entered into Advisory Stage only.				
2) Above are costs incurred for each stage. The costs for Stages 2 - 4 include the costs incurred in the previous stage(s). Estimated lost revenue follows the same approach.				
3) Stage 4 revenue loss estimates here do not include funds that will be brought in by surcharges. Estimates for those surcharges have not been developed.				
* The City may implement a rate surcharge in the Mandatory Stage.				

Reprioritizing Current Revenue – This consists of reducing revenue contributions to the capital program and lowering the year end operating cash target. These are the most flexible resources to offset revenue and expenditure problems.

Reprioritize Expenses – Reducing planned operations and maintenance expenditures reduces demand on revenues or frees up money to meet unexpected needs.

Rate Surcharge – In emergency situations, rate surcharges send a strong signal to customers to reduce water use and also help to make-up revenues lost due to decreased demand.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment E

CONTACT LIST FOR WATER SHORTAGE CONTINGENCY PLAN

A working list of contacts for easy reference in case of a drought or emergency should be developed and regularly updated by the Tukwila Water Utility group in consultation with others in the Public Works Department. In addition to the communication elements contained in the WSCP, the following will be contacted directly in the event of a drought or emergency to inform them and ask for their support and cooperation in reducing demand.

Customers

List of wholesale water customers

List of large irrigators, including those using alternate sources

List of large commercial and industrial customers (i.e. Shasta, Boeing, Hotels, etc.)

City of Tukwila Contacts

Department Directors

Contacts for:

Tukwila Parks and Recreation Department

Tukwila Public Works Maintenance and Operations

Tukwila Engineering

Fire Department

Mayor's Office

Other public agencies with high visibility water use

State Department of Transportation

King County Department of Natural Resources & Parks

Tukwila School District

Highline Aviation High School

Landscape Interests

King County Cooperative Extension

Washington State Nursery and Landscape Association

Irrigation Association

Washington Association of Landscape Professionals

American Society of Landscape Architects

Pacific Northwest Golf Course Superintendents' Association

Washington Irrigation Contractors Association

*Note: Resource Conservation maintains a database of over 400 landscape-related businesses and other contacts.

Business Groups

South King County Chamber of Commerce

Boeing Commercial Airplane Co.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment F

**POSSIBLE ADVISORY STAGE WATER CONSERVATION TIPS
FOR CUSTOMERS**

Conserve Inside

For most households, the vast majority of water is used indoors. Taking conservation actions and installing efficient fixtures help reduce your water use year-round. There are also ways to conserve water in outdoor uses and at work. Below are suggested actions:

- Fix leaking faucets and toilets.
- Wash only full loads in the dishwasher and clothes washer.
- Minimize faucet use when brushing your teeth, shaving and washing dishes.
- Don't pre-rinse dishes unless you need to. Most new dishwashers don't require pre-rinsing.
- Save luke warm water for watering plants, etc. while you wait for hot water in kitchens and showers.
- If you are buying a new toilet, look for a FlushStar model. Call us or visit us online if you have questions.
- If you are buying a new washing machine, WashWise rebates are available for qualified machines.

Conserve Outside

Make the most of the water you will use in the spring and summer:

- Aerate lawns in the spring to better absorb water.
- Mulch planting beds to decrease evaporation.
- Select the right plants for the right place – contact TUKWILA or see our website for information.
- Tune-up and improve your irrigation system – rebates may be available.
- Wash your cars at locations that recycle their water.

Note: For more information on home water conservation tips for inside and out, visit www.savingwater.org or call 684-7283 (684-SAVE)

Conserve at Work

Businesses and institutions can reduce water use and lower utility costs by adopting conservation practices and replacing inefficient equipment or operations.

- Check for leaks.
- Use a broom, instead of a hose, to routinely clean driveways and sidewalks
- Turn off water-using equipment when not in use, including dishwashers, garbage disposals, and food troughs.
- Upgrade equipment efficiency – rebates may be available.
- Increase employee awareness of water conservation.
- Call (206) 343-8505 for technical assistance for work-related water-wise tips.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment G

**POSSIBLE VOLUNTARY STAGE CUSTOMER WATER
 SAVING ACTIONS**

The following voluntary actions are being requested of all customers:

SET A GOAL: Such as use 10% less water

Most customers can easily save 10% by choosing several items from the menu of water saving actions below. If you routinely do outdoor watering, select those actions first. Set a goal to reduce your water use by 10% from the amount you used during the same billing period last year. Most utility bills contain your water consumption for each billing period. Much of the 10% can probably be achieved through conservation actions that are wise to do all the time. If that is not sufficient, then the special curtailment actions listed here can be implemented during the duration of the supply problem.

REDUCE OUTDOOR WATER USE

Conservation Actions:

- Avoid **watering** between 10 AM and 7 PM to reduce evaporation.
- **Stop obvious water waste** such as gutter flooding, sidewalk and street watering, and fix leaks.
- **Never leave a hose running**, always use a shut-off nozzle.
- **Use a broom** rather than a hose or pressure washer to clean sidewalks and driveways.

Curtailment Actions:

- **Reduce lawn watering** (twice a week or less if possible).
- **Let your lawn go dormant.** Customers who choose to not water their lawns should water deeply once each rainless month to keep grass roots alive. To avoid runoff when you water, if the water puddles, cycle your sprinkler on and off until water is absorbed.
- **Refrain from filling** empty pools and hot tubs.
- **Turn off water features** and fountains.
- **Wash vehicles only at car washes that recycle their water.**

REDUCE INDOOR WATER USE

Conservation Actions:

- **Install a water efficient FlushStar toilet.** These toilets have proven to perform well and give long-term water savings. Replacing a frequently used old toilet with a new efficient toilet can save most households up to \$70 a year in utility bills (*based on data from 2005*). Check www.savingwater.org for FlushStar toilet models.
- **Install a high-efficiency clothes washer.** New washers are typically one-third more water efficient than old washers. Rebates are available from Seattle Public Utilities by calling (206) 684-SAVE.
- **Wash only full loads in the clothes washer and dishwasher,** or choose an appropriate load-size setting for the number of items in the washer.
- **Turn off the tap** while brushing your teeth, hand-washing dishes or shaving.
- **Fix leaky faucets and toilets.** Put several drops of food coloring in your toilet tank. After 20 minutes, if you have color in the bowl, you have a slow leak that over time can amount to a lot of water.

City of Tukwila

WATER SHORTAGE CONTINGENCY PLAN

- **Install an efficient showerhead.** New showerheads work well and use much less water than old high-flow models.
- **Install an efficient faucet aerator.** Replace your older bathroom faucet nozzle (aerator) with one that uses one gallon per minute or less.

Curtailment Actions:

- **Spend one minute less in the shower.** Try to limit showers to five minutes or less.
- **Flush your toilet less often.** Toilet flushing is the largest water use inside the home. As the saying goes, “If it’s yellow, let it mellow.”

REDUCE WATER USE AT WORK

There are a wide variety of opportunities for businesses and agencies to reduce their water use and operating expenses.

Conservation Actions:

- **Check cooling towers.** Cooling towers - and the ways that they regulate water use – represent real opportunities for improving water efficiency.
- **Check for and fix leaks.** Toilet and urinal leaks are very common. Investigate obvious or suspected leaks.
- **Use a broom,** instead of a hose or pressure washer, to routinely clean driveways and sidewalks.
- **Turn off water-using equipment** when not in use, including open hoses, dishwashers, garbage disposals, and food troughs.
- **Check air conditioners, refrigerators, and ice machines.** If your company's air conditioners or refrigerators use water-cooled condensers, investigate air-cooled equipment for possible efficiencies. Rebates are available. Visit www.savingwater.org.
- **Install water-efficient toilets, urinals and faucets** in public and employee restrooms. Replacing old toilets, urinals, and faucet aerators with efficient ones can produce substantial savings. Rebates are available. Visit www.savingwater.org.
- **Reuse process water.** Water used in industrial and manufacturing processes should be reused as often as possible. Rebates are available. Visit www.savingwater.org.
- Hospitality businesses can offer guests the option of clean linens each day.
- **Increase employee awareness of water conservation** through management memos or newsletter messages. Install signs that encourage water conservation in restrooms or work areas where water is used. For additional work-related conservation tips, call (206) 343-8505.

Curtailment Actions:

- **Reduce outdoor watering** (twice a week or less if possible). Rebates are available for smart irrigation technologies. Visit www.savingwater.org.
- **Minimize vehicle washing,** defer or use a water recycling car wash.
- **Turn off** decorative water fountains.
- **Serve water only on request** at restaurants. Avoid thawing with running water.
- **For home water conservation tips, visit www.savingwater.org**
or call (206) 684-7283 (684-SAVE)

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

Attachment H

POSSIBLE EXEMPTIONS FROM WATER USE RESTRICTIONS

New Lawns and Landscapes

If a lawn and/or landscape is installed prior to the date the watering restrictions were announced, and in the same calendar year, it may be watered for a limited duration on a daily basis for a specified number of days, e.g., 10 minutes per day for the first two weeks after its installation. After that period, some watering may still be allowed on a reduced basis. The watering may also be restricted to certain times of day. All details will be determined based on the time of year and severity of the shortage.

The utility will publicize the rules for exemptions to the lawn and landscape watering restrictions. The customer will need to contact the utility with name and address, stating that they meet the conditions and will be watering their lawn and/or landscape. This should be done in writing, either via email or other means. The utility reserves the right to spot check on site for compliance.

New lawns and landscapes may also be installed after the date of the restrictions. To receive a watering exemption the minimum requirements for soil preparation must be met and a signed affidavit provided to that effect. Minimum soil preparation consists of cultivating into the top six inches of existing soil at least two inches of organic soil amendment, such as composted yard waste. The same restrictions for watering as above would also apply.

For purposes of this exemption, “new lawn” refers to a lawn newly installed during the current year only. Overseeded or otherwise renovated lawns will not be exempt from the lawn watering restrictions.

Note: The utility will not guarantee continued watering. If the water supply situation worsens, any exemptions may be revoked. In the event that the shortage continues to worsen and the Emergency Curtailment Stage is activated, this exemption would be revoked.

Sports Fields and Golf Courses (greens and tees only)

Sports fields and golf courses (greens and tees only) can be watered according to an evapotranspiration (ET)-based schedule, provided at least the following:

- The irrigation system must be audited between 0 to 60 days prior to the effective date of the watering restrictions, by an Irrigation Association-certified Irrigation Auditor.
- The audit must find that the system's lowest quarter distribution uniformity is at least 70%.

City of Tukwila
WATER SHORTAGE CONTINGENCY PLAN

- Watering is prohibited during the warmest time of day. Specific times will be announced by the utility.
- Water running to waste is to be avoided.

Other Exemptions

For purposes of dust control, water may be applied to construction areas or other areas needing to comply with air quality requirements. If reclaimed water is available, consider requiring or promoting that it be used for dust control, if practical.

Ballfields and playfields may be watered at the minimum rate necessary for dust control and safety purposes.

COLIFORM MONITORING PLAN

Coliform Monitoring Plan

City of Tukwila Water Utility

A. SYSTEM INFORMATION

System Name: City of Tukwila	King County, Washington	System I.D. #: 89500F
Name of Plan Preparer Patrick Brodin	Position Operations Manager	Daytime Phone # (206) 433-1860
Number of Monthly Samples Required by Regulation: <u>18*</u>	Number of Sample Sites Needed: <u>4</u>	

*ROUTINE SAMPLING: The number of monthly samples is reduced because the City of Tukwila is part of a regional sampling program in conjunction with Seattle Public Utilities. SPU takes 21 samples (WFI stipulates 18).

SOURCES: The City of Tukwila receives all of its water through the treated Cedar Surface Water Supply from Seattle Public Utilities (DOH #S01 – ID #77050Y) under a Block Contract as a member agency of the Cascade Water Alliance.

TREATMENT: Tukwila receives all of its water from the Cedar River Watershed publicly owned and operated by Seattle Public Utilities. Public access is restricted and management of the watershed is guided by a Habitat Conservation Plan. Daily, more than 50 samples are tested before and after treatment at Seattle Public Utilities water quality lab for a variety of waterborne disease indicators, minerals, chemicals and contaminants. The Cedar supply source is:

- Screened to remove debris
- Chlorinated to remove microbial contaminants, such as bacteria and viruses
- Fluoridated for dental health protection
- Ozonated for odor and taste improvements and Giardia control
- Ultraviolet disinfected to disable microbial contaminants such as chlorine resistant Cryptosporidium
- Supplemented with lime for pH adjusted corrosion control to minimize lead leaching in older plumbing systems.

STORAGE: The North Hill Reservoir tank – 2,000,000-gallon concrete pre-stressed with connected 360-low zone and 400-high zone pumps located at 15045 57th Avenue South.

PRESSURE ZONES: Tukwila has six (6) pressure zones with taps on the Cedar Supply:

360-ZONE - Largest most extensive zone in the City covering the Central Business District (Southcenter et.al.) area, the Interurban/Duwamish Corridor, East Marginal Way to near Norfolk and the South Boeing Field area.

380-ZONE – Area serves the small residential Crystal Springs neighborhood.

400-ZONE – Area serves the Tukwila North Hill residential neighborhood.

490-ZONE – Area includes to upper Ryan Hill residential zone east of I-5

340-ZONE – Area includes to lower Ryan Hill zone including some commercial.

320-ZONE – Area has both Oxbow (separate tap) and North Boeing Field along East Marginal Way South to the north city boundary and SPU emergency intertie.

Coliform Monitoring Plan

City of Tukwila Water Utility

PRESSURE STATIONS: Booster pumps are located at the North Hill Reservoir for the 360-Zone and the 400-Zone. There are PRV (Cla-Valves) at all Cedar Supply taps that reduces the Lake Young's head from about 200 psi to approximately 150 psi system pressure at around 30 feet above mean sea level. At all emergency interties, PRVs are operated at pre-set thresholds to supply emergency supply from neighboring Utilities and Municipalities. A distribution system PRV exists at 9649 East Marginal Way South to supply North Boeing Field (320-zone) and another at 4900 South 107th Street to supply the Lower Ryan Hill zone. Isolation valves are used on the North Hill to flow into the 400-zone from the 360-zone should the Reservoir and high zone booster pumps need to be shut down.

B. Laboratory Information (Primary Contact: WSDOH 1-800-426-4791)

Seattle Public Utility (SPU) Water Quality Laboratory – (206) 684-3000.

Alternative Lab: Pace Analytical Services, 940 S. Harney St., Seattle, (206) 767-5060

C. ROUTINE, REPEAT, & TRIGGERED SAMPLE LOCATIONS

Location/Address for Routine Sample Sites	Location/Address for Routine Sample Sites
TU-1. 65 th Avenue South, north of Southcenter Boulevard in Tukwila's North Hill.	1-1. 65 th Avenue South at Tukwila Park, Sample Stand 1-2. Repeat Upstream – 6510 Southcenter Blvd. 1-3. Repeat Downstream – 6503 S. 153 rd Street 1-4. TBD (Varies in residential urban location)
TU-2. South 122 nd Street, west of 46 th Avenue South in the Allentown area.	2-1. South 122 nd St. & 46 th Avenue S. 2-2. Repeat Upstream – 4510 S. 122 nd Street 2-3. Repeat Downstream – 4622 S. 122 nd Street 2-4. TBD (Varies in residential urban location)
TU-3. 1232 Andover Park West north of South 180 th Street.	3-1. 1232 Andover Park West blue sample stand 3-2. Repeat Upstream – Business 1180 Andover Park West 3-3. Repeat Downstream – Business 6750 S. 180 th Street 3-4. TBD (Check with local business in vicinity)
TU-4. 53 rd Avenue South, south of S. 140 th Street	4-1. 53rd Avenue South & S. 140th Street 4-2. Repeat Upstream – 14010 53 rd Avenue S. 4-3. Repeat Downstream – Dickenson Residence/14038 53 rd Avenue South 4-4. TBD (Varies in residential urban location)

Coliform Monitoring Plan

City of Tukwila Water Utility

D. REDUCED TRIGGERED SOURCE MONITORING JUSTIFICATION

NOTE: The Tukwila Water Utility is not a groundwater wholesaler or consecutive water system. Please reference September 23, 2013 letter from Jim Nilson, SPU Sr. Water Quality Engineer (attached)

ROUTINE SAMPLE ROTATION SCHEDULE

Bi-weekly Sampling Rotation Schedule*

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1, 2, 3	TU-2	TU-1 TU-2			TU-3 TU-4
Week 4	TU-1 TU-2	TU-1	TU-2	TU-3 TU-4	TU-2 TU-3

*NOTE: Seattle Public Utilities allow for 23 scheduled samples per month but stop at 21 samples. No samples are scheduled on the 5th week of the month unless needed for make-up routes.

E. MONTH FOLLOWING UNSATISFACTORY SAMPLES

The City of Tukwila has 4 designated sampling stands meeting the Seattle Public Utilities sample station specifications and requirements. Sample collection locations will be at locations shown in Table C above for repeat upstream and downstream locations. Washington State DOH publication 331-036 (revised) recommends a normal monitoring schedule since the Tukwila system collects five or more routine samples each month.

F. *E. coli* – PRESENT RESPONSE PLANS

Tukwila does not use groundwater sources, therefore any unsatisfactory total coliform samples require a response plan only for a distribution system sample. When two related samples (a routine and one or more of its corresponding repeat samples) test positive for total coliform bacteria – and there is *E. coli* bacteria in one or more of the samples, immediate public notification (within 24 hours) is required. A Distribution System *E. coli* Response Checklist is made a part of this plan (see attached).

G. SYSTEM MAP (Included with Tukwila Comprehensive System Plan; an 8½” by 11” schematic is included showing sampling stand locations.)

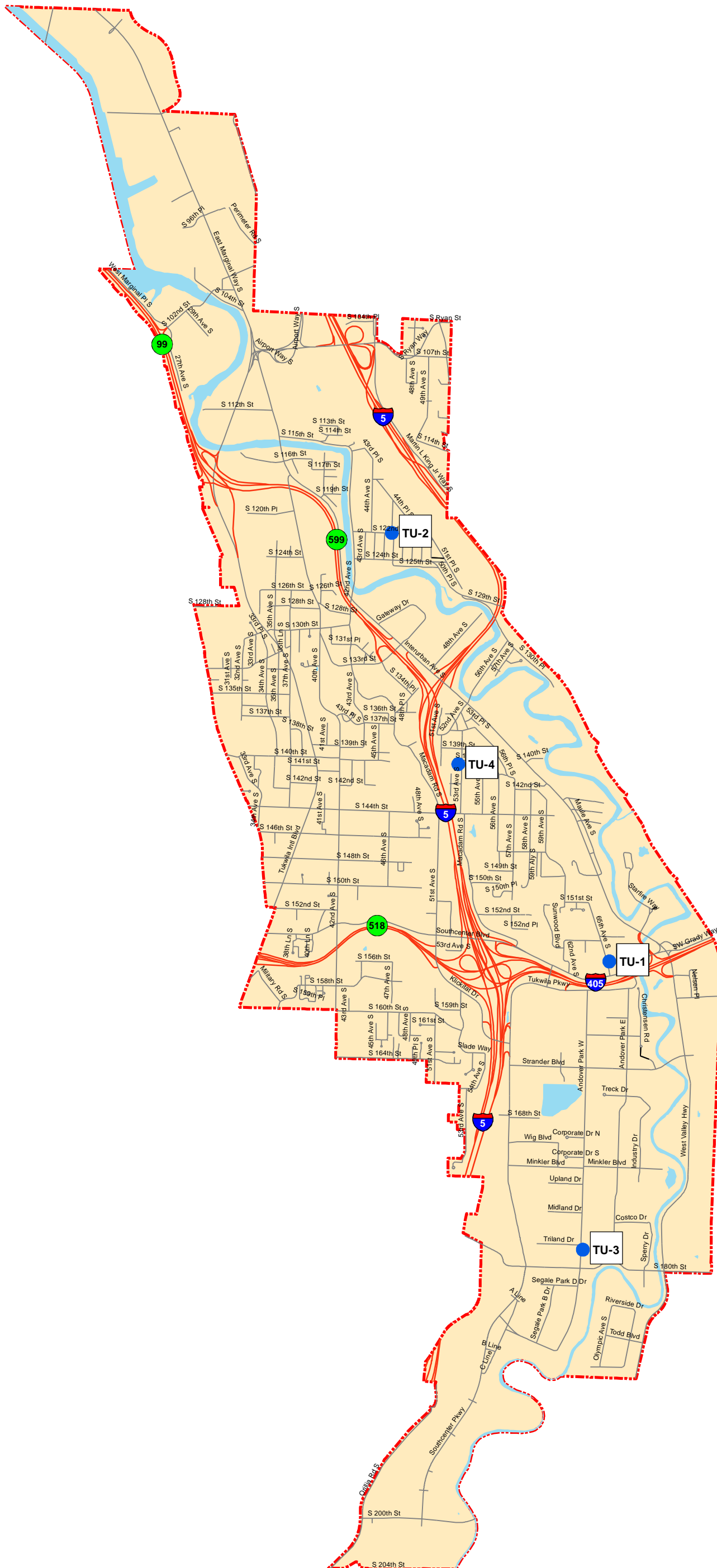


City of Tukwila

Water Sample Stand Locations



Not to Scale



Vicinity Map



Disclaimer:
The location of features and boundaries are approximate and are intended for reference only. Data is based on best information available.



Appendix F - Instructions for Sample Collection

1. Check calendar to determine your route and take a handheld PC with the appropriate route downloaded on it and field data sheet.
2. Grab sterilized sample bottles from the sample receiving room and place in cooler. Two ice packs are required for the large coolers and a single ice pack is required for the small coolers. Always take at least 2 to 3 extra bottles along with you in case a sample bottle is contaminated in the field. Make sure the sample bottles are designated for bacteriological use and are labeled with a SPU Water Quality LIMS bar code.
3. When you arrive at the sample stand check the flow. If the water is not flowing or flowing at a low velocity, flush the sample stand at a high velocity for 5 to 10 minutes. Then return the flow to an acceptable velocity and allow to flow for an additional 2 to 3 minutes. Before sampling, scan the bar code of the Sample Site (inside the sample stand) and sample bottle with the handheld. Then measure the water temperature and chlorine residual by using the digital thermometer and digital HACH Pocket Colorimeter. Enter the results into your handheld PC and record on your field data sheet. You may then collect a sample.
4. When you are ready to collect a sample, hold the bottle at the base, remove the sterile seal, and unscrew the cap. Hold the cap so that the threads are facing downward. Do not set the sample cap down and do not allow your fingers to touch the inner surface of the cap.
5. Immediately fill the sample bottle up to the shoulder leaving ample air space (approximately 1 inch of air space is adequate). Avoid splashing while filling the bottle and do not overflow the bottle. If you do overflow the bottle, get a new sample bottle and try again. At no point during sampling should the sample bottle touch the sample tap or any other surface.
6. After filling the bottle to the appropriate level, immediately cap the bottle securely. Write the sample location on the bottle label and place bottle in an upright position in the cooler. Do not throw or toss the bottle in the cooler. It is important that samples remain cool ($<10^{\circ}\text{C}$) during transit, so keep cooler lid closed when not in use.
7. If at any point you are uncertain of the sterility of the sample bottle or your sample collection technique, get a new bottle and start all over. It's always better to be safe.
8. After collecting and capping sample, flush sample stand at a high velocity for 5 minutes. This is very important to minimize bacterial growth in the sample stand.
9. After completing route, check to make sure that all of the samples listed on your field data sheet have been collected. Do not collect samples from locations which are not listed on your field data sheet. Once back at the lab, download the handheld to the LIMS computer and generate the LIMS sample labels for each sample collected. Review and check that the field data has been entered into the LIMS correctly.
10. Keep your coolers clean. At least once a week, clean out your coolers with soap and water.

Coliform Sampling Procedure

The State Department of Health Office of Drinking Water (ODW) recommends that you collect your sample using the following steps. If instructions from your laboratory are different, please call ODW for clarification.

Generally the sample kit contains:

- A sample bottle
- A lab form
- A rubber band

The general sampling procedure for coliform monitoring is as follows:

Step One

Routine and repeat samples should be collected from sites throughout the distribution system in accordance with your Coliform Monitoring Plan.

Choose a sample tap that represents the water in your distribution system. Avoid poor sample sites such as swivel faucets, hot and cold mixing faucets (with a single lever), leaky or spraying faucets, drinking fountains, janitorial sinks, frost-free hose bibs, and faucets below or near ground level.

Step Two

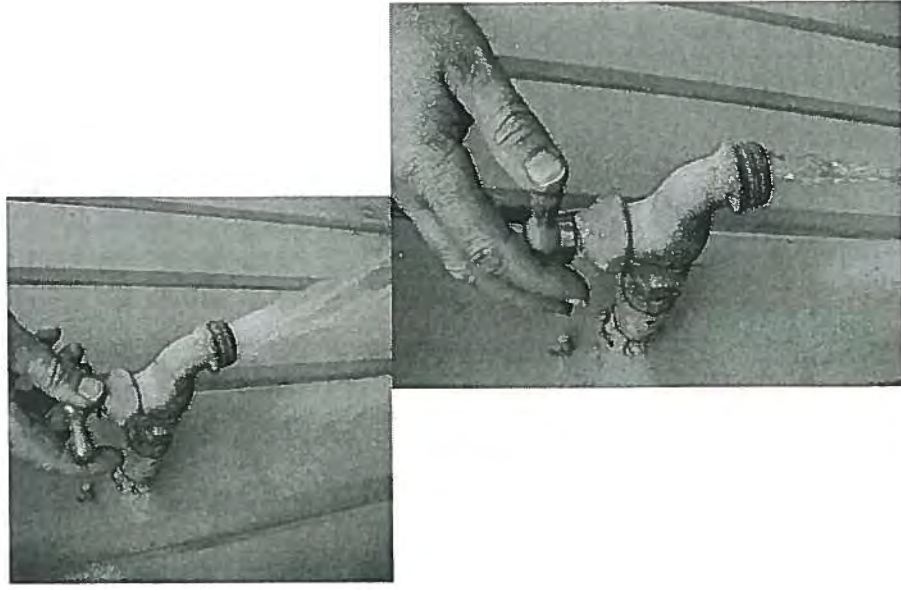
Remove any attachments from the faucet, including aerators, screens, washers, hoses, and water filters. If you choose to disinfect the sample site prior to sample collection, be sure to thoroughly flush until all disinfectant is removed.



DOH PUB #331-225

Step Three

Turn on the cold water only and let it run with a steady stream for at least five minutes. Before collecting the sample, turn the water down to a thin stream (about the width of a pencil), then let the water run one minute. If the system is chlorinated, measure the chlorine residual and note the results on the lab slip. Water conservation tip: The flushed water may be saved in a bucket to be used later.



Step Four

There may be some liquid or powder in the sample bottle to neutralize any chlorine that may be present. Do not rinse it out.

Step Five

To avoid contamination while taking the sample, hold the bottle near the bottom with one hand, hold the top of the cap with the other, and then unscrew the cap.

Do not set the cap down, touch any part of the cap that touches the bottle, or let anything touch the rim of the bottle or the inside of the cap.

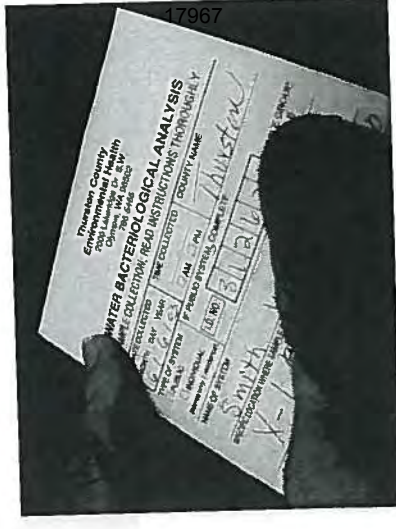


Step Six

Hold the bottle under the stream of water, being careful not to let the bottle touch the sample tap. Fill the bottle to the neck or indicated fill line but do not allow it to overflow. Remove the bottle from the water flow and replace the cap.

Step Seven

Complete the lab slip. If there was anything unusual about the sample collection, note it on the lab slip.



Laboratory forms vary, but the following information is very important to complete:

- Water system ID number
- Water system name
- Collection date and time the sample was taken



- Type of sample (check ONLY ONE Type: Routine, Repeat, Raw, or For Information Only)
- Sample location (street address or other type of location identifier)
- System type (Group A or B)

Step Eight

Secure the lab slip to the bottle with the rubber band. Deliver the sample to a certified lab or to a designated drop-off location for the lab as soon as possible. Lab analysis must begin within 30 hours of sample collection.

If you have questions about coliform sampling collection procedures, contact your regional office:

SW Regional Office:
(360) 236-3044

NW Regional Office:
(253) 395-6775

Eastern Regional Office:
(509) 456-2788

For more information

TUKWILA PUBLIC WORKS DEPARTMENT
6300 Southcenter Boulevard, Tukwila, WA 98188
Phone: 206-433-0179 Water Maintenance: 206-433-1860
Email: Public.Works@TukwilaWA.gov
Website: www.TukwilaWA.gov

CASCADE WATER ALLIANCE
Conservation Rebates: 425-453-0930
Website: www.CascadeWater.org/

ENVIRONMENTAL PROTECTION AGENCY
Groundwater and Drinking Water site:
www.EPA.gov/safewater/index.html

Safe Drinking Water Hotline email
hotline-sdwa@epamail.EPA.gov

Safe Drinking Water Hotline: 1-800-426-4791

PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND
HEALTHIER WASHINGTON

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City of Seattle
Seattle Public Utilities

September 23, 2013

Mr. Pat Brodin
Operations Manager Div. I & II
City of Tukwila
600 Minkler Boulevard
Tukwila, WA 98188

Dear Mr. Brodin,

The Ground Water Rule is a drinking water regulation that went into effect in 2009. This letter is to inform you about compliance with the Ground Water Rule when the Seattle Wells are used. We are required to send this letter to you as part of our compliance plan. The Washington Dept. of Health has indicated that you need to include reference to this letter in your utility's Coliform Monitoring Plan.

As part of SPU's compliance plan for the Ground Water Rule, we have analyzed which wholesale customers could receive water from our wells. Based on our analysis, your water system will not receive water from the Seattle Wells when they are operating. Therefore, the use of the Seattle Wells will not affect your utility with respect to the requirements of the Ground Water Rule.

If you have any questions about this letter, please feel free to contact me at 206-615-1363 or jim.nilson@seattle.gov.

Sincerely,

Jim Nilson
Sr. Water Quality Engineer

Copy: Carol Stuckey, DOH
Chuck Clarke, CWA
Dave Hilmoie, SPU
Terri Gregg, SPU
Wylie Harper, SPU
Lynn Kirby, SPU

Ray Hoffman, Director
Seattle Public Utilities
700 5th Avenue, Suite 4900
PO Box 34018
Seattle, WA 98124-4018

Tel (206) 684-5851
Fax (206) 684-4631
TDD (206) 233-7241
ray.hoffman@seattle.gov

<http://www.seattle.gov/util>

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IDSE REPORT

Form 7: IDSE Report for Standard Monitoring

Page 1 of 14

I. GENERAL INFORMATION**A. PWS Information*****B. Date Submitted* December 16, 2008**PWSID: WA53 89500PWS Name: City of TukwilaPWS Address: 6300 Southcenter Blvd.City: TukwilaState: WAZip: 98188Population Served: 21,000

System Type:	Source Water Type:	Buying / Selling Relationships:
<input checked="" type="checkbox"/> CWS	<input checked="" type="checkbox"/> Subpart H	<input checked="" type="checkbox"/> Consecutive System
<input type="checkbox"/> NTNCWS	<input type="checkbox"/> Ground	<input type="checkbox"/> Wholesale System
		<input type="checkbox"/> Neither

C. PWS OperationsResidual Disinfectant Type: Chlorine Chloramines Other: _____Number of Disinfected Sources: ___ Surface ___ GWUDI ___ Ground 1 Purchased**D. Contact Person***Name: Mike CusickTitle: Utilities EngineerPhone #: 206-433-2441Fax #: 260-431-3665E-mail: mcusick@ci.tukwila.wa.us**II. STAGE 2 DBPR REQUIREMENTS*****A. Number of Compliance Monitoring Sites**Highest TTHM: 3Highest HAA5: 1Existing Stage 1: NATotal: 4**B. Schedule** Schedule 1 Schedule 2 Schedule 3 Schedule 4**C. Compliance Monitoring Frequency** During peak historical month
(1 monitoring period) Every 90 days (4 monitoring periods)

Form 7: IDSE Report for Standard Monitoring Page 2 of 14

III. MONITORING RESULTS*

- A. Did you deviate in any way from your approved standard monitoring plan?** Yes No

If YES, explain (attach additional pages if necessary):

1. The samples for Site T-3 were recollected on October 25, 2007 due to contamination of the original samples collected on October 15. Special consideration was given to the October data from Site T-3 in selection of the Stage 2 Sites. Inspection of the data collected indicates that Site T-3 trended consistently highest over the course of the year-long standard monitoring period. As such, it was determined that the late re-collection at this site had minimal impact on the site selection process and on the re-evaluation of peak-historical month.

- B. Where were your TTHM and HAA5 samples analyzed?**

In-House

Is your in-house laboratory certified?

Yes No

Certified Laboratory

Name of certified laboratory: Seattle Public Utilities Water Quality Laboratory

- C. What method(s) was used to analyze your TTHM and HAA5 samples?**

TTHM

HAA5

EPA 502.2

EPA 552.1

EPA 524.2

EPA 552.2

EPA 551.1

EPA 552.3

SM 6251 B

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

D. IDSE Standard Monitoring Results - TTHM

Site ID ¹	Data Type	TTHM (mg/L)						LRAA
E-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.014	0.011	0.015	0.013	0.024	0.015	0.015
A-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.016	0.014	0.016	0.018	0.031	0.019	0.019
A-2	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.019	0.016	0.016	0.020	0.031	0.026	0.021
T-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.031	0.024	0.024	0.031	0.038	0.039	0.031
T-2	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.029	0.013	0.019	0.029	0.033	0.028	0.025
T-3	Sample Date	10/25/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.037	0.024	0.024	0.032	0.041	0.043	0.033
H-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.027	0.022	0.019	0.031	0.037	0.026	0.027
H-2	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.019	0.014	0.016	0.019	0.025	0.016	0.018

¹ Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan. Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

E. IDSE Standard Monitoring Results - HAA5

Site ID ¹	Data Type	HAA5 (mg/L)						LRAA
E-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.022	0.017	0.022	0.020	0.030	0.013	0.021
A-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.020	0.020	0.024	0.024	0.036	0.025	0.024
A-2	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.024	0.022	0.024	0.027	0.039	0.021	0.026
T-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.030	0.029	0.034	0.036	0.043	0.032	0.034
T-2	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.029	0.026	0.026	0.035	0.044	0.021	0.030
T-3	Sample Date	10/25/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.030	0.026	0.035	0.037	0.035	0.027	0.032
H-1	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.026	0.029	0.034	0.041	0.038	0.022	0.032
H-2	Sample Date	10/15/2007	12/17/2007	2/19/2008	4/21/2008	6/16/2008	8/18/2008	
	Sample Result	0.019	0.019	0.024	0.027	0.033	0.016	0.023

¹ Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan. Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

F. Stage 1 DBPR Compliance Monitoring Results - TTHM

Site ID ¹	Data Type	TTHM (mg/L)				LRAA
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

¹ Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan. Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

G. Stage 1 DBPR Compliance Monitoring Results - HAA5

Site ID ¹	Data Type	HAA5 (mg/L)				LRAA

¹ Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan. Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

IV. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
SMP# T-3	<input checked="" type="checkbox"/> Highest TTHM <input type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	Highest TTHM LRAA
SMP# T-1	<input type="checkbox"/> Highest TTHM <input checked="" type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	Highest remaining HAA5 LRAA
SMP# H-1	<input checked="" type="checkbox"/> Highest TTHM <input type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	Highest remaining TTHM LRAA
SMP# T-2	<input checked="" type="checkbox"/> Highest TTHM <input type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	Highest remaining TTHM LRAA
	<input type="checkbox"/> Highest TTHM <input type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	
	<input type="checkbox"/> Highest TTHM <input type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	
	<input type="checkbox"/> Highest TTHM <input type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	
	<input type="checkbox"/> Highest TTHM <input type="checkbox"/> Highest HAA5 <input type="checkbox"/> Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

Page 8 of 14

V. PEAK HISTORICAL MONTH AND PROPOSED STAGE 2 DBPR COMPLIANCE MONITORING SCHEDULE

A. Peak Historical Month* June

B. Is Your Peak Historical Month the Same as in Your IDSE Standard Monitoring Plan?

Yes No

If no, explain how you selected your new peak historical month (*attach additional sheets if needed*)

See Attachment 1

C. Proposed Stage 2 DBPR Compliance Monitoring Schedule*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week) ¹			
	period 1	period 2	period 3	period 4
SMP# T-3	2 nd Week of June	2 nd Week of September	2 nd Week of December	2 nd Week of March
SMP# T-1	2 nd Week of June	2 nd Week of September	2 nd Week of December	2 nd Week of March
SMP# H-1	2 nd Week of June	2 nd Week of September	2 nd Week of December	2 nd Week of March
SMP# T-2	2 nd Week of June	2 nd Week of September	2 nd Week of December	2 nd Week of March

¹ period = monitoring period. Complete for the number of monitoring periods from Section II.C.

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

VI. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system if it has changed since you submitted your Standard Monitoring Plan (Form 6).

VII. ATTACHMENTS

- Additional sheets for explaining how and why you deviated from your standard monitoring plan (Section III).
- Additional sheets for Standard Monitoring Results (Section III). **REQUIRED** if you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- Additional sheets for Stage 2 DBPR Compliance Monitoring Sites (Section IV). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- Additional sheets for explaining how you selected the peak historical month (Section V).
- Additional sheets for proposed Stage 2 DBPR peak historical month and compliance monitoring schedule (Section V). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- Distribution system schematic* (Section VI). **REQUIRED** if it has changed from **your approved IDSE standard monitoring plan**.
- Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: 14

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR

Attachment 1
Additional Sheets Explaining Selection of Peak Historical Month
(Section V)

In the SMP developed for Tukwila the peak month was expected to be August based on temperature data. Results of IDSE Standard Monitoring indicate that the peak month for both TTHM and HAA5 formation is June (averages of 32.0 ppb and 37.0 ppb, respectively). The TTHM and HAA5 averages calculated for each site during each monitoring period are summarized in the Table below. The highest average month for each type of DBP are highlighted in the Table.

Sampling Period	Average TTHM (mg/L)	Average HAA5 (mg/L)
10/15/2007	0.024	0.025
12/17/2007	0.017	0.024
2/19/2008	0.019	0.028
4/21/2008	0.024	0.031
6/16/2008	0.032	0.037
8/18/2008	0.027	0.022
Overall	0.024	0.028

Because the highest TTHM and HAA5 concentrations observed during standard monitoring were both observed in June, June has been determined to be the City's new peak historical month.

Attachment 2
Compliance Calculation Procedures

Compliance Calculation Procedures

Compliance monitoring for the DBPR Stage 2 will occur at sampling intervals of 90 days. During each sample period, samples will be collected at the sites specified in the IDSE Report. The Site I.D.s and physical locations of the four compliance monitoring sites specified for the City of Tukwila are summarized in the table below:

Stage 2 Compliance Monitoring Site ID		Location
1	T-3	Hydrant located at 15335 Sunwood Blvd.
2	T-1	Hydrant #51 at S. 147th St. and 59th Ave. S.
3	H-1	SS-8 at 7755 East Marginal Way S.
4	T-2	Hydrant #38-C at Fort Dent Way and Starfire Way

Sampling at all four sites will occur at the following regular sampling periods each year starting in 2012:

Period 1	Period 2	Period 3	Period 4
2 nd Week of June	2 nd Week of September	2 nd Week of December	2 nd Week of March

Samples collected during Stage 2 DBPR compliance monitoring periods will be analyzed for TTHM and HAA5 at the SPU Water Quality Laboratory or some other certified laboratory. TTHM will be analyzed using EPA 524.2, EPA 502.2 or EPA 551.1. HAA5 will be analyzed using EPA 552.1, EPA 552.2, EPA 552.3 or SM 6251B.

At the end of the each quarterly monitoring period, locational running annual averages (LRAAs) for TTHM and HAA5 at each site will be calculated and reported based on the sampling results of that quarter and the three preceding quarters. LRAA calculation and reporting will begin the fourth sampling period after the Stage 2 DBPR is implemented in April of 2012, and continue regularly every following quarter. For example, the first 2 compliance calculation and reporting periods will proceed as follows:

March 2013: TTHM and HAA5 LRAAs calculated and reported for each site using results from June 2012, September 2012, December 2012, and March 2013.

June 2013 (2nd reporting period): TTHM and HAA5 LRAAs for each site using results from September 2012, December 2012, March 2013, and June 2013.

The method for LRAA calculations will use the arithmetic average of the four most recent quarterly sets of results for HAA5 or TTHM at each site. LRAA calculations will follow the method of the sample calculation below:

Given the following hypothetical set of compliance monitoring results for Site T-3:

<u>HAA5</u>	<u>TTHM</u>
Period 1 = 0.0283 mg/L	Period 1 = 0.0303 mg/L
Period 2 = 0.0294 mg/L	Period 2 = 0.0310 mg/L
Period 3 = 0.0285 mg/L	Period 3 = 0.0296 mg/L
Period 4 = 0.0312 mg/L	Period 4 = 0.0294 mg/L

The LRAAs for Site T-3 would be calculated as follows:

$$LRAA_{HAA5} = \left[\frac{(Period1\ Result) + (Period2\ Result) + (Period3\ Result) + (Period4\ Result)}{4} \right]$$

$$= \left[\frac{(0.0283) + (0.0294) + (0.0285) + (0.0312)}{4} \right] = 0.02935\text{mg} / L$$

Results for each DBP LRAA shall be rounded to three places (i.e. 1 part per billion) for reporting to the State:

$$LRAA_{HAA5} = 0.02935\text{mg} / L \Rightarrow 0.029\text{mg} / L$$

$$LRAA_{TTHM} = \left[\frac{(Period1\ Result) + (Period2\ Result) + (Period3\ Result) + (Period4\ Result)}{4} \right]$$

$$= \left[\frac{(0.0303) + (0.0310) + (0.0296) + (0.0294)}{4} \right] = 0.030075\text{mg} / L$$

Results rounded for reporting:

$$LRAA_{TTHM} = 0.030075\text{mg} / L \Rightarrow 0.030\text{mg} / L$$

IDSE STANDARD MONITORING PLAN

LEAD and COPPER REPORT - Residential Monitoring

System Name: Tukwila Water Department
 PWS No.: 89500
 Method: EPA 200.8

Source Name:
 DOH Source No. D93
 County: King.

Lab Number	Collection Date	Recieved Date	Analysis Date	Location	DOH # :		Lead_mg/L	Copper_mg/L		Analyst
					SRL:	Action Level:		0.09	0.023	
07411036	06/19/2012	06/19/2012	08/22/2012	14262 - 55th Ave S.	121CW094s		0.0006	0.032	MATEOL	
07411037	06/19/2012	06/19/2012	08/22/2012	15185 - 62nd Ave. S.	121CW462s		0.0051	0.065	MATEOL	
07411163	06/20/2012	06/20/2012	08/22/2012	5327 S. 140th St.	121CW461s		0.0000	0.014	MATEOL	

Total samples: 3

Laboratory Supervisor: *Jan A. Dunn*

17967

WATER FACILITIES INVENTORY FORM



WATER FACILITIES INVENTORY (WFI) FORM

Quarter: 1
 Updated: 11/20/2012
 Printed: 03/14/2013
 WFI Printed For: On-Demand
 Submission Reason: Annual Update

ONE FORM PER SYSTEM

RETURN TO: Northwest Regional Office, 20425 72nd Ave S STE 310, Kent, WA, 98032

1. SYSTEM ID NO. 89500 F	2. SYSTEM NAME TUKWILA WATER DEPARTMENT	3. COUNTY KING	4. GROUP A	5. TYPE Comm
-----------------------------	--	-------------------	---------------	-----------------

6. PRIMARY CONTACT NAME & MAILING ADDRESS PAT BRODIN [OPERATIONS MANAGER] 600 MINKLER BLVD TUKWILA, WA 98188 RECEIVED MAR 19 2013 TUKWILA CITY SHOPS	7. OWNER NAME & MAILING ADDRESS TUKWILA, CITY OF BOB GIBERSON 6200 SOUTHCENTER BLVD TUKWILA, WA 98188 TITLE: PW DIRECTOR	8. Owner Number 002989
STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS CITY STATE ZIP	STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS CITY STATE ZIP	

9. 24 HOUR PRIMARY CONTACT INFORMATION Primary Contact Daytime Phone: (206) 433-1861 Primary Contact MobileCell Phone: (206) 571-6279 Primary Contact Evening Phone: (206) 433-1808 Fax: (206) 575-3404 E-mail: pat.brodin@tukwilawa.gov	10. OWNER CONTACT INFORMATION Owner Daytime Phone: (206) 431-2457 Owner MobileCell Phone: Owner Evening Phone: (206) 433-1808 Fax: (206) 431-3665 E-mail: bob.giberson@tukwilawa.gov
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WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

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

Not applicable (Skip to #12)
 Owned and Managed SMA NAME: _____ SMA Number: _____
 Managed Only
 Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark ALL that apply)

<input type="checkbox"/> Agricultural	<input checked="" type="checkbox"/> Hospital/Clinic	<input checked="" type="checkbox"/> Residential
<input checked="" type="checkbox"/> Commercial / Business	<input checked="" type="checkbox"/> Industrial	<input checked="" type="checkbox"/> School
<input type="checkbox"/> Day Care	<input type="checkbox"/> Licensed Residential Facility	<input type="checkbox"/> Temporary Farm Worker
<input checked="" type="checkbox"/> Food Service/Food Permit	<input checked="" type="checkbox"/> Lodging	<input type="checkbox"/> Other (church, fire station, etc.):
<input checked="" type="checkbox"/> 1,000 or more person event for 2 or more days per year	<input checked="" type="checkbox"/> Recreational/ RV Park	

13. WATER SYSTEM OWNERSHIP (mark only one)	14. STORAGE CAPACITY (gallons)
<input type="checkbox"/> Association <input checked="" type="checkbox"/> City / Town <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> Investor <input type="checkbox"/> Private <input type="checkbox"/> Special District <input type="checkbox"/> State	2,000,000

15 Source Number	16 SOURCE NAME LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	17 INTERTIE INTERTIE SYSTEM ID NUMBER	18 SOURCE CATEGORY											19 USE	20	21 TREATMENT					22 DEPTH DEPTH TO FIRST OPEN INTERVAL IN FEET	23 CAPACITY (GALLONS PER MINUTE)	24 SOURCE LOCATION						
			WELL	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RAINFY / INF. GALLERY	OTHER	PERMANENT	SEASONAL			EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION			FLUORIDATION	IRRADIATION (UV)	OTHER	1A, 1A SECTION	SECTION NUMBER	TOWNSHIP	RANGE
SD1	77050Y/SEATTLE	77050 Y													X			X							2500			00N	00E
SD2	71850L/RENTON	71850 L													X		X								0	SW	25	23N	04E
SD3	381501/KENT	38150 1													X		X							0	SW	36	23N	04E	
SD4	406506/HIGHLINE	40650 6													X		X							0	NE	35	23N	04E	
SD5	41998T/KCWD # 125	41998 T													X		X							0	NW	10	23N	04E	

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO. 89500 F	2. SYSTEM NAME TUKWILA WATER DEPARTMENT	3. COUNTY KING	4. GROUP A	5. TYPE Comm
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	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY APPROVED
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	3476	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	1299		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	172		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	2005		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	729	729	
28. TOTAL SERVICE CONNECTIONS		4205	

29. FULL-TIME RESIDENTIAL POPULATION
A. How many residents are served by this system 180 or more days per year? 8260

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

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?	14000	14000	14000	14000	14000	14000	14000	14000	14000	14000	14000	14000
B. How many days per month is water accessible to the public?	31	28	31	30	31	30	31	31	30	31	30	31

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	495	495	495	495	495	495			495	495	495	495
B. How many days per month are they present?	19	18	23	17	20	8			21	21	18	13

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Requirement is exception from WAC 246-290	18	18*	18*	18*	18*	18*	18*	18*	18*	18*	18*	18*

35. Reason for Submitting WFI:

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

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

SIGNATURE: _____ DATE: _____
 PRINT NAME: _____ TITLE: _____

STANDARD SPECIFICATIONS & DETAILS

CHAPTER 7 WATER SUPPLY

SECTION 7.0 GENERAL

7.0.1 COMPREHENSIVE WATER PLAN

The City of Tukwila has adopted a Comprehensive Water Plan to ensure the development of an efficient and adequate water supply system for the City. All extensions, additions, changes, or alterations to the City water system shall be consistent with the Comprehensive Plan.

The Comprehensive Plan indicates the general location and configuration of the proposed system supply mains, interties, and loops. The exact location or configuration of the system may be modified or adjusted by the Developer, provided the proposed system remains consistent with the overall concept of the Plan. All modifications to the Comprehensive Plan design requirements require written approval by the Director.

If the City's Comprehensive Water Plan anticipates or indicates the system may be expanded in the future, the permit application plan submittal shall include the expansion plan into the design.

Refer to Figure 7 for water district boundaries within Tukwila.

7.0.2 SYSTEM PRESSURE

Public or private systems shall be designed to maintain a minimum residual pressure not less than 20 psi at ground level at all points in the system, under maximum instantaneous fire flow demand.

7.0.3 METERING

All water used for any purpose other than fire protection service shall be metered. Each individual building requires a separate water meter and service line main tap.

7.0.4 WELLS

New private wells or sources of water will not be allowed. Existing facilities covered by a current water right permit from the State of Washington will be allowed if they conform to all local, state, and federal laws and regulations. The City does not allow connection between public and private systems. Such connections are unlawful.

7.0.5 COMBINATION SYSTEMS

Domestic water supply shall not be combined with any fire-only supply system for new construction. Existing combination systems are allowed only where the Permittee has City-approved fire line metering and has demonstrated to the Director that the private system complies with the most current cross connection control requirements.

7.0.6 FIRE AND LOOPED SYSTEM

If possible for purposes of meeting fire protection and water quality standards, water systems are to be looped in accordance with the City's *Comprehensive Water Supply Plan* and the Uniform Fire Code. Non-looped systems require the Director's approval.

7.0.7 RECLAIMED WATER

Where available, reclaimed water can be utilized for non-potable uses such as irrigation, cooling, and energy needs. Technical specifications (i.e. blocking, valves, etc.) as provided in these Standards for potable water systems are also applicable to reclaimed water systems. In addition, non-potable, reclaimed water systems must be clearly identified with signs and purple coloring in accordance with the Water Reclamation and Reuse Standards of the Washington DOE manual, *Criteria for Sewage Works Design*.

7.0.8 SYSTEM MODIFICATIONS

Modification to the water supply or plumbing on private property requires upgrade of the meter(s) and the cross connection control to current standards.

7.0.9 MAINTENANCE

The property owner owns and maintains the water service from the meter onto the property.

SECTION 7.1 METERED SERVICE**7.1.1 GENERAL**

- A. All permanent meters for one project shall be located at the property line and within the right-of-way. No pack joints will be allowed.
 1. Residential - Connections shall be a minimum of $\frac{3}{4}$ inch and shall use one section of copper tubing type K continuous from the main to the meter, without any joints. Materials between

the meter and the house must meet the current Uniform Plumbing Code.

2. Non-residential - Connections shall be a minimum of 1 inch and shall use one section of copper tubing type K continuous from the main to the meter, without any joints. Pipe and fittings shall be rated for pressure of twice the maximum working pressure of the 360-pressure zone.
3. Deduct Meter - The meter shall read in cubic feet and shall have a TRPL register that is compatible to the Sensus automatic reading system. Install deduct meter for landscape irrigation next to the permanent water meter or within six feet of the permanent meter when located in a landscaped area. In order to connect the deduct meter to the permanent meter reading system, connect the two boxes using 1-1/2" PVC conduit.
4. Permanent Service Disconnection - When determined by the Director, Permittee shall remove the corporation stop at the main and pipes, meters, etc.

7.1.2 3/4" AND 1" SERVICE

Materials

- A. Tapping Saddle: Single strap Romac (iron pipe thread).
- B. Corporation Stop: Mueller B-25028 or B-20013.
- C. Angle stop: Mueller ball valve with tailpiece containing angle check valve.
- D. Meter Setter: No setters allowed.
- E. Pipe: Type K copper tubing.
- F. Meter Box:
 1. For 3/4" – Olympic Foundry SM-29/Carson 1118 – 11"x18" or equivalent plastic with D.I. lid.
 2. For 1" – #2 Fogtite/Mid States plastic with D.I. lid.
 3. Plastic meter boxes allowed in landscape areas only. Solid steel 1/2" diamond plate lid in traffic areas. Boxes used in traffic areas require prior approval.
- G. See note for Brass Fitting Materials 7.1.5.

Installation

Per WS-01.

7.1.3 1-1/2" AND 2" SERVICE**Materials**

- A. Tapping Saddle: Double strap Romac (iron pipe thread).
- B. Corporation Stop: Mueller B-25028 or B-2969.
- C. Meter setter: Mueller B2423, or City-approved equal.
- D. Bypass Assembly: 1" assembly with lockwing.
- E. Pipe Material: Type K copper tubing or high molecular weight black polyethylene pipe, with tracing tape.
- F. Meter Box:
 - 1. For 1-1/2" meter - Fogtite #2 with 1/4" diamond-plate, solid, steel lid or Carson 1730 plastic box with D.I. lid.
 - 2. For 2" meter - Fogtite #3 or a 2' x 4' meter box, with 1/4" diamond plate, solid steel, lid with three 12-inch minimum tiers or approved vault. Lids must have a hinged inspection plate, centered over meter. Plastic #3 in planter area is allowed.
- G. See note for Brass Fitting Materials 7.1.5.

Installation

- A. Install bypass assembly.
- B. Embed pipe in 5/8" minus crushed rock.
- C. Per WS-02 and WS-03.

7.1.4 3", 4", AND 6" SERVICES**Materials**

- A. Tapping Tee. Refer to Section 7.2.5, under water mains.
- B. Tapping Valve: Gate valve. Cast iron valve with cast iron valve box and 18" cast iron valve box top section.
- C. Meter Valve: Gate valve with hand wheel.
- D. Pipe Material: Ductile iron, Class 52.
- E. Concrete thrust blocks.
- F. Steel tie rods.
- G. Bypass Assembly: 1-1/2" with locking wings on ball valves.
- H. Meter vault: Watertight 444-LA or 644-LA with spring assisted, galvanized-diamond plate cover with locking latch and recessed lift handle.

Installation

- A. Embed pipe in 5/8" minus crushed rock.

- B. For ductile iron pipe, install concrete thrust blocks and/or steel tie rods at any change in service line direction. Field conditions may require installation of restrained joints.
- C. Install service with bypass assembly per WS-04.
- D. Install one gate valve on each side of and immediately next to the meter.

7.1.5 BRASS FITTING MATERIALS

- A. All materials for water services ¾-inch to 2-inch shall conform to AWWA C800 and shall be new and undamaged. The same manufacturer of each item shall be used throughout the project.
- B. Brass products furnished under this specification which are not in contact with potable water shall have an alloy composition of copper, tin, lead and zinc in accordance with ASTM B62. The material is to be copper alloy UNS C83600, commonly referred to as 85-5-5-5.
- C. All brass components that are designed to be in contact with potable water must be made from either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of 0.25% by weight and shall comply with ANSI/AWWA C800 and ANSI/NSF Standard 61 Annex G.
- D. Brass fittings shall comply with the Safe Drinking Water Act, as amended and the U.S. Environmental Protection Agency (EPA).
- E. Unless otherwise noted, all fittings and valves shall have a minimum working pressure of 150 psi.
- F. All fittings shall either be stamped or embossed with the manufacturer's name or trademark.

7.1.6 TEMPORARY WATER METER

Permittee rents the temporary meter from the City for use with one designated project. The temporary water meter is installed on fire hydrants only. The rental is subject to the following conditions:

- A. Meter presented to Public Works Operation every 30 days for a meter reading and inspection.
- B. Meter promptly returned following project completion or by the permit expiration, whichever comes first. Permittee receives a final bill when the meter is returned to Operations.
- C. Meter returned in the same condition as when rented. The Permittee is responsible for meter damage or loss and shall pay all costs related to repair or replacement.

- D. Permittee may move the meter(s) from one hydrant to another within the same project providing Permittee:
 - 1. Notifies and receives approval from the Water Department before the meter is moved, and,
 - 2. Uses hydrant wrenches when connecting or disconnecting the meter.

SECTION 7.2 WATER MAIN

7.2.1 GENERAL

Water/Sewer Separation

Install water mains at least 10 feet horizontally, measured edge to edge, from any existing or proposed sewer. The Director may allow deviation, provided the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer, at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer.

Water/Sewer Crossing

Install water mains crossing sewer lines so that the bottom of the water main is at least 18 inches above the top of the sewer. Locate full section of water pipe so that its midpoint is above the sewer pipe at the crossing. This installation may require special structural support for the water and sewer pipe.

New Water Mains

All new water mains within the City of Tukwila shall comply with the following:

- A. Water mains shall extend along the entire property frontage.
- B. Design velocities less than or equal to 8 feet per second, under maximum flow conditions.
- C. Provide 3 feet to 5 feet deep covering over main.
- D. Comply with Section 2.4.5, including no pipe deflection.

Pipe Size

- A. In residential zones, water mains shall be 8-inch diameter, unless the Director requires larger pipe.
- B. In non-residential zones, water mains shall be at least 12-inch diameter, or the size specified in the City's Comprehensive Water Plan, whichever is greater.

Loop Systems

Wherever possible, close or loop the systems to avoid non-looped lines. Where non-looped mains are unavoidable, install a standard 2-inch blow-off assembly, for flushing purposes. Blow-off assembly per WS-09. If the Director deems flows and pressure sufficient, a fire hydrant may be required in lieu of the blow-off assembly.

Traffic Areas

Air and vacuum release valves in traffic areas require approval from the Director.

7.2.2 MATERIAL

- A. All pipes, fittings, valves, hydrants, joints, and other components shall conform to AWWA, the Standard Specifications, and be acceptable for use by the City of Tukwila.
- B. Pipe - Ductile iron pipe, cement lined, standard thickness, Class 52 minimum, conforming to the standards of AWWA C-151.
- C. Fittings and Joints - Cast iron or ductile iron, with flanged or mechanical joint connections and the same thickness class as the pipe used. All fittings shall be cement mortar lined in accordance with AWWA C-104.
- D. Cast iron fittings - Long body for operating pressure rating of 150 psi, unless otherwise noted. Metal thickness and manufacturing process shall conform to applicable portions of USA Standard A-21.10, A-21.11, B-16.2, and B-16.4.
- E. Flanged Joint - Conforming to USA Standard B-16.1. Rubber gaskets for push-on-joint (Tyton) or mechanical joint (MJ) in accordance with AWWA C-1110. Gaskets shall be neoprene, chlorinated butyl, or cloth-inserted rubber. Type of connections shall be specified as push-on-joint (Tyton), mechanical joint (MJ), plain end (P.E.), flanges (FL) not threaded.

7.2.3 VALVES

Material

- A. Resilient seat, opening counter-clockwise, non-rising stem type, with double O-ring seal equipped with standard 2-inch square stem nuts. Flanged valves or mechanical joint, suitable for installation with the type and class of pipe being used.
- B. Gate Valves conforming to AWWA C-500.

- C. Butterfly Valves conforming to AWWA Standard C-504, Class 150, cast iron short body and O ring stem seal. Butterfly valves in chambers shall have a manual crank operation. Buried butterfly valves shall have a standard 2-inch operating nut and suitable valve box. Direct buried valves shall be ground rated.
- D. Check Valves - 150 psi working pressure
- E. Air Release Valves per WS-07 and WS-08.

Installation

- A. Install valves at intervals sufficient to minimize sanitary hazards during repairs, no farther than 500 feet apart in industrial and commercial zones, and no farther than one block or 800 feet apart in other zones.
- B. Install a gate valve for 12-inch and smaller water mains.
- C. Install a butterfly valve for water mains larger than 12-inch diameter.
- D. Install at least two valves at all tee intersections.
- E. Install at least three valves at water supply/sanitary sewer crossings.
- F. Install a gate valve at all hydrants and fire line extensions per WS-13.

7.2.4 BLOCKING**Material**

- A. Cast in place with concrete originating from a commercial batch plant or commercial batch truck. The City does not allow hand mixing.
- B. Tie-rods shall be galvanized, painted steel with a bituminous coating, or corten steel.

Installation

- A. Provide reaction blocking at all tees, plugs, bends, and hydrants per WS-11 through WS-12.
- B. Cast in place so blocking bears against fittings only.
- C. Allow room at joints to allow dismantling.
- D. Wrap fittings with plastic sheeting.
- E. Do not backfill until the concrete reaches 3000-psi strength.
- F. Field conditions may require tie rods and/or restrained joints in addition to concrete thrust restraint blocking.

7.2.5 LINE TAPS

General

- A. The Permittee shall give the Public Works Department at least five working days notice of intention to disrupt service.
- B. Connection to an existing, in-service, water main shall be made by a wet tap. All new connections to the City of Tukwila water system shall be in strict accordance with 7-11.3 (9) A of *Standard Specifications for Road, Bridge, and Municipal Construction*.
- C. The Director allows cut-ins as exception and may require the addition of in-line valve(s).

Material

- A. Size on Size - Tapping Tee of cast iron or ductile iron, full encirclement mechanical joint style, Mueller.
- B. Note: Other than size on size - Tapping sleeves of epoxy-coated fabricated steel.
- C. Fabricated steel sleeves: ASTM 285 grade C or ASTM A.36 steel, with a fusion bonded epoxy coating to AWWA C213-79. Painted coatings are not acceptable.

Installation

- A. Refer to WS-10.
- B. A qualified tapping service approved by the Director must install the tap. Swab all fittings with a 5-6% chlorine solution, in accordance with AWWA Standard C-601.
- C. For approved cut-ins, assemble pipe, fittings, and gate valves at the site. Complete all assembly and ready it for installation before the water in the main is shut-off. Once the water is shut-off, the cut-in shall proceed until the line is restored to service. Installation, once begun shall not halt until completed.

SECTION 7.3 FIRE LINE/HYDRANT

Applicant shall make written request for any exception to the following hydrant requirements.

- A. Size hydrant supply lines to provide the fire-flow required by; 1) Appendix III-A of the Uniform Fire Code, Fire Flow Requirements for buildings and 2) the City's Water System Comprehensive Plan.
- B. Install all fire hydrants, auxiliary gate valves, and supply lines per City WS-13 and WS-14. Install fire hydrant feed lines at right angles to the supply main in conformance with WS-13.

- C. Locate hydrants so they are in plain view, for a distance of 50 feet, in the line of vehicular approach. The approach line-of-sight shall be free of shrubs, trees, fences, landscaping, etc. All hydrants shall be painted per the NFPA 291 color codes. For Class AA, rated at 1500 gpm or greater, the tops and nozzle caps shall be painted with Farwest Paint Color Number 257 (Delphinium Blue) and all hydrant barrels shall be painted Farwest Paint Color Number X-3472 (case yellow – safety). For other capacity ratings of hydrants, refer to NFPA 291, or consult with the City.
- D. Locate hydrants within 150 feet of the building and no farther than 300 feet from any perimeter point of the building.
- E. Locate public fire hydrants at a maximum spacing of 300 feet along City water mains.
- F. Leads from the service main to the hydrant shall be at least 6-inch diameter and not over 50 feet long.

SECTION 7.4 CROSS CONNECTION CONTROL

7.4.1 GENERAL

In accordance with Washington State Department of Health guidelines for Group A Public Water Systems, the Director has implemented a cross-connection control program to protect the public water system from contamination via cross connection. The program requires elimination or control of any cross-connection between the distribution system and a consumer's water system by the installation of an approved backflow device. The owner of these devices must maintain and provide annual test results to the Department.

7.4.2 NEW CONNECTIONS

A. Water Supply

Every new, commercial or multi-family residential connection to the City's water supply requires installation of an approved Reduced Pressure Principle Assembly immediately downstream of the permanent water meter as premises isolation. Installation at another location requires the Director's approval.

B. Fire System

Every new or modified fire line connection to the City's water supply, including single family residences, shall include an approved detector double check valve assembly, installed per WS-15. The City does not require detector double check valve

assembly on a private fire system that is downstream of a connection protected by an RPPA.

C. Irrigation System

Unless installed downstream from an RPPA, every new or modified irrigation system shall incorporate a double check valve assembly for cross connection control.

7.4.3 EXISTING CONNECTIONS

When reviewing a Development Permit, including a Tenant Improvement (TI) application, the Director evaluates the existing service connection(s) per the following criteria:

- A. If the project includes any alterations to the existing plumbing system, then the entire plumbing system must be brought up to the current standards as set forth in the Uniform Plumbing Code, including the installation of approved backflow prevention on the water supply, fire line and irrigation system.
- B. If the project does not include any changes to the existing plumbing system, then such systems lawfully in existence at the time of installation may have their use, maintenance or repair continued if the use, maintenance, or repair is in accordance with the original design and location and no hazard to life, health, or property has been created by such plumbing system. The Department reviews high health cross-connection hazard premises as defined in WAC 246-290-490, Table 9, for premises isolation requiring either an Air Gap (AG) or Reduced Pressure Principal Assembly (RPPA).
- C. If any previously unapproved backflow prevention device cannot be upgraded in the same location with an approved backflow prevention device, such limitations must be evaluated by the Director.
- D. If a new device is installed at a location downstream from the original device, all pipe must first be approved for potable water use prior to reconnection. The pipe material must be specifically rated for potable water use (no black iron), and the entire length of main to be converted must be thoroughly scoured using a multi-staged pigging process acceptable to the Director.

7.4.4 FIRE PROTECTION SYSTEM

A. Design

The plans must be prepared, stamped, signed and dated by a Level III certificate of competency holder (NICET) or by a professional engineer registered in Washington State.

B. Installation

When the backflow prevention device is installed outside the building and underground, the installer must have Level III certificate of competency or a Level U contractor's certificate of competency (NICET). If the installer is different from the designer, then the installer must stamp, sign and date the plans, in addition to the designer's stamp, signature and date.

The customer's ownership of the fire protection system begins off of the City owned water main.

SECTION 7.5 INSPECTION AND APPROVAL

7.5.1 WATER MAIN TESTING

- A. All water mains and appurtenances shall be pressure tested for leakage in accordance with City requirements, after flushing and disinfecting for new and reestablished systems. The water main and appurtenances shall be brought to a hydrostatic pressure of 250 psi, measured at the high point in the line. Water mains require a one-hour test and fire lines require a two-hour test, during which time there cannot be any loss in pressure.
- B. The main shall be tested between valves or at a maximum distance of 500 feet along the main. Any leaks or imperfections shall be corrected before final acceptance. No air will be allowed in the line.
- C. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected. The Permittee shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made, including all connections as shown on the plan. Insofar as is practical, tests shall be made with pipe joints, fittings and valves exposed for inspection. The owner shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition, and the air in the line has been released before requesting the City to witness the test.

7.5.2 FLUSH AND DISINFECT

- A. All new, cleaned or repaired water mains and some backflow preventer installations require disinfecting and flushing per AWWA Standard C-601. The flushing and disinfecting shall include detailed procedures for the adequate flushing, disinfecting, and microbiological testing.
- B. At no time shall chlorinated water from a new main be flushed into a body of fresh water including lakes, rivers, streams, and any and all other waters where fish or other natural water life can be expected.
- C. Sections of pipe to be disinfected shall first be flushed to remove any solids or contaminated material that may have become lodged in the pipe.
- D. At least twelve (12) hours after the flushing procedure, the Permittee shall request that the City Inspector collect water samples from the new system. These samples shall be taken in sterilized bottles and tested by a DOH approved testing lab, as designated by the Water Department. All samples must meet the DOH quality standards prior to placing the lines into service.
- E. The Permittee shall dispose of treated water flushed from the lines. Prior approval from the Director is required for disposal to sanitary sewers or surface water systems.
- F. Bag test fire lines using two new burlap bags.

7.5.3 STANDARD PLANS AND SPECIFICATIONS

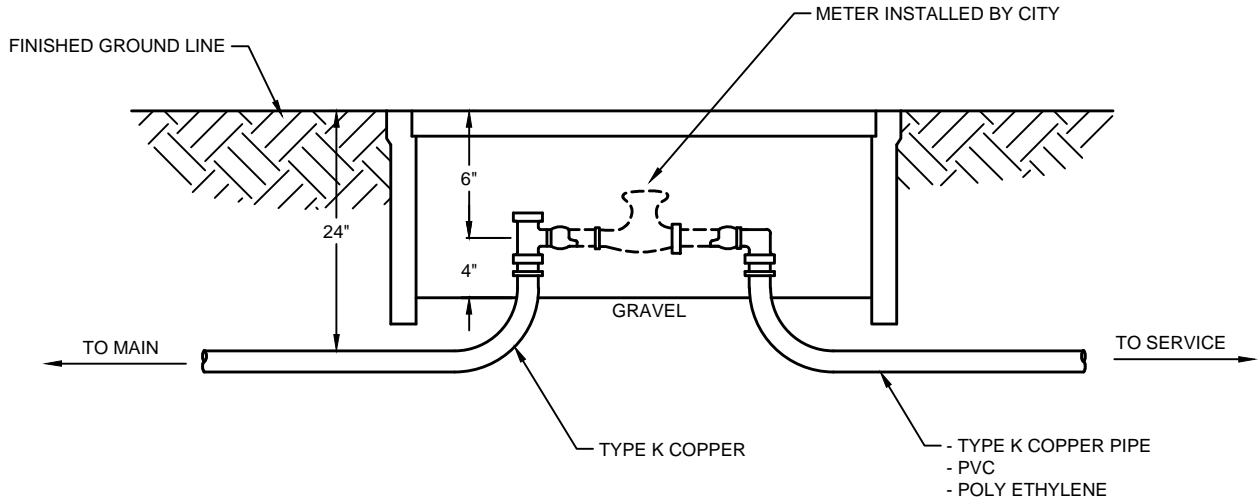
In accordance with WAC 246-290-120, the City of Tukwila maintains standard plans and specifications on file with the State Department of Health to satisfy DOH approval requirements for: the installation of hydrants, valves, fittings and meters; repair or replacement of system components with similar components; or maintenance or painting of surfaces not contacting potable water. The standard plans and specifications also constitute a waiver from formal submittal and approval of specific distribution main improvements provided that construction of such projects are certified by a registered professional engineer as being in compliance with the standard specifications found in the DOH approved water system plan and provided that the District provides documentation to DOH of the pressure test results, disinfection procedures used and tests performed, and water quality sample results obtained prior to placing the distribution pipeline into service. All other water system improvement projects require submittal

to and approval from the State Department of Health. A copy of the City of Tukwila's current standards is available at 6300 Southcenter Blvd., Suite 100.

SECTION 7.6 WATER DISTRICT BOUNDARIES

SECTION 7.7 WATER SUPPLY STANDARD DETAILS

WS-01	Meter – ¾" and 1"
WS-02	Meter – 1-1/2" and 2" Setter
WS-03	Service– 1-1/2" and 2" Domestic
WS-04	Meter - 3" and 6"
WS-05	Not Available
WS-06	Water Main – Valve Box Operating Nut Extension
WS-07	Water Main – Air and Vacuum Release (non-Traffic Areas)
WS-08	Not Available
WS-09	Water Main - Blow Off Assembly
WS-10	Water Main – Tapping Tee
WS-11A	Blocking – Deadman with 45°
WS-11B	Blocking - Deadman with 45° Alternate
WS-12A	Blocking – Horizontal - Concrete (2 Sheets)
WS-12B	Blocking – Vertical - Concrete
WS-13	Fire Hydrant – Assembly and Setting
WS-14	Fire Hydrant – Guard Post
WS-15	Cross Connection Control – Fire (2 Sheets)
WS-16	Encasement – Controlled Density Fill
WS-17	Encasement – Steel
WS-18	Trench – Bedding and Backfill
WS-19	1" Fire/Domestic Service
WS-20	Flow-through System 1" Fire/Domestic Service
WS-21A	RPPA Assembly
WS-21B	RPPA Notes



3/4" OR 1" PARTS LIST:

- 1 - 1" COUPLINGS MUELLER 110 X ANGLE STOP - BALL
- 1 - 1" OR 3/4" CORP STOP - BALL
- 1 - TAILPIECE WITH FEMALE IRON PIPE THREAD

NOTES:

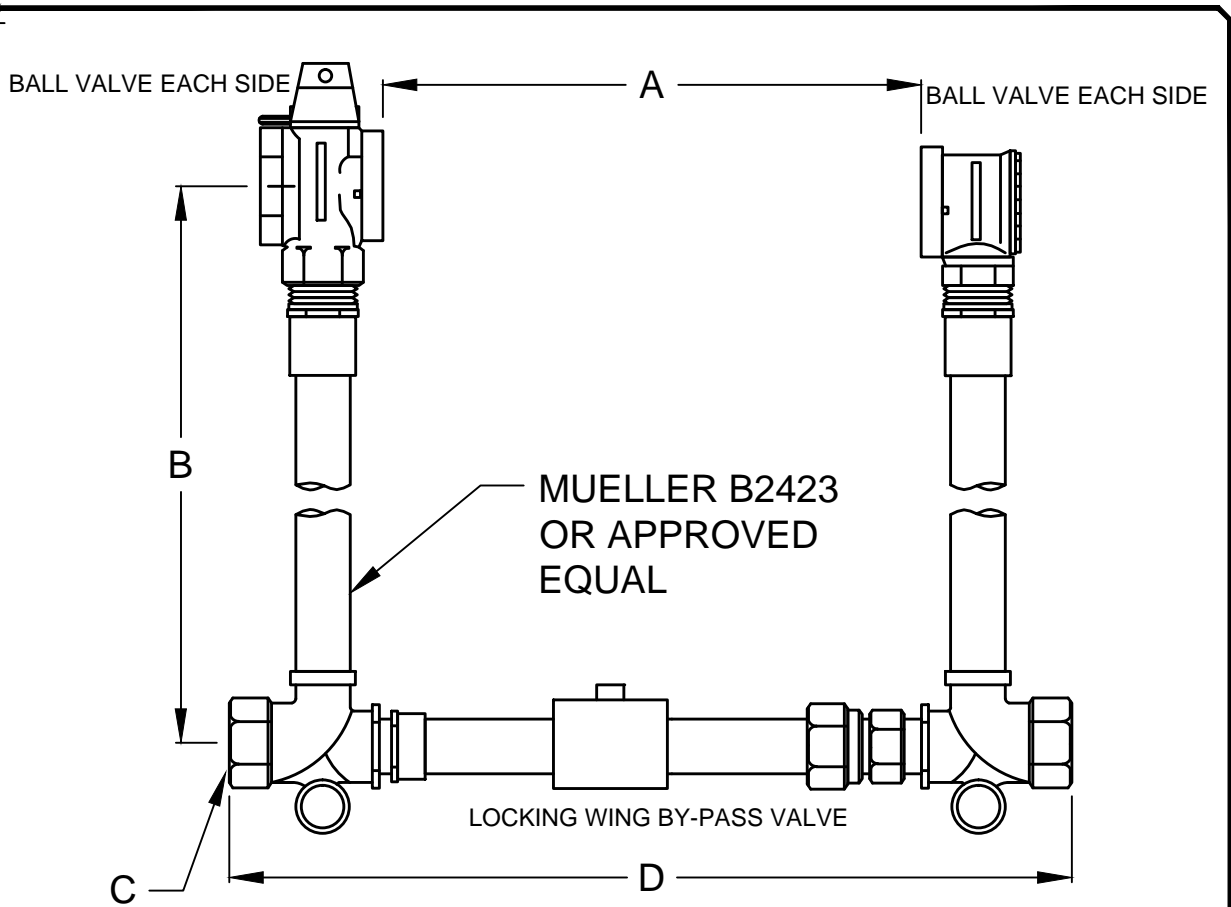
1. NO METER BOXES IN SIDEWALKS AND DRIVEWAYS WHERE POSSIBLE.
2. USE CLEAN 5/8" MINUS CRUSHED ROCK TO BACKFILL AROUND CORP STOP AND SERVICE LINE.
3. REFER TO CHAPTER 7 OF THESE STANDARDS.
4. BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

METER	
3/4" OR 1"	
SHEET: WS-01	
REVISION #1: 02-2014	LAST REVISION:
APPROVAL: R. TISCHMAK, CITY ENGINEER	



DIMENSIONS

METER SIZE	1-1/2"	2"
Dimension A*	13.25"	17.25"
Dimension B - Riser Height	12", 15", 18", 21", 24", 27"	12", 15", 18", 21", 24", 27"
Dimension C - Nominal pipe size of inlet and outlet	1-1/2"	2"
Dimension D*	21.50"	26.63"

NOTES:

1. COMPOUND METER SUPPLIED AND SET BY THE CITY. 2" SINGLE REGISTER METER REQUIRES PRE-APPROVAL.
2. METER BOX SUPPLIED BY PERMITEE.
3. METER SETTER TO BE APPROVED BY THE CITY INSPECTOR PRIOR TO BACKFILL.
4. REFER TO CHAPTER 7 OF THE STANDARDS.
5. BRASS FITTINGS SHALL BE LEAD FREE.

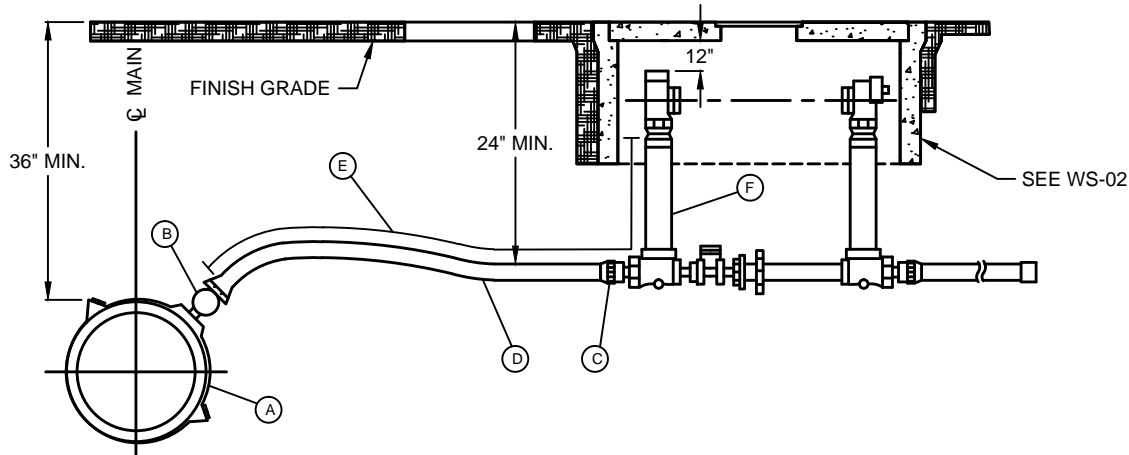
*CONTACT PUBLIC WORKS OPERATIONS FOR PREFERRED SPACING.

NOT TO SCALE



**City of
Tukwila**

METER	
1-1/2" AND 2" SETTER	
SHEET:	WS-02
REVISION #1:	02-2014
LAST REVISION:	08.04
APPROVAL:	R. TISCHMAK, CITY ENGINEER



- (A) PAINTED HIGH TENSILE D.I. SERVICE SADDLE WITH DOUBLE STRAP, AWWA I.P. THREAD TAP, ROMAC 202S OR EQUAL SIZE AS REQUIRED.
- (B) CORPORATION STOP, AWWA I.P. INLET BY MALE IRON PIPE THREAD OUTLET, MUELLER BALL NO. B-2969 OR EQUAL AS NEEDED.
- (C) COUPLING MALE IRON PIPE THREAD BY MUELLER 110 FITTING, MUELLER NO. H-15451 OR EQUAL.
- (D) COPPER TUBING, TYPE K OR HIGH MOLECULAR DENSITY POLYETHYLENE.
- (E) TRACING TAPE FOR POLYETHYLENE PIPE.
- (F) MUELLER B2423 OR APPROVED EQUAL.

NOTES:

- SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.
- METER WILL BE SUPPLIED AND INSTALLED BY THE CITY OF TUKWILA.
- SETTER SHALL BE POSITIONED TO CENTER RIGID SPREADER UNDER INSPECTION LID AND PROVIDE ADEQUATE CLEARANCE BETWEEN BYPASS AND BOX WALL FOR OPERATING AND LOCKING BYPASS VALVE.
- BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

SERVICE

1-1/2" & 2" DOMESTIC

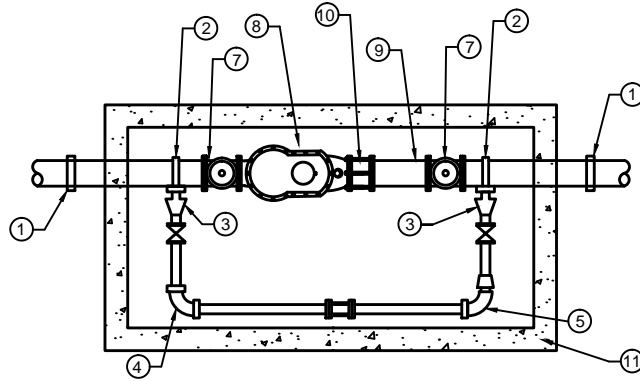
SHEET: WS-03

REVISION #1: 02-2014 LAST REVISION:

APPROVAL: R. TISCHMAK, CITY ENGINEER

MATERIAL LIST - COPPER BYPASS

- ① 2 - FLEX. CPLG. TO FIT, EQUAL TO ROCKWELL 441 (REDUCE AT TAP).
- ② 2 - SINGLE STRAP SERVICE CLAMPS EQUAL TO ROMAC 101 WITH IPS TAP. ROCKWELL 313.
- ③ 3 - STRAIGHT CPLG., COPPER TO OUTSIDE I.P. THREAD EQUAL TO MUELLER H-15428 110 COMP.
- ④ 1-1/4 BEND CPLG. COPPER TO COPPER, EQUAL TO MUELLER H-15526.
- ⑤ 1-1/4 BEND CPLG. COPPER TO OUTSIDE I.P. THREAD EQUAL TO MUELLER H-15530.
- ⑥ 2 - BALL VALVES WITH PADLOCK WINGS OR LOCK CAPS (MUELLER).
- ⑦ 2 - G.V. FL. EQUAL TO MUELLER A-2307-6.
- ⑧ 3" TO 6" COMPOUND METER SUPPLIED BY CITY.
- ⑨ 1 - C.I. ADPT., FL. X PE LENGTH TO FIT.
- ⑩ 1 - CPLG. ADPT., FL. EQUAL TO ROCKWELL 912.

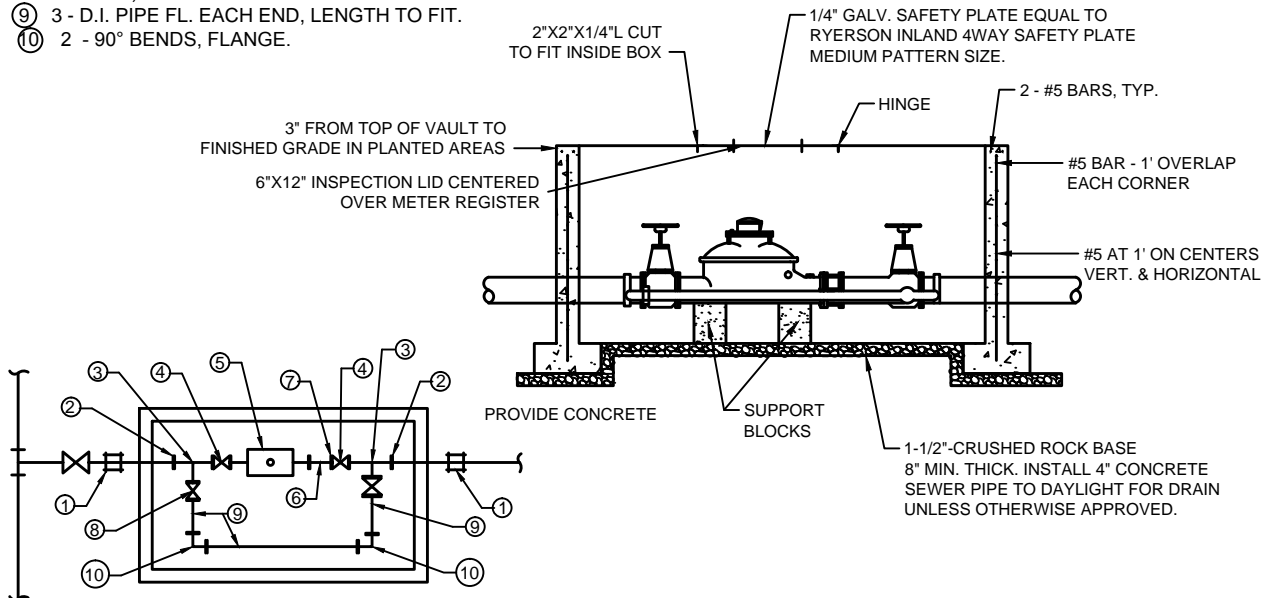


GENERAL NOTES:

- 1. METERS 3"-6" SUPPLIED BY CITY.
- 2. VAULT SHALL BE PRECAST CONCRETE VAULT.
- 3. ALL PIPE & FITTINGS 4" AND LARGER SHALL BE CEMENT LINED, CL52.
- 4. PIPING FROM MAIN TO VAULT SHALL BE 4" ON 3" METER INSTALLATION, TEE WITH VALVE ON EXISTING MAIN REQUIRED.
- 5. REFER TO SECTION 7.3.2.
- 6. BRASS FITTINGS 2" AND LESS SHALL BE LEAD FREE.

MATERIAL LIST - D.I. BYPASS

- ① 2 - FLEX CPLG. TO FIT.
- ② 2 - D.I. FL. X P.E., LENGTH AS REQUIRED.
- ③ 2 - TEE, FL.
- ④ 2 - G.V., FL. MUELLER A-2370-6 OR EQUAL.
- ⑤ 1 - 3" TO 6" METER, AS SPECIFIED.
- ⑥ 1 - ADPT. FL. X P.E. 12" LONG.
- ⑦ 1 - CPLG. ADPT., FL. EQUAL TO ROCKWELL.
- ⑧ 2 - G.V. FL. EQUAL TO MUELLER A-2370-6 (G.V. SATISFACTORY LOCKING DEVICE MUST BE FURNISHED).
- ⑨ 3 - D.I. PIPE FL. EACH END, LENGTH TO FIT.
- ⑩ 2 - 90° BENDS, FLANGE.



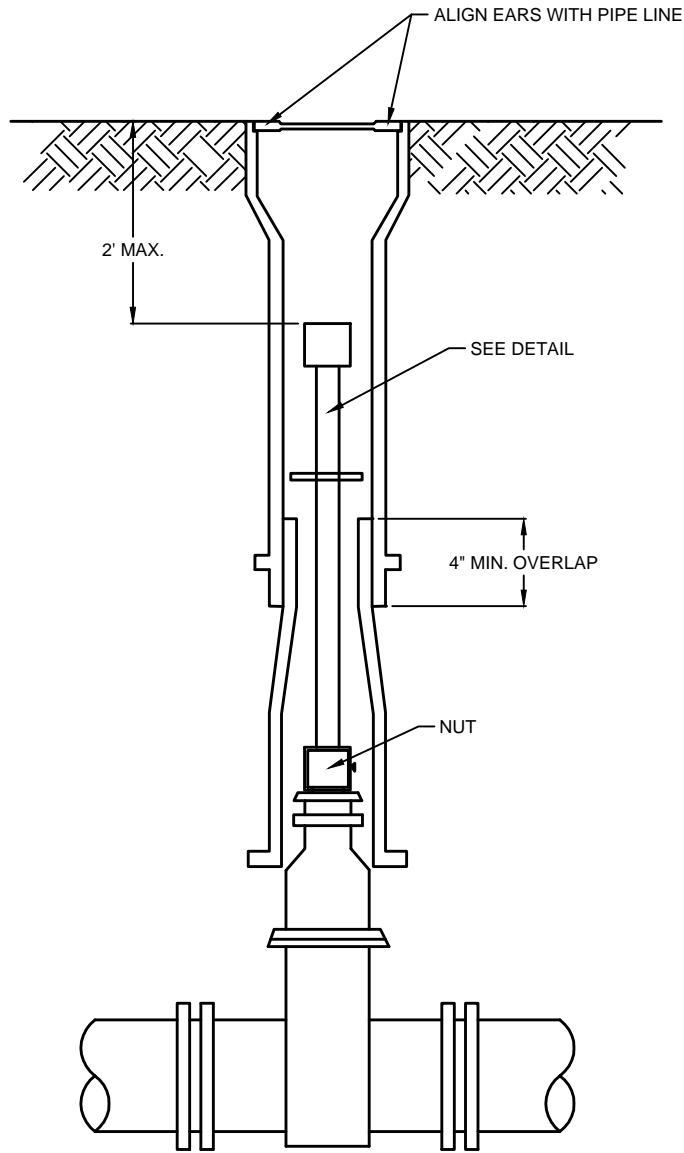
WITH DUCTILE IRON BY-PASS

NOT TO SCALE

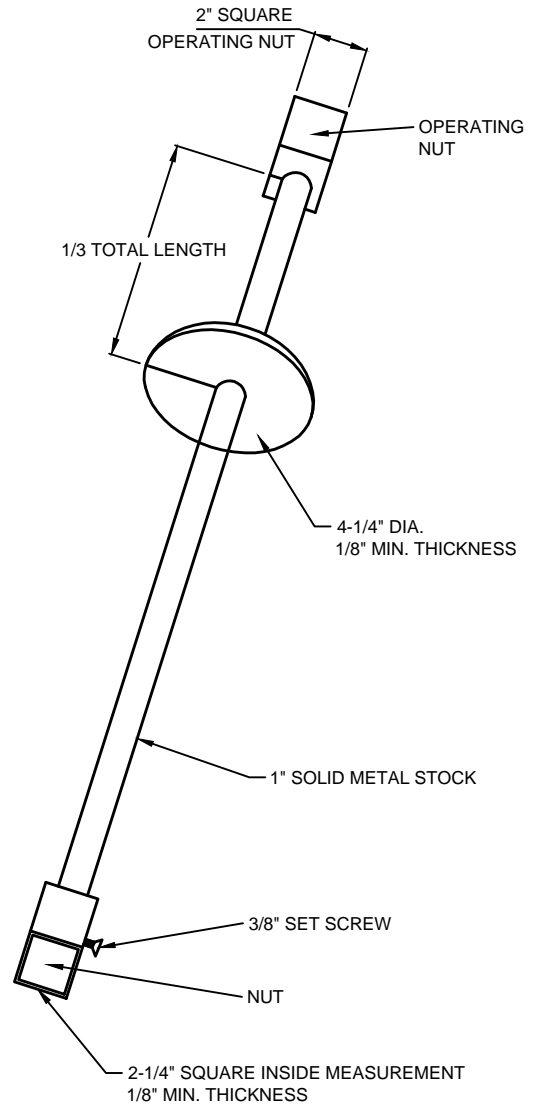


*City of
Tukwila*

METER	
3" TO 6"	
SHEET:	WS-04
REVISION #1: 02-2014	LAST REVISION:
APPROVAL:	R. TISCHMAK, CITY ENGINEER



ASSEMBLY



DETAIL

NOTES:

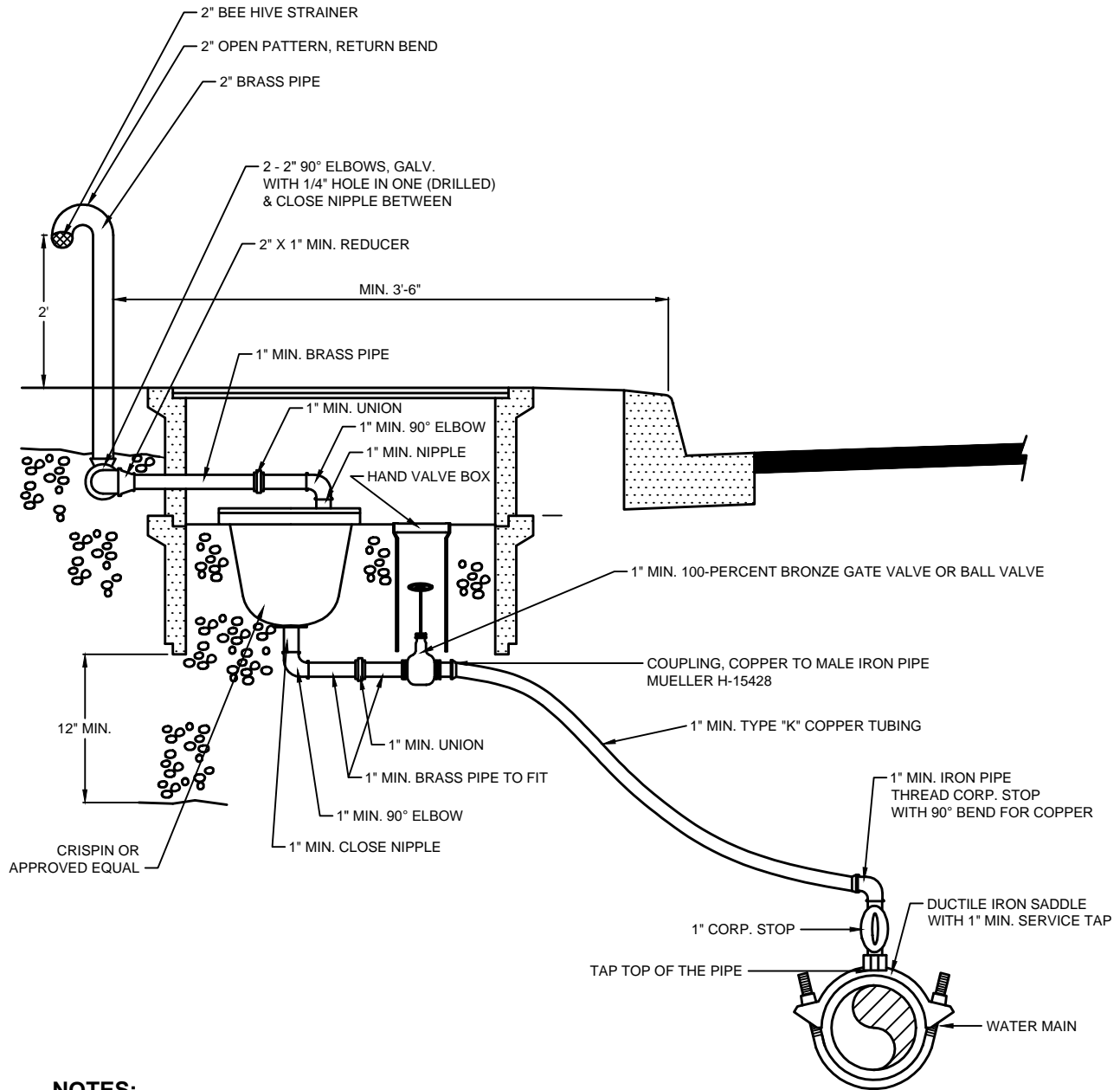
1. EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN 5 FEET BELOW FINISHED GRADE.
2. ONLY ONE EXTENSION, MINIMUM OF 3 FEET LONG, TO BE USED PER VALVE.
3. ALL EXTENSIONS ARE TO BE MADE OF STEEL AND PAINTED WITH TWO COATS OF METAL PAINT. NO FIELD-FABRICATED EXTENSIONS.
4. VALVE BOX COVER SHALL BE LABELED "WATER".

NOT TO SCALE



*City of
Tukwila*

WATER MAIN	
VALVE BOX (OPERATING NUT EXTENSION)	
SHEET:	WS-06
REVISION #1: 02-2014	LAST REVISION:
APPROVAL:	R. TISCHMAK, CITY ENGINEER



NOTES:

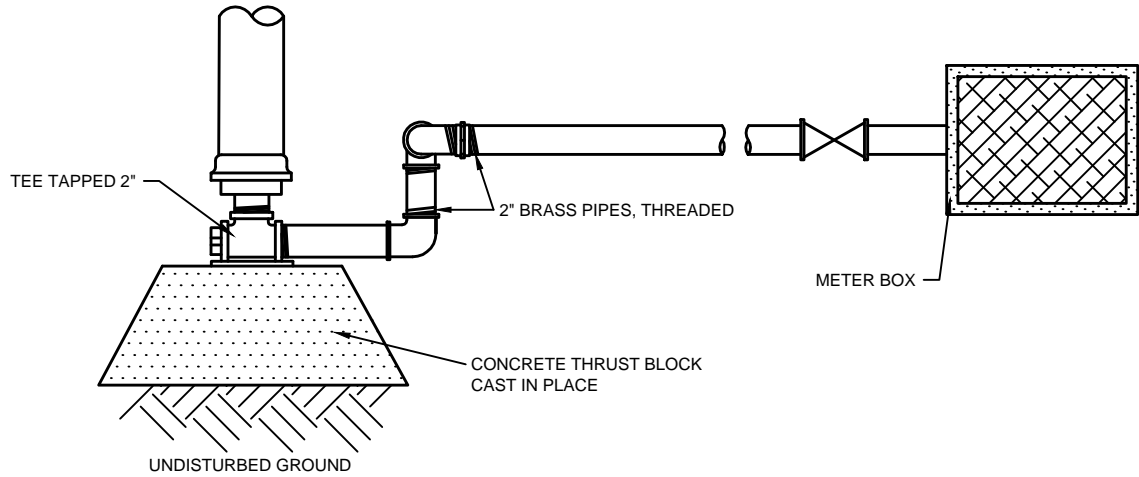
1. INSTALL AIR VALVE IN 17" X 28" CONCRETE METER BOX WITH 3/8" STEEL DIAMOND PLATE COVER, FOG-TITE METER SEAL CO. NO. 2 METER BOX OR EQUAL.
2. BED WITH WASHED GRAVEL, PASSING 1-1/2" AND RETAINED ON 1/4" MESH.
3. INSTALL 10' MIN. DISTANCE FROM ANY VEHICULAR ACCESS.
4. REFER TO CHAPTER 7 OF THE STANDARDS.
5. BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE

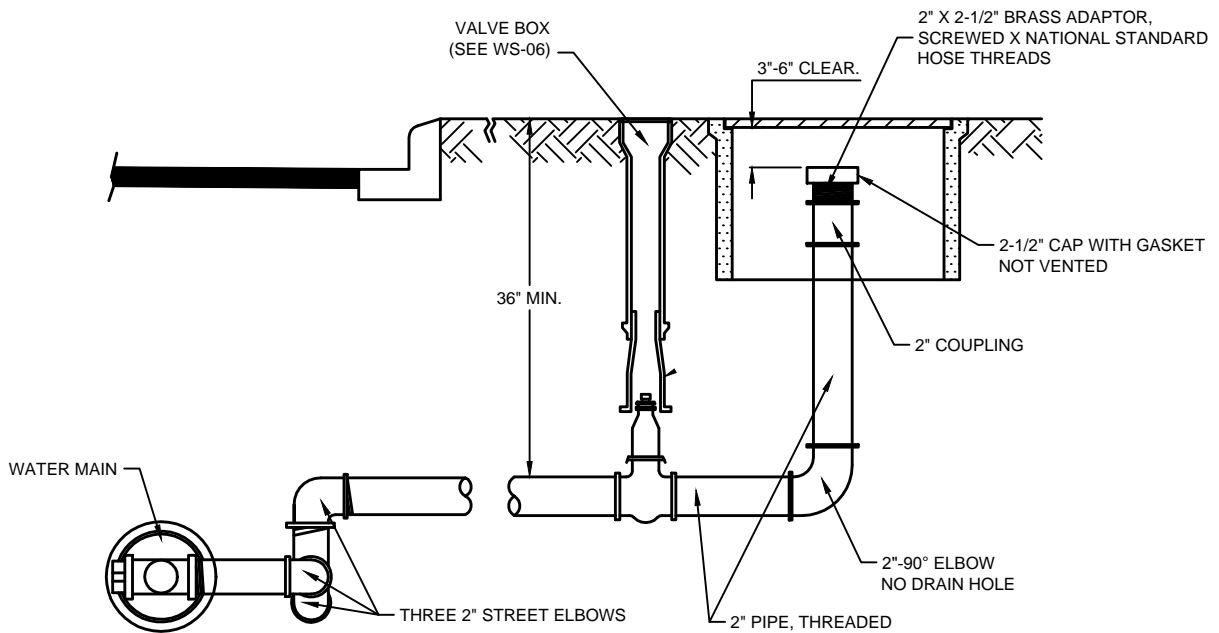


*City of
Tukwila*

WATER MAIN	
AIR AND VACUUM RELEASE (NON-TRAFFIC AREAS)	
SHEET:	WS-07
REVISION #1:	02-2014
APPROVAL:	R. TISCHMAK, CITY ENGINEER



PLAN VIEW



ELEVATION VIEW

NOTES:

1. ALL PIPE BEYOND MAIN SHALL BE PAINTED BRASS
2. INSTALL CAST METAL VALVE MARKER POST AND EXTENSION PIPE ADJACENT TO METER BOX. PAINT WITH TWO COATS OF NON-CORROSIVE PROTECTIVE PAINT, PER A.W.W.A. STANDARDS.
3. TWO PIECE CAST IRON VALVE BOX WITH STANDARD 24" BASE AND 18" TOP WITH 2" OVERLAP, RICH VALVE BOX OR EQUAL LIDS TO HAVE TABS.
4. REFER TO CHAPTER 7 OF THESE STANDARDS.
5. REFER TO WS-12A & WS-12B FOR BLOCKING, WS-06 FOR VALVE BOX.
6. BRASS FITTINGS SHALL BE LEAD FREE.

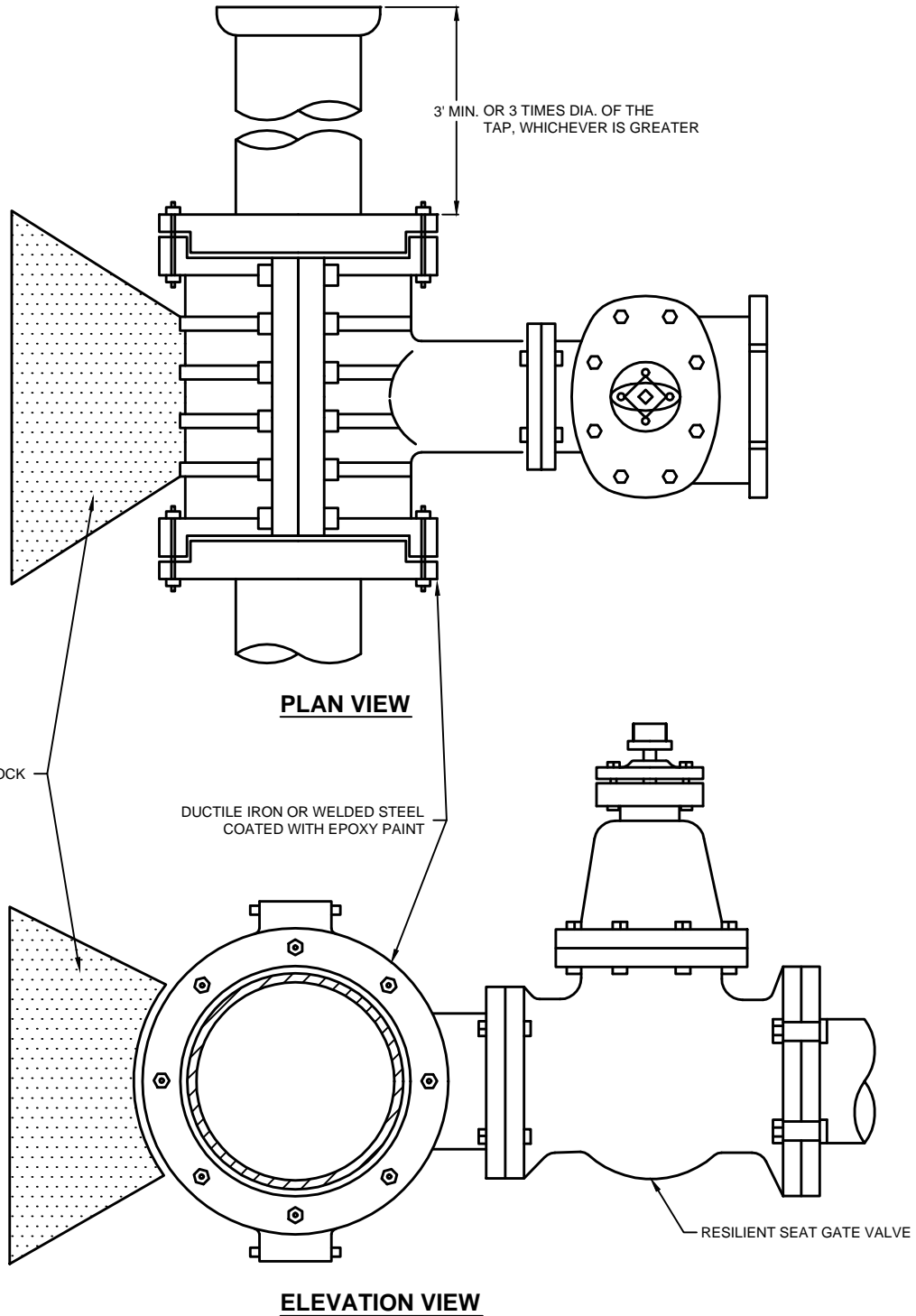
NOT TO SCALE



*City of
Tukwila*

WATER MAIN	
BLOW-OFF ASSEMBLY	
SHEET:	WS-09
REVISION #1: 02-2014	LAST REVISION:
APPROVAL:	R. TISCHMAK, CITY ENGINEER

17967



NOTES:

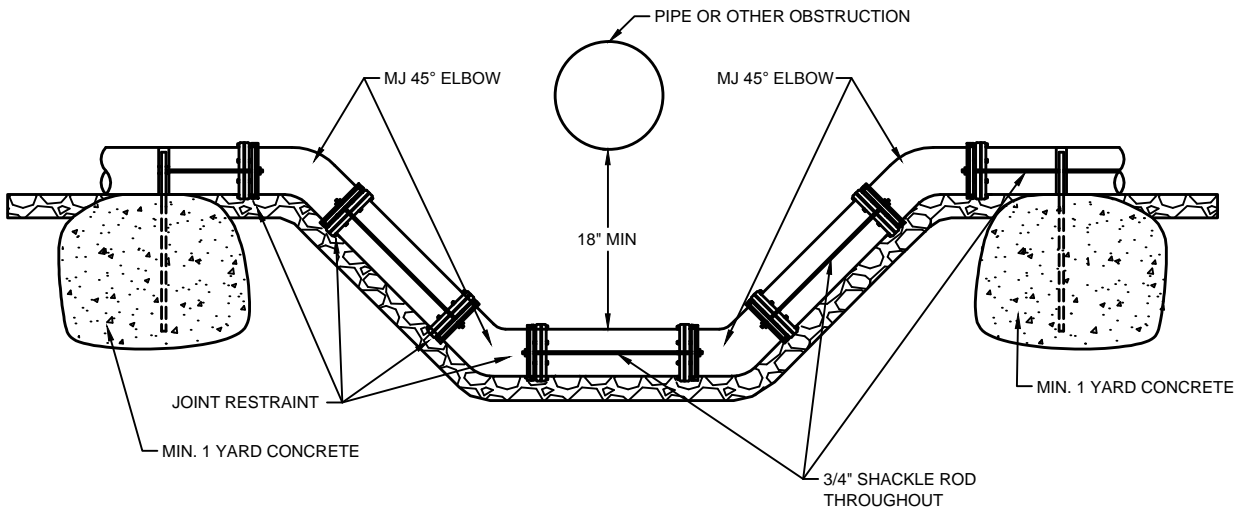
1. USE FOR TAPS ON CEMENT LINED DUCTILE PIPE.
2. PRE-TEST ASSEMBLY BEFORE DRILLING.
3. REFER TO CHAPTER 7 OF THESE STANDARDS.
4. REFER TO WS-13 & WS-14.

NOT TO SCALE

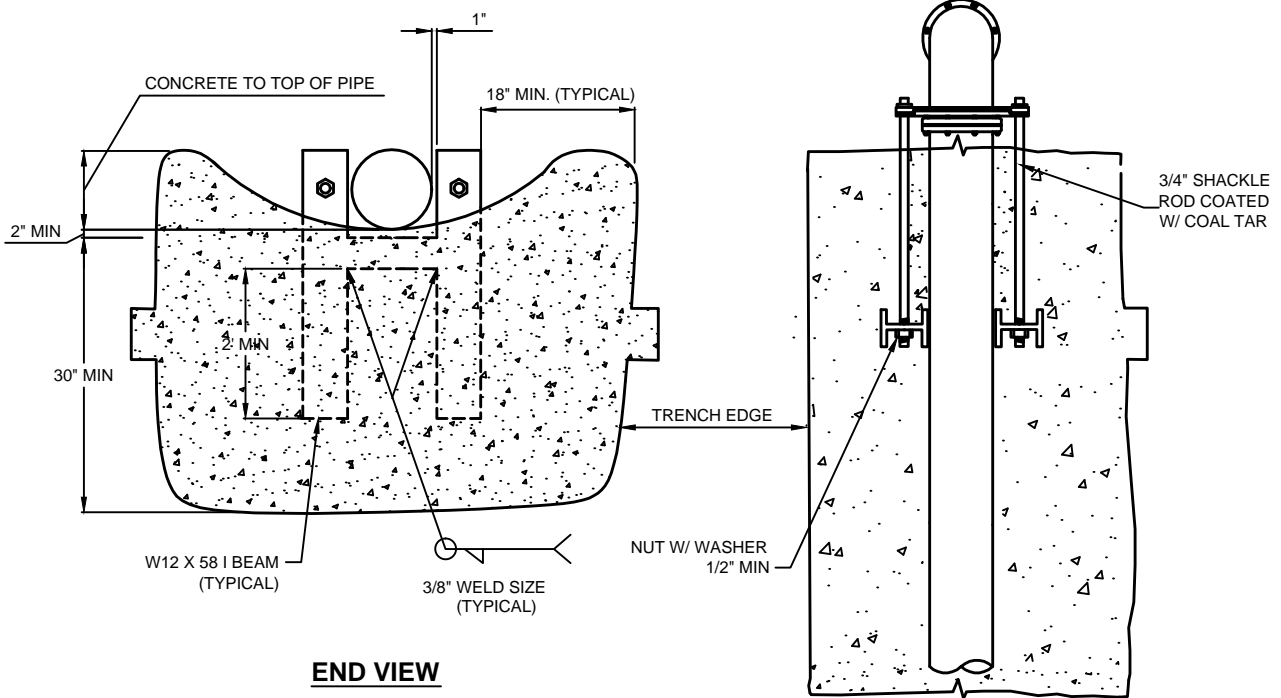


*City of
Tukwila*

WATER MAIN	
TAPPING TEE	
SHEET:	WS-10
REVISION #1: 02-2014	LAST REVISION: 07.08
APPROVAL:	R. TISCHMAK, CITY ENGINEER



ELEVATION VIEW



END VIEW

PLAN VIEW

NOTE:

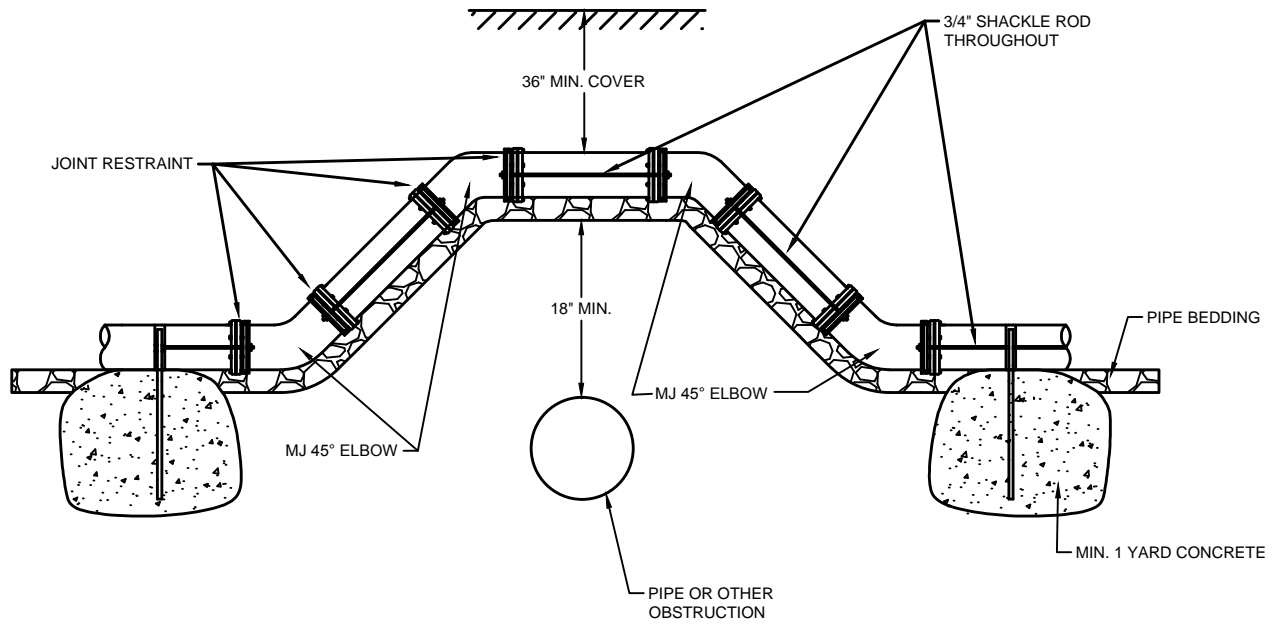
- 1. SHACKLE RODS SHALL BE ASPHALT-COATED STEEL OR CORTEN STEEL.

NOT TO SCALE



*City of
Tukwila*

BLOCKING	
8958A5B'K #() š69B8G	
SHEET:	WS-11A
REVISION #1:	02-2014
APPROVAL:	R. TISCHMAK, CITY ENGINEER



**ELEVATION VIEW
ALTERNATE**

NOT TO SCALE



*City of
Tukwila*

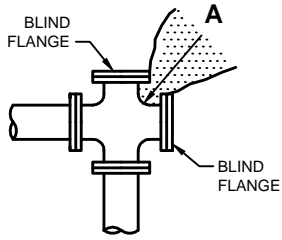
BLOCKING

8958A5B`K #() š69B8 G'f5 @19FB5 H9Ł

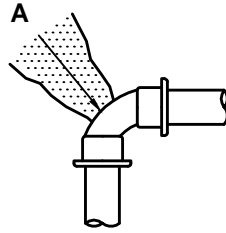
SHEET: **WS-11B**

REVISION #1: **02-2014** LAST REVISION:

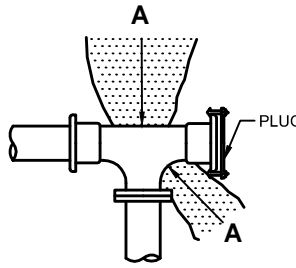
APPROVAL: **R. TISCHMAK, CITY ENGINEER**



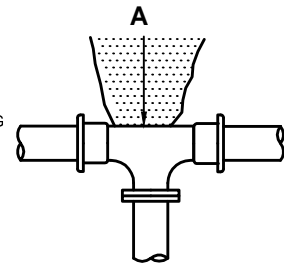
CAPPED CROSS



- \$69B8



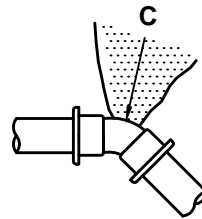
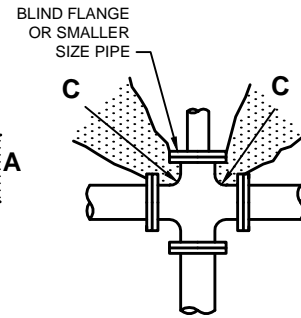
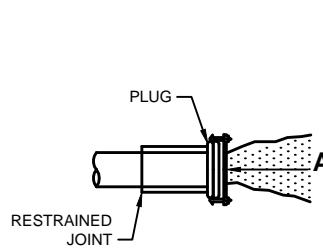
TEE W/ PLUG



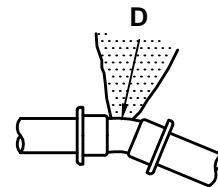
TEE W/O PLUG

THRUST BLOCKING SIZE

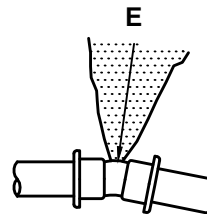
PIPE SIZE DIA	A (ft ²)	C (ft ²)	D (ft ²)	E (ft ²)
4"	4	2	1	1
6"	10	5	3	1
8"	18	10	5	2
10"	28	15	8	4
12"	40	22	11	6
14"	55	30	15	8
16"	71	39	20	10
18"	90	49	25	13
20"	111	60	31	15
22"	135	73	37	19
24"	160	87	44	22
28"	218	118	60	30
30"	251	136	69	35
36"	361	195	100	50
42"	491	266	135	68
48"	641	347	177	89



() \$69B8



&& \$69B8



% \$69B8

NOTES:

1. BEARING AREA OF CONCRETE THRUST-BLOCK BASED ON 250 PSI PRESSURE AND SAFE SOIL BEARING LOAD OF 1000 POUNDS PER SQUARE FOOT.
2. ADJUST BEARING AREA FOR OTHER PIPE SIZES, PRESSURES, AND SOIL CONDITIONS.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE AND HAVE A MINIMUM AREA OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING.
4. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATION PRESSURE UNDER ALL CONDITIONS OF SERVICE.
5. HEIGHT OF THRUST BLOCK MUST BE EQUAL TO OR LESS THAN 1/2 THE DEPTH FROM THE GROUND SURFACE TO THE BLOCK'S BASE.
6. USE GALVANIZED OR ASPHALT-COATED SHEEL, THREADED RODS AND PIPE CLAMPS.
7. REFER TO CHAPTER 7 OF THESE STANDARDS.

NOT TO SCALE



**City of
Tukwila**

BLOCKING (HORIZONTAL)

CONCRETE

SHEET: **WS-12A 1 OF 2**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

-THRUST BLOCKING SIZE
 -ASSUME 1000 SOIL PRESSURE
 -DESIGN PRESSURE 250 PSI

DIA	D ₉ SQ FT	D ₉ F ₉₅ (PSI)	<958 ft HL	A LOAD (LB)	A AREA (SF)	C LOAD (LD)	C AREA (SF)	D LOAD (LD)	D AREA (SF)	E LOAD (LD)	E AREA (SF)
4	0.08727	250	577.5	4,454.46	4	2,410.74	2	1,228.96	1	617.62	1
6	0.19635	250	577.5	10,022.54	10	5,424.16	5	2,765.17	3	1,389.65	1
8	0.34907	250	577.5	17,817.85	18	9,642.95	10	4,915.86	5	2,470.49	2
10	0.54542	250	577.5	27,840.39	28	15,067.11	15	7,681.03	8	3,860.15	4
12	0.78540	250	577.5	40,090.16	40	21,696.64	22	11,060.68	11	5,558.61	6
14	1.06902	250	577.5	54,567.17	55	29,531.54	30	15,054.82	15	7,565.89	8
16	1.39627	250	577.5	71,271.40	71	38,571.80	39	19,663.44	20	9,881.97	10
18	1.76715	250	577.5	90,202.87	90	48,817.44	49	24,886.54	25	12,506.87	13
20	2.18167	250	577.5	111,361.57	111	60,268.44	60	30,724.12	31	15,440.58	15
22	2.63982	250	577.5	134,747.49	135	72,924.82	73	37,176.19	37	18,683.10	19
24	3.14160	250	577.5	160,360.65	160	86,786.56	87	44,242.74	44	22,234.44	22
28	4.27607	250	577.5	218,268.67	218	118,126.15	118	60,219.28	60	30,263.54	30
30	4.90875	250	577.5	250,563.52	251	135,604.00	136	69,129.27	69	34,741.31	35
36	7.06860	250	577.5	360,811.47	361	195,269.76	195	99,546.16	100	50,027.48	50
42	9.62115	250	577.5	491,104.51	491	265,783.83	266	135,493.38	135	68,092.97	68
48	12.56640	250	577.5	641,442.62	641	347,146.23	347	176,970.94	177	88,937.75	89

NOT TO SCALE



*City of
Tukwila*

**BLOCKING
CONCRETE**

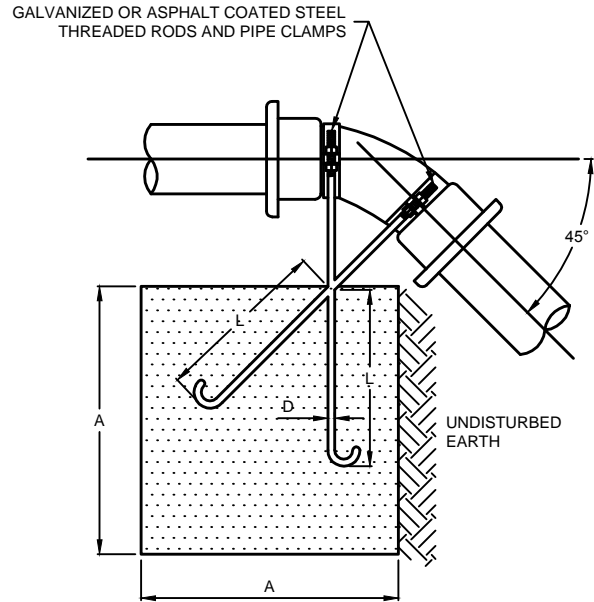
SHEET: **WS-12A 2 OF 2**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

VERTICAL BLOCKING
: CF %%% \$! &&%&S!' \$S69B8G

PIPE SIZE (INCHES)	V.B. (DEGREES)	CU. FT.	A (FEET)	D (INCHES)	L (FEET)
4	11 1/4	8	2.0	3/4	1.5
	22 1/2	11	2.2		2.0
	30	17	2.6		
6	11 1/4	11	2.2	3/4	2.0
	22 1/2	25	2.9		
	30	41	3.5		
8	11 1/4	16	2.5	3/4	2.0
	22 1/2	47	3.6		
	30	70	4.1	3/4	2.5
10-12	11 1/4	32	3.2	3/4	2.0
	22 1/2	88	4.5	7/8	3.0
	30	132	5.1		
16	11 1/4	70	4.1	7/8	3.0
	22 1/2	184	5.7	1 1/8	4.0
	30	275	6.5	1 1/4	
18-20	11 1/4	91	4.5	7/8	3.0
	22 1/2	225	6.1	1 1/4	4.0
	30	330	6.9	1 3/8	4.5
24	11 1/4	128	5.0	1	3.5
	22 1/2	320	6.8	1 3/8	4.5
	30	480	7.9	1 5/8	5.5



VERTICAL BLOCKING FOR 11 1/4°, 22 1/2°, 30°, 45°, AND 90° BENDS

J9FH75 @6 @7?-B; : CF () \$S69B8G

4	45	30	3.1	3/4	2.0
6		68	4.1		
8		123	5.0		
12		232	6.1	3/4	2.5
16		478	7.8	1 1/8	4.0
20		560	8.2	1 1/4	
24		820	9.4	1 3/8	4.5

NOT TO SCALE



*City of
Tukwila*

BLOCKING (VERTICAL)

CONCRETE

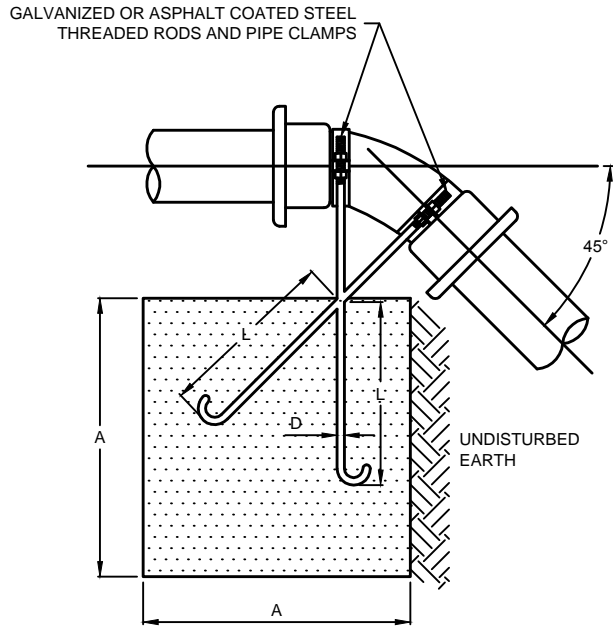
SHEET: **WS-12B**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

VERTICAL BLOCKING
: CF °%/% \$! &&%&S!' \$š69B8G

PIPE SIZE (INCHES)	V.B. (DEGREES)	CU. FT.	A (FEET)	D (INCHES)	L (FEET)
4	11 1/4	8	2.0	3/4	1.5
	22 1/2	11	2.2		2.0
	30	17	2.6		
6	11 1/4	11	2.2	3/4	2.0
	22 1/2	25	2.9		
	30	41	3.5		
8	11 1/4	16	2.5	3/4	2.0
	22 1/2	47	3.6		
	30	70	4.1	3/4	2.5
10-12	11 1/4	32	3.2	3/4	2.0
	22 1/2	88	4.5	7/8	3.0
	30	132	5.1		
16	11 1/4	70	4.1	7/8	3.0
	22 1/2	184	5.7	1 1/8	4.0
	30	275	6.5	1 1/4	
18-20	11 1/4	91	4.5	7/8	3.0
	22 1/2	225	6.1	1 1/4	4.0
	30	330	6.9	1 3/8	4.5
24	11 1/4	128	5.0	1	3.5
	22 1/2	320	6.8	1 3/8	4.5
	30	480	7.9	1 5/8	5.5



VERTICAL BLOCKING FOR 11 1/4°, 22 1/2°, 30°, 45°, AND 90° BENDS

J9FH75 @6 @7?-B; : CF () š69B8G

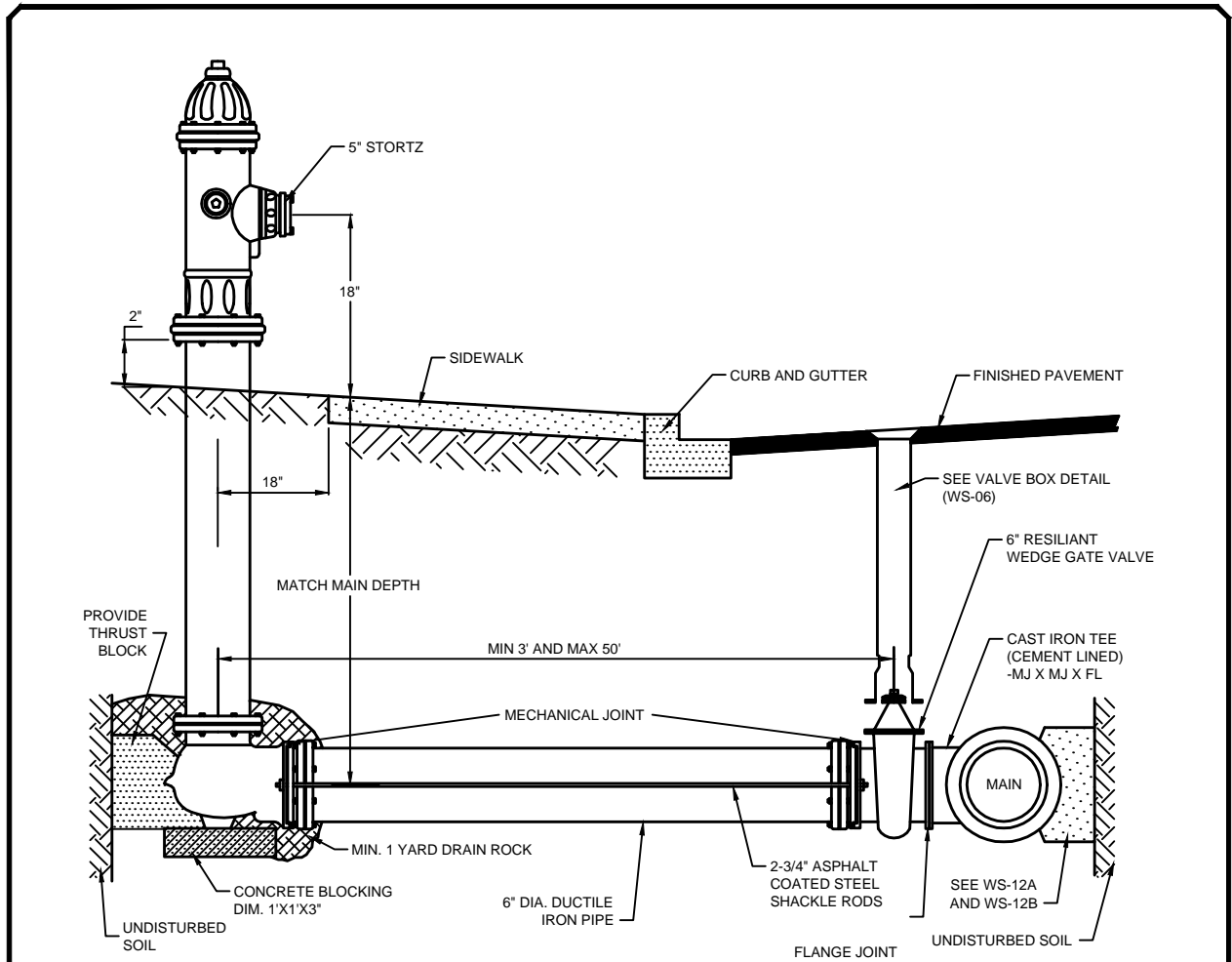
4	45	30	3.1	3/4	2.0
6		68	4.1		
8		123	5.0		
12		232	6.1	3/4	2.5
16		478	7.8	1 1/8	4.0
20		560	8.2	1 1/4	
24		820	9.4	1 3/8	4.5

NOT TO SCALE



*City of
Tukwila*

BLOCKING (VERTICAL)	
CONCRETE	
SHEET:	WS-12B
REVISION #1: 02-2014	LAST REVISION:
APPROVAL:	R. TISCHMAK, CITY ENGINEER



NOTES:

1. REFER TO CHAPTER 7 OF THESE STANDARDS.
2. HYDRANTS EQUAL TO MUELLER #A-423, CLOW MEDALLION #F-2545, M & H 929, OR EJIW # 5CD250 WATER MASTER.
3. HYDRANTS SHALL BE EQUIPPED WITH TWO 2-1/2" N.S.T. HOSE PORTS AND ONE 5" STORTZ PUMPER DISCHARGE PORT AND SHALL HAVE A 1-1/4" PENTAGON OPEN LIFT OPERATING NUT. HYDRANTS SHALL HAVE A 6" M.J. BOTTOM CONNECTION AND 5-1/4" MAIN VALVE OPENING, AND SHALL HAVE 18" ABOVE GRADE LEVEL TO THE CENTER OF THE PUMPER DISCHARGE PORT.
4. HYDRANTS SHALL CONFORM TO A.W.W.A. SPECIFICATIONS C 502-54; SHALL BE COMPRESSION TYPE AND SHALL HAVE A TWO PIECE BREAKING FLANGE WITH BREAKING THIMBLE AT THE GROUND LINE OR STEM; SHALL HAVE A SELF-OILING DRY BONNET WITH FACTORY FILLED RESERVOIR HOLDING APPROXIMATELY 8 OUNCES OF OIL. OIL RESERVOIR SHALL BE SO DESIGNED AS TO GIVE A COMPLETE LUBRICATION OF STEMS EACH TIME THE HYDRANT IS OPERATED. THE UPPER STEM SHALL HAVE A BRASS SLEEVE.
5. SHACKLE RODS SHALL BE ASPHALT-COATED STEEL OR CORTEN STEEL.
6. CITY HYDRANTS BONNET AND PORT CAPS SHALL BE FARWEST COMPASS BLUE # 4602. BARREL SHALL BE FARWEST CASE YELLOW SAFETY X-3472.
7. PRIVATE HYDRANTS SHALL BE PAINTED WITH TWO COATS OF FARWEST CASE YELLOW (# X-3472).
8. WHERE NO CURB AND GUTTER IS INSTALLED, FIRE HYDRANT SHALL BE LOCATED CLOSE TO THE PROPERTY LINE AND INSIDE THE RIGHT OF WAY OR EASEMENT. INSTALL BOLLARD GUARD POST PER WS-14.
9. HYDRANTS INSTALLED, RELOCATED OR OTHERWISE WORKED UPON AS A RESULT OF A PROJECT SHALL BE FRESHLY PAINTED.
10. HYDRANT SHALL NOT BE CLOSER THAN 4' TO ANY FIXED OBJECT, WITH THE EXCEPTION OF HYDRANT GUARD POSTS, PER TMC 14.24.03.

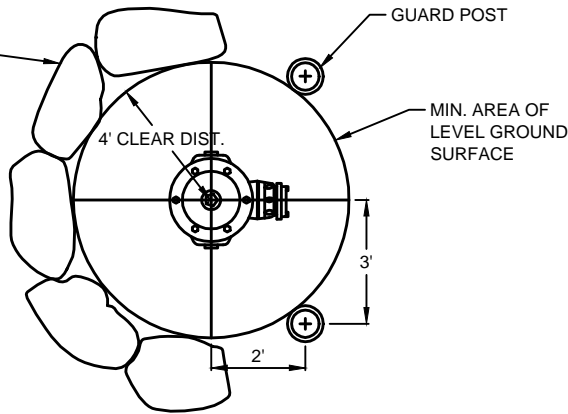
NOT TO SCALE



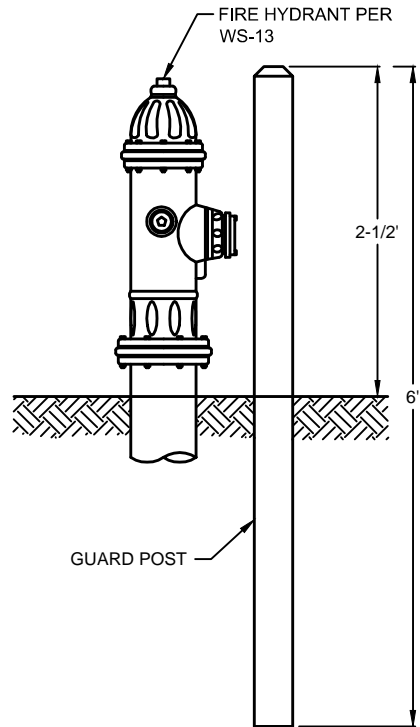
City of
Tukwila

FIRE HYDRANT	
ASSEMBLY AND SETTING	
SHEET:	WS-13
REVISION #1: 02-2014	LAST REVISION: 04.08
APPROVAL:	R. TISCHMAK, CITY ENGINEER

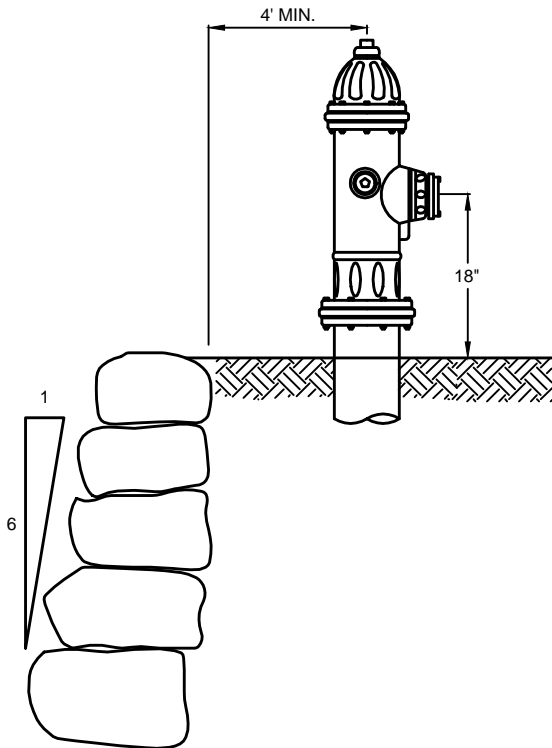
ROCK WALL,
PLANTINGS, OR
OTHER SURFACE
OBSTRUCTIONS



PLAN



**GUARD POST
ELEVATION**



NOTES:

1. GUARD POST SHALL BE EITHER CONCRETE FILLED STEEL PIPE (MIN. 4" DIA.) OR CONCRETE POST (MIN. 8" DIA.).
2. POSTS SHALL BE AT LEAST 3 FEET FROM THE CENTER OF THE HYDRANT AND SHALL NOT BE IN DIRECT LINE WITH ANY DISCHARGE PORTS.
3. POSTS SHALL BE 6 FEET LONG; 3-1/2 FEET SHALL BE BURIED.
4. PAINTED FINISH SHALL BE FARWEST CASE YELLOW #3472.

NOT TO SCALE



*City of
Tukwila*

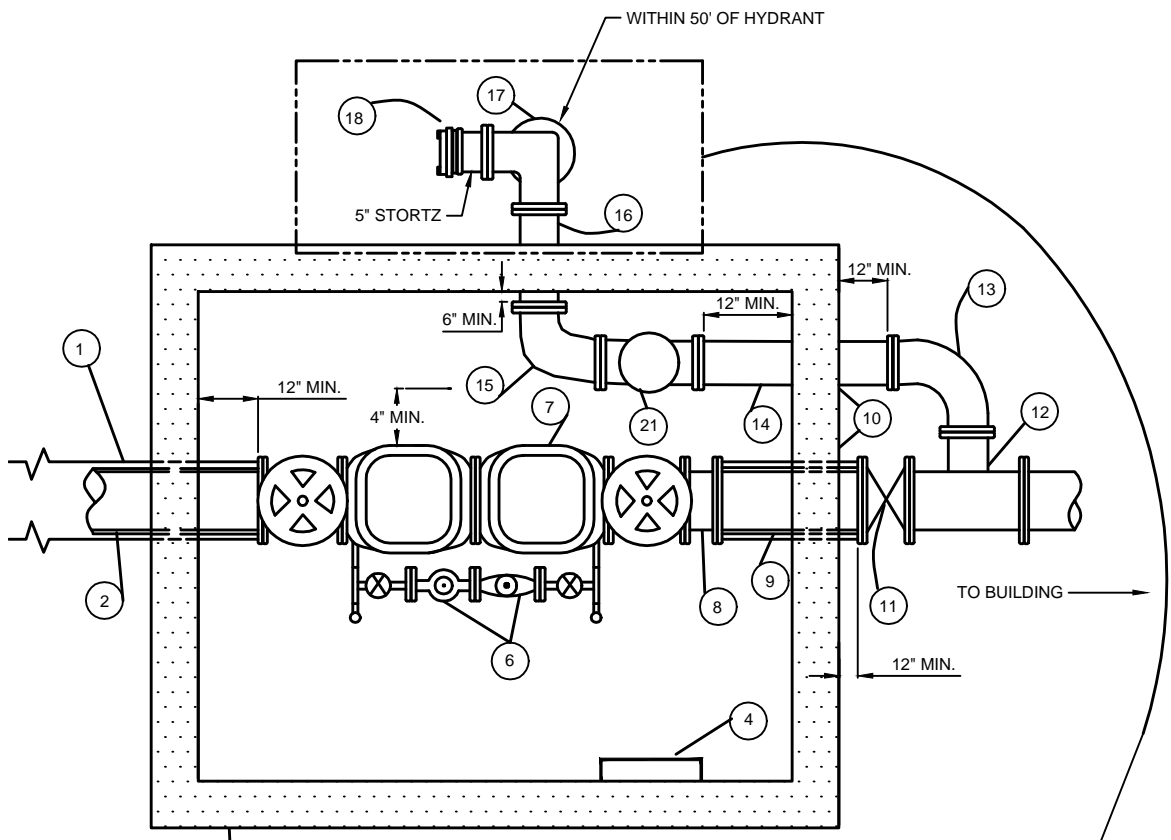
FIRE HYDRANT

GUARD POST

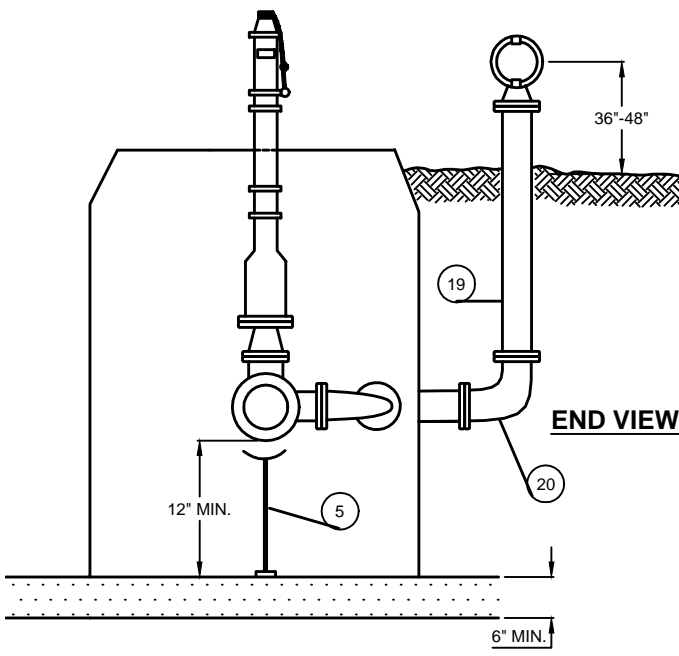
SHEET: **WS-14**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

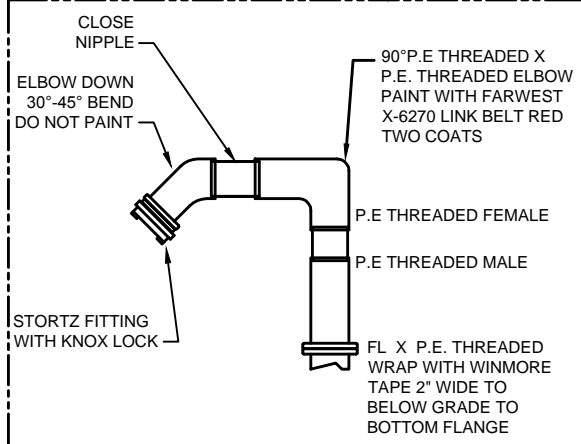


PLAN VIEW



END VIEW

**COMPACTED FOUNDATION
GRAVEL UNDER VAULT**



SIDE VIEW

NOTES:

- 1. DESIGN FOR 4" THRU 10" DDCV.
- ⑤ THE PIPE SUPPORT IS LOCATED INSIDE THE VAULT.

NOT TO SCALE



*City of
Tukwila*

**CROSS CONNECTION CONTROL
DETECTOR DOUBLE CHECK VALVE & VAULT**

SHEET:	WS-15 1 OF 2	
REVISION #1:	02-2014	LAST REVISION:
APPROVAL:	R. TISCHMAK, CITY ENGINEER	

MATERIAL LISTING:

1. 3/4" SHACKLE RODS WITH STAR BOLTS AND ASPHALT EMULSION COATING.
2. 4" MIN. D.I. CLASS 52 PIPE.
3. PRECAST CONCRETE VAULT WITH HINGED STEEL PLATE COVER, DIMENSION TO VARY WITH SIZE OF ASSEMBLY.
4. O.S.H.A. APPROVED LADDER IF OVER 30" DEEP.
5. PIPE SUPPORT STAND UNDER EACH CHECK VALVE.
6. COPPER OR BRONZE BYPASS WITH AN APPROVED DCVA AND 3/4" WATER METER.
7. APPROVED DCVA IN MAIN LINE WITH TWO RESILIENT SEATED SHUTOFF VALVES AND TEST COCKS.
8. 10", 8", 6" OR 4" COUPLING ADAPTER, FL.
9. 10", 8", 6" OR 4" FL*PE D.I. CLASS 52 PIPE LENGTH TO FIT.
10. GROUT INTERIOR AND EXTERIOR ALL AROUND PIPE USING NON-SHRINK GROUT.
11. 10", 8", 6" OR 4" GATE VALVE FL*MJ WITH POST INDICATOR VALVE.
12. FLANGE TEE ASSEMBLY SIZED ACCORDINGLY.
13. FLANGED 90° BEND.
14. 4" OR 6" D.I. CLASS 52 PIPE FL*FL.
15. 4" OR 6" 90° BEND FL.
16. 4" OR 6" D.I. CLASS 52 PIPE, FL*FL.
17. 6" 90° BEND, FL.
18. UL LISTED 5" STORTZ CONNECTION WITH 30° OR 45° ELBOW.
19. 6" D.I. CLASS 52 PIPE LENGTH AS REQUIRED FLANGE * THREADED P.E.
20. 6" 90° BEND FL.
21. SWING TYPE GRAVITY OPERATED CHECK VALVE WITH BALL DRIP VALVE TO BE INSTALLED HORIZONTALLY.

DETECTOR DOUBLE CHECK AND VAULT ASSEMBLY GENERAL NOTES:

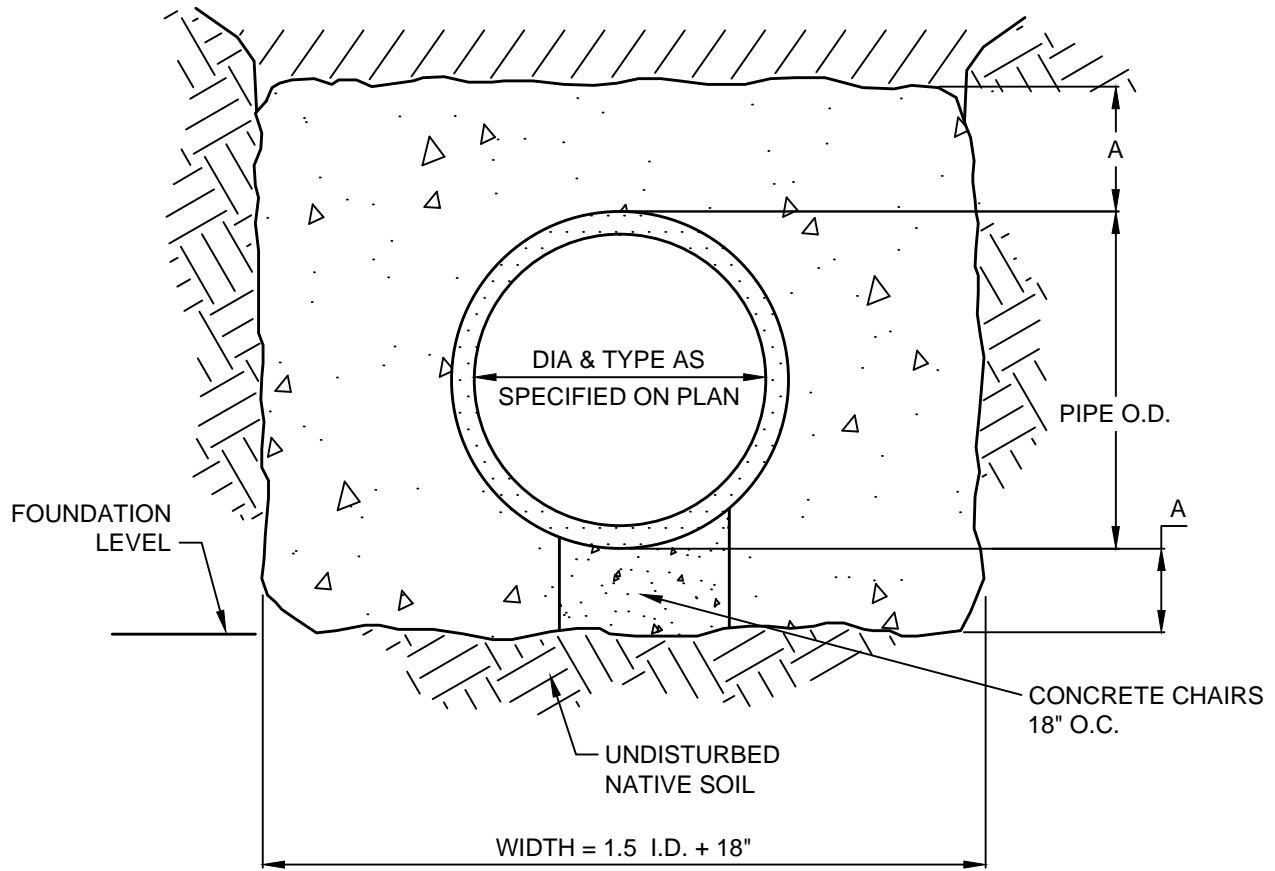
1. BACKFLOW PREVENTORS SHALL BE APPROVED BY DEPARTMENT OF HEALTH.
2. SIZE VAULT BASED ON SIZE OF APPARATUS AND MEETING MINIMUM CLEARANCES.
3. A SEPARATE DETAIL PLAN FOR VAULT INSTALLATION AND SPRINKLER LINE MUST BE SUBMITTED AND APPROVED BY THE FIRE MARSHALL PRIOR TO INSTALLATION.
4. MINIMUM APPARATUS SIZE SHALL BE 4".
5. VAULT SHALL BE SEALED TO PREVENT WATER LEAKAGE.
6. LADDERS SHALL BE REQUIRED WHEN DEPTH FROM TOP OF LID TO FLOOR OF VAULT EXCEEDS 30". INSTALLATION OF ALL LADDERS SHALL BE IN COMPLIANCE TO O.S.H.A.
7. LOCATE VAULT IN PLANTING AREA AND NOT IN PAVING AREA, UNLESS APPROVED BY THE ENGINEER.
8. FITTINGS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C110/A21.10 AND CEMENT LINED (SEE APWA & AWWA).
9. PIPE SHALL BE DUCTILE IRON MEETING ANSI A21.51, CL52 & CEMENT LINED.
10. TEMPORARY SUPPORT SHALL BE PROVIDED UNDER VALVES AT THE TIME OF INSTALLATION. AFTER COMPLETE INSTALLATION INSTALL PERMANENT PIPE SUPPORT STAND.
11. PROVIDE BALL DRIP VALVES ON F.D.C. CHECK VALVE ASSEMBLY OR AT BOTTOM OF F.D.C. RISER.
12. FIRE DEPARTMENT CONNECTION TO BE PROVIDED WITH ONE (1) 5" STORTZ CONNECTIONS AND TWO 30° OR 45° ELBOWS.
13. ALL UNDERGROUND PIPING TO BE INSPECTED, FLUSHED, AND PRESSURE TESTED IN THE PRESENCE OF AN INSPECTOR PRIOR TO COVER AND CONNECTION TO THE OVERHEAD SYSTEM.
14. UPON INSTALLATION, BACKFLOW PREVENTION ASSEMBLIES ARE TO BE TESTED BY A CERTIFIED TESTER AND ALL TEST-COCKS ARE TO BE PLUGGED AFTER THE TEST. THEREAFTER, ANNUAL TESTS SHALL BE PERFORMED AT OWNER'S EXPENSE, AND COPIES OF TEST RESULTS SHALL BE PROVIDED.
15. CONCRETE VAULT SHALL HAVE ONE 4' X 4' OR TWO 3' X 3' STEEL HINGED DOORS.
16. BACKFLOW PREVENTION VALVES AND POST OR WALL INDICATING VALVES SHALL BE PROVIDED WITH UL CENTRAL STATION TAMPER SUPERVISION.

NOT TO SCALE



*City of
Tukwila*

CROSS CONNECTION CONTROL**DETECTOR DOUBLE CHECK VALVE AND VAULT**SHEET: **WS-15 2 OF 2**REVISION #1: **02-2014** LAST REVISION: **08.04**APPROVAL: **R. TISCHMAK, CITY ENGINEER**



NOTES:

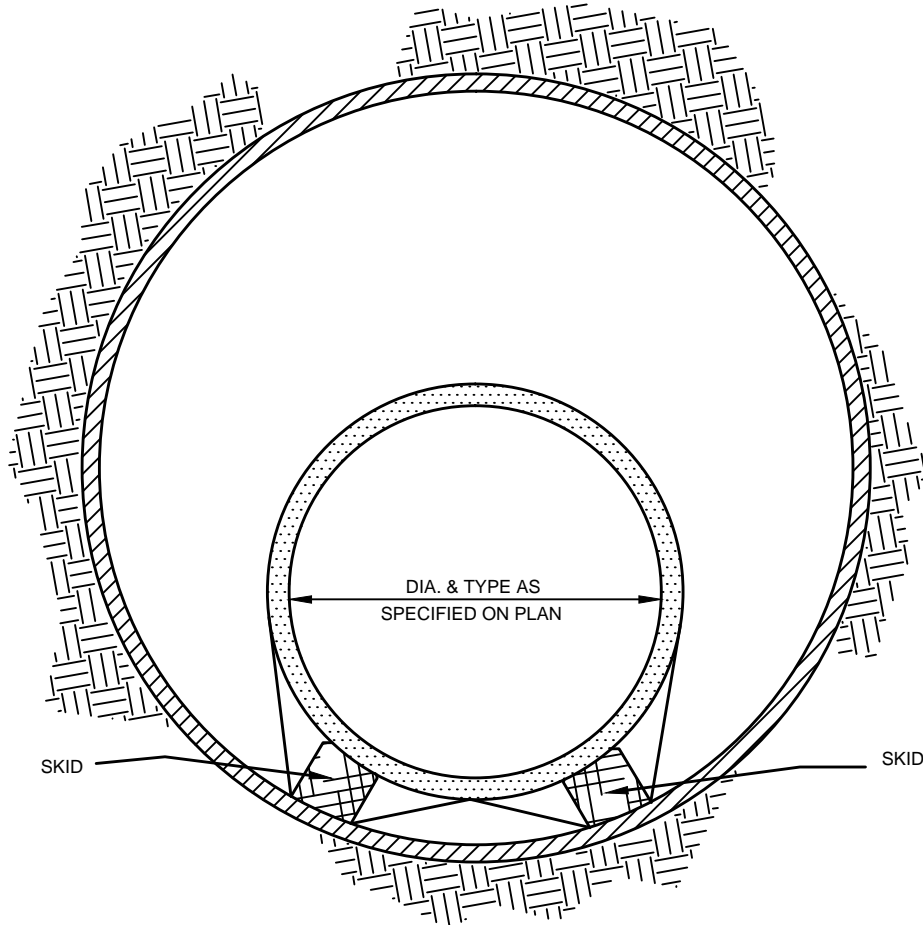
1. A = 1/4 I.D. (6" MIN. - 12" MAX.)
2. ENCASE IN CONTROLLED DENSITY FILL (CDF), PER WSDOT/APWA STANDARD SPECIFICATIONS SECTION 2-09.3(1)E.
3. CONCRETE STRENGTH 3000 psi.
4. COVERS SHALL BE LABELED WITH 2" RAISED LETTERS SAYING "SEWER" FOR SANITARY SEWER, "STORM" FOR STORM DRAIN IN THE RIGHT-OF-WAY, "DRAIN" FOR STORM DRAIN ON PRIVATE PROPERTY, "WATER" WHEN INSTALLED ON POTABLE WATER, OR "RECLAIMED" WHEN INSTALLED ON RECLAIMED WATER.

NOT TO SCALE



*City of
Tukwila*

ENCASEMENT	
CONTROLLED DENSITY FILL	
SHEET:	WS-16
REVISION #1:	02-2014
LAST REVISION:	04.08
APPROVAL:	R. TISCHMAK, CITY ENGINEER



NOTES;

1. STEEL CASING PIPE SHALL BE ASTM A-36 PIPE MANUFACTURED IN ACCORDANCE WITH AWWA C-201. FIELD JOINTS SHALL BE BUTT WELDED IN ACCORDANCE WITH AWWA C-206 UNLESS OTHERWISE SPECIFIED ON PLANS OR DIRECTED BY ENGINEER.
2. PLACE CASING BY BORING OR BY JACKING.
3. SKIDS SHALL SUPPORT THE FULL LENGTH OF EACH PIECE OF PIPE, EXCEPT FOR JOINT AREA. SKIDS SHALL BE SECURELY STRAPPED TO THE CARRIER PIPE. THE NUMBER, SIZE AND PLACEMENT OF SKIDS SHALL BE SUFFICIENT TO SUPPORT THE CARRIER PIPE, INCLUDING JOINT SECTIONS, ABOVE THE STEEL CASING.
4. FILL CASING VOID WITH SAND. GROUT CASING ENDS WITH CONCRETE OR CONTROLLED DENSITY FILL AT LEAST 12" THICK.
5. COVERS SHALL BE LABELED WITH 2" RAISED LETTERS SAYING "SEWER" FOR SANITARY SEWER, "STORM" FOR STORM DRAIN IN THE RIGHT-OF-WAY, "DRAIN" FOR STORM DRAIN ON PRIVATE PROPERTY, "WATER" WHEN INSTALLED ON POTABLE WATER, OR "RECLAIMED" WHEN INSTALLED ON RECLAIMED WATER.

NOT TO SCALE



*City of
Tukwila*

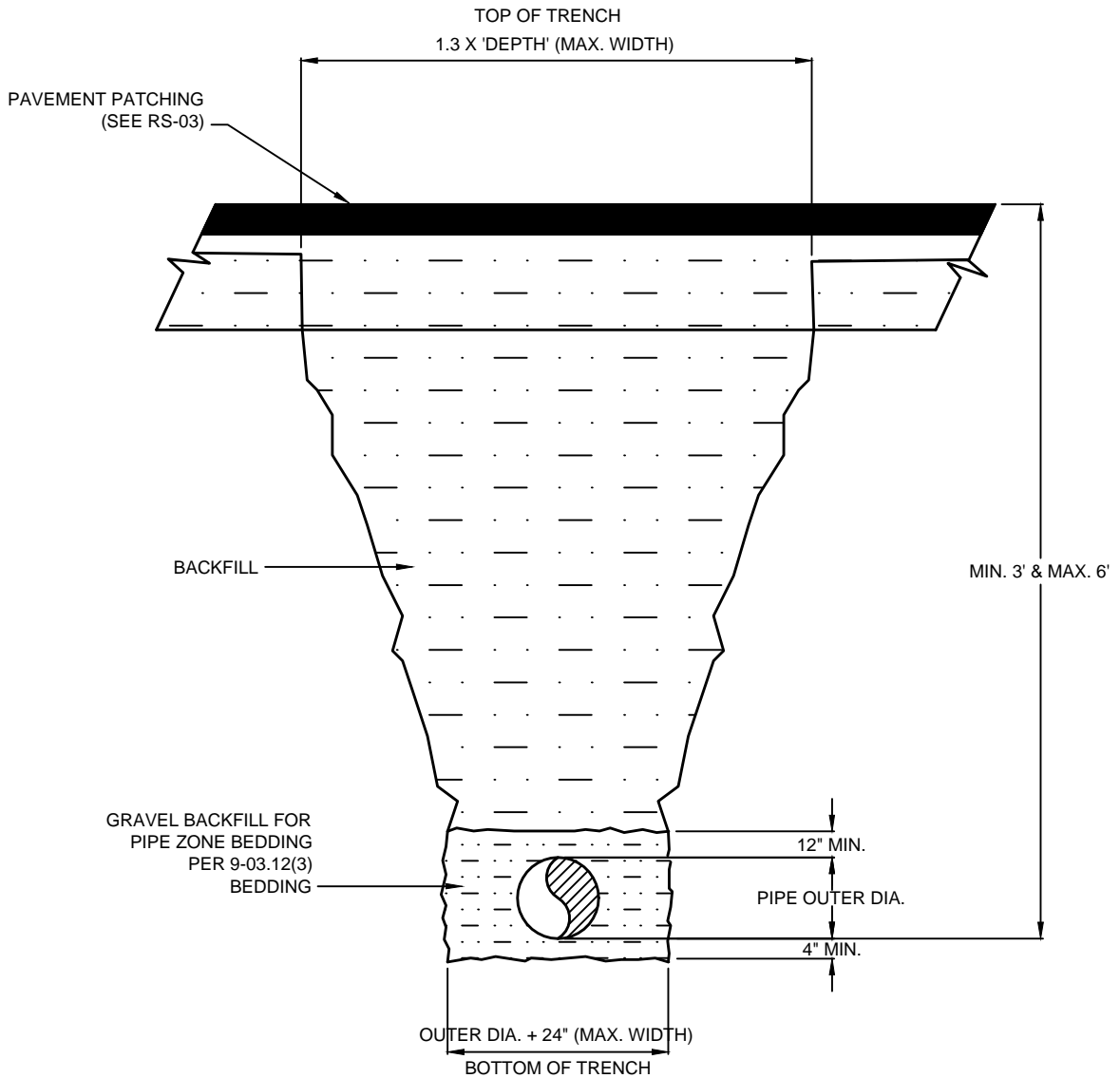
ENCASEMENT

STEEL

SHEET: WS-17

REVISION #1: 02-2014 LAST REVISION:

APPROVAL: R. TISCHMAK, CITY ENGINEER



NOTE:

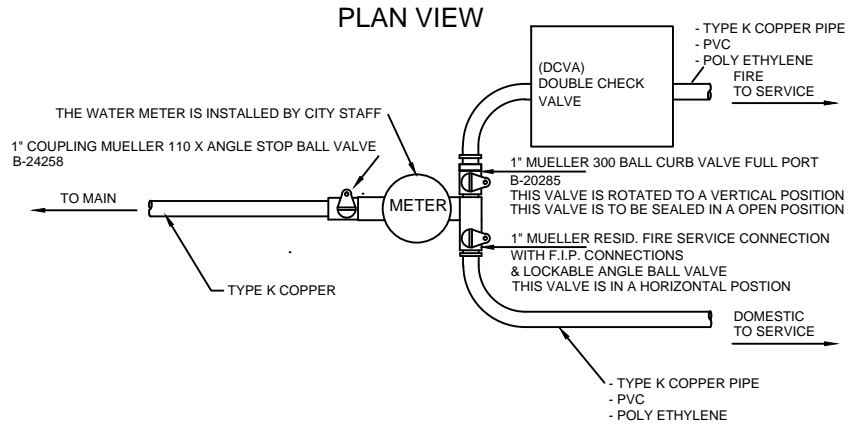
1. ALL BACKFILL SHALL BE 5/8" CRUSHED ROCK COMPACTED TO 90% MODIFIED PROCTOR OPTIMUM DENSITY.
2. REFER TO RS-03 FOR PAVEMENT PATCHING.
3. PAVED AREAS: BACKFILL WITH CRUSHED ROCK.
4. UNPAVED AREAS: BACKFILL WITH NATIVE MATERIAL OR CRUSHED ROCK.

NOT TO SCALE

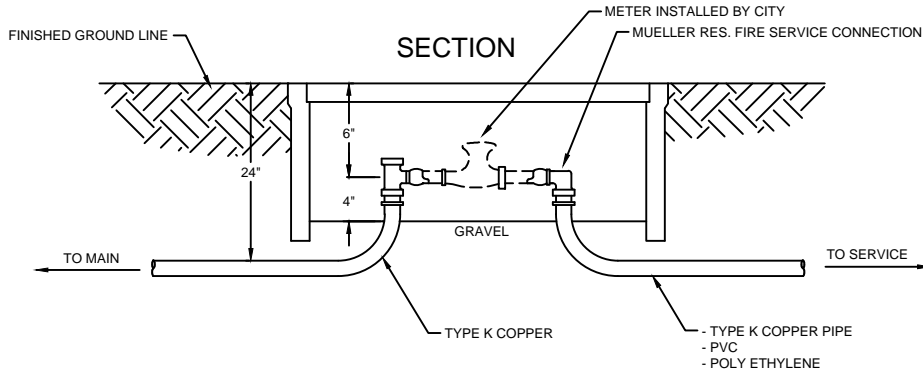


*City of
Tukwila*

TRENCH	
BEDDING AND BACKFILL	
SHEET:	WS-18
REVISION #1: 02-2014	LAST REVISION: 04.08
APPROVAL: R. TISCHMAK, CITY ENGINEER	



FITIINGS USED ON THE PIPES LEADING TO THE HOUSE FROM THE MUELLAR TEE SHALL BE MUELLER 110 TYPE FITTINGS OR EQUAL.



1" FIRE SERVICE PARTS LIST:

- 1-B-24258 - 1" COUPLING MUELLER 110 X ANGLE STOP - BALL
- 1-B-25028 - 1" CORP STOP - BALL
- 1 - TAILPIECE WITH FEMALE IRON PIPE THREADS

NOTES:

1. NO METER BOXES IN SIDEWALKS AND DRIVEWAYS WHERE POSSIBLE.
2. USE CLEAN 5/8" MINUS CRUSHED ROCK TO BACKFILL AROUND CORP STOP AND SERVICE LINE.
3. THE FIRE SPRINKER SYSTEM SHALL BE DESIGNED PER APPENDIX R AND NFPA 13D
4. THE DOUBLE CHECK VALVE SHALL BE INSTALLED WITHIN 5' OF THE WATER METER.
5. THE DOUBLE CHECK VALVE SHALL BE INSTALLED TO PROTECT FROM FREEZING.
6. ALL BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



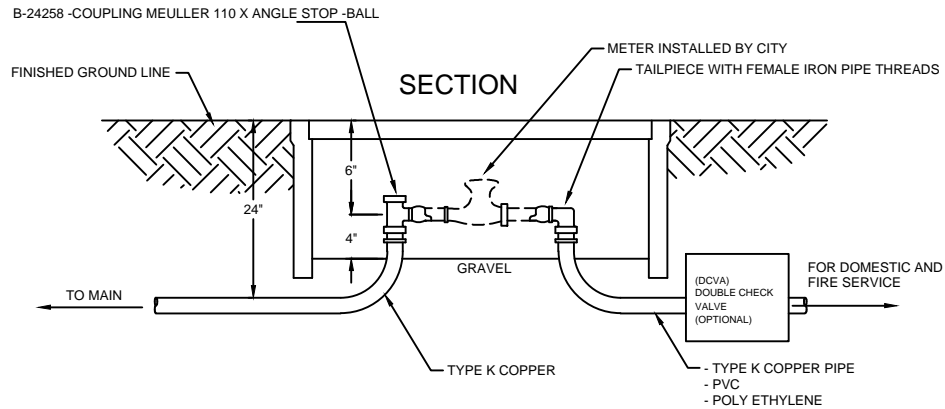
*City of
Tukwila*

1" FIRE / DOMESTIC SERVICE

SHEET: **WS-19**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**



1" FIRE SERVICE PARTS LIST:

- 1-B-24258 - 1" COUPLING MUELLER 110 X ANGLE STOP - BALL
- 1-B-25028 - 1" CORP STOP - BALL
- 1 - TAILPIECE WITH FEMALE IRON PIPE THREADS

NOTES:

1. NO METER BOXES IN SIDEWALKS AND DRIVEWAYS WHERE POSSIBLE.
2. USE CLEAN 5/8" MINUS CRUSHED ROCK TO BACKFILL AROUND CORP STOP AND SERVICE LINE.
3. THE FIRE SPRINKLER SYSTEM SHALL BE DESIGNED PER APPENDIX R AND NFPA 13D
4. REFER TO CHAPTER 7 OF THE STANDARDS.
5. ALL BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

FLOW-THROUGH SYSTEM

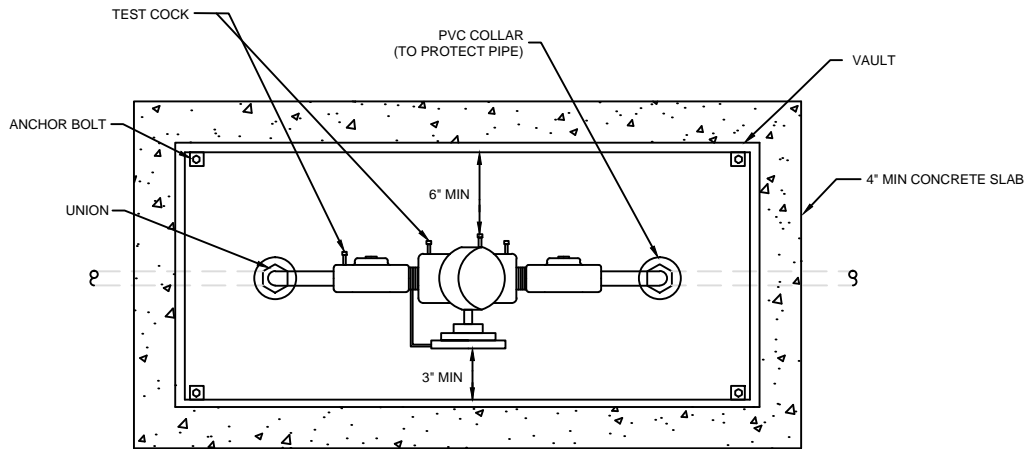
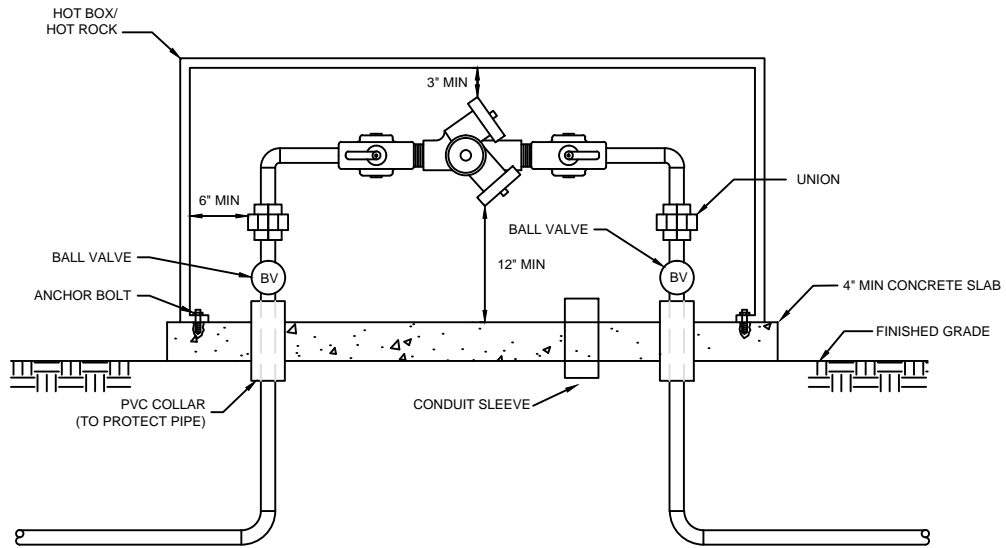
1" FIRE / DOMESTIC FIRE SERVICE

SHEET: **WS-20**

REVISION #1: **02-2014**

LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**



NOT TO SCALE



*City of
Tukwila*

**2" AND SMALLER REDUCED PRESSURE
PRINCIPAL ASSEMBLY INSTALLATION**

SHEET: **WS-21A**

REVISION #1: **02-2014**

LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

1. THE RPPA SHALL BE INSTALLED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING. IT SHALL BE TESTED AFTER INSTALLATION, BY A WASHINGTON STATE CERTIFIED BACK-FLOW ASSEMBLY TESTER, TO INSURE ITS SATISFACTORY OPERATION BEFORE OCCUPANCY AND ANNUALLY THEREAFTER. A COPY OF THE TEST RESULTS SHALL BE GIVEN TO THE PUBLIC WORKS INSPECTOR.
2. AN RPPA SHALL NOT BE INSTALLED IN A PIT BELOW GROUND LEVEL.
3. THE FREEZE PROTECTION ENCLOSURE FOR THE RPPA MUST INCLUDE A DAYLIGHT DRAIN. THE DRAIN MUST BE ABLE TO BE BORE SIGHTED. IT MUST BE INSTALLED ABOVE GROUND LEVEL. THE DRAIN MUST ALSO BE ABLE TO HANDLE THE VOLUME OF WATER THAT POTENTIALLY COULD BE DISCHARGED FROM THE RELIEF PORT.
4. THE FREEZE PROTECTION ENCLOSURE SHALL BE SUPPORTED BY A MIN. FOUR (4) INCH CONCRETE SLAB WITH FOUR (4) ANCHOR BOLTS ATTACHING THE COVERING TO THE SLAB.
5. RPPA MUST BE PROTECTED FOR FREEZING.
6. AN RPPA INSTALLED MORE THAN FIVE (5) FEET ABOVE FLOOR LEVEL MUST HAVE A PLATFORM UNDER IT FOR THE TESTER OR MAINTENANCE PERSON TO STAND ON. THE PLATFORM MUST BE OSHA APPROVED AND MEET ALL APPLICABLE SAFETY STANDARDS AND CODES.
7. WHEN THE RPPA IS LOCATED INSIDE A BUILDING IT SHALL BE INSTALLED IN A LOCATION WHERE BOTH THE OCCASIONAL SPITTING FROM THE RELIEF PORT AND THE POSSIBLE CONSTANT DISCHARGE DURING A FOULED CHECK VALVE SITUATION WILL NOT BE OBJECTIONABLE. AN APPROVED AIR GAP FUNNEL ASSEMBLY, EITHER PROVIDED BY THE MANUFACTURER OR FABRICATED FOR SPECIFIC INSTALLATION, MAY BE INSTALLED TO HANDLE THE OCCASIONAL SPITTING OF THE RELIEF VALVE DUE TO PRESSURE FLUCTUATIONS. A LINE FROM THIS FUNNEL ASSEMBLY MAY THEN BE RUN TO AN ADEQUATELY SIZED FLOOR DRAIN OF EQUAL OR GREATER SIZE. IT MUST BE EMPHASIZED THAT THE AIR GAP FUNNEL ASSEMBLY WILL HANDLE ONLY THE OCCASIONAL SPITTING AND WILL NOT CONTROL FLOW IN A CONTINUOUS RELIEF SITUATION.
8. A PVC COLLAR SHALL BE INSTALLED BETWEEN THE PIPE AND CONCRETE SLAB.
9. A UNION SHALL BE INSTALLED ON THE RISERS TO AID IN REMOVAL OF THE ASSEMBLY.
10. BALL VALVES WILL BE INSTALLED ON THE RISERS TO AID IN THE TESTING AND MAINTENACE OF THE ASSEMBLY.
11. ALL BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

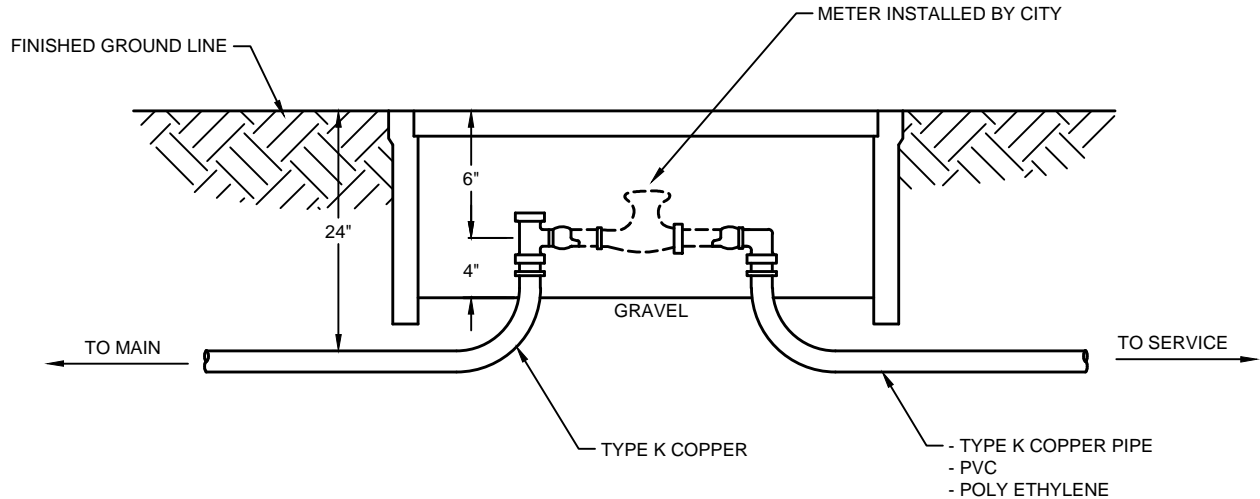
2" AND SMALLER REDUCED PRESSURE

PRINCIPAL ASSEMBLY INSTALLATION

SHEET: **WS-21B**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**



3/4" OR 1" PARTS LIST:

- 1 - 1" COUPLINGS MUELLER 110 X ANGLE STOP - BALL
- 1 - 1" OR 3/4" CORP STOP - BALL
- 1 - TAILPIECE WITH FEMALE IRON PIPE THREAD

NOTES:

1. NO METER BOXES IN SIDEWALKS AND DRIVEWAYS WHERE POSSIBLE.
2. USE CLEAN 5/8" MINUS CRUSHED ROCK TO BACKFILL AROUND CORP STOP AND SERVICE LINE.
3. REFER TO CHAPTER 7 OF THESE STANDARDS.
4. BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

METER

3/4" OR 1"

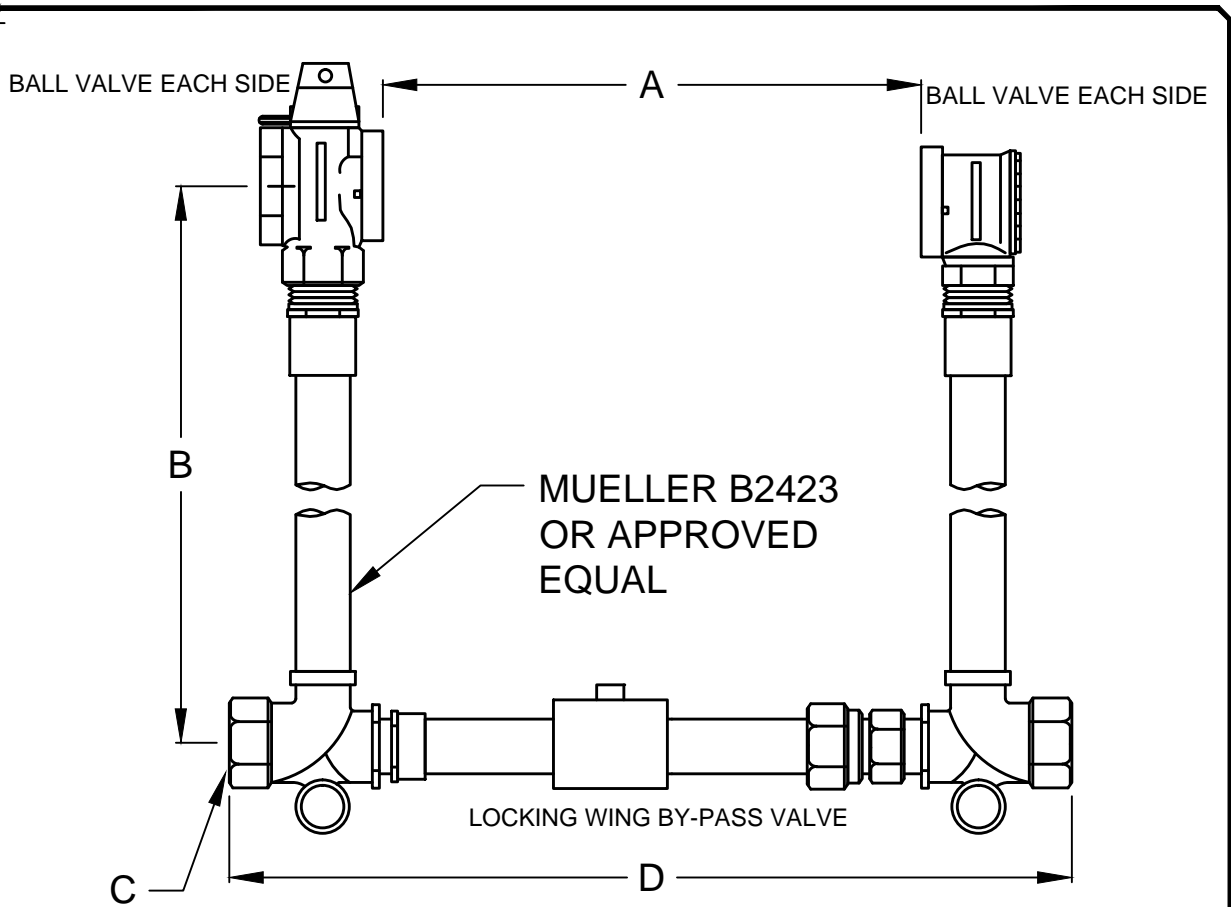
SHEET:

WS-01

REVISION #1: 02-2014

LAST REVISION:

APPROVAL: R. TISCHMAK, CITY ENGINEER



DIMENSIONS

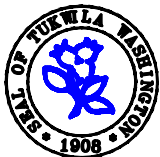
METER SIZE	1-1/2"	2"
Dimension A*	13.25"	17.25"
Dimension B - Riser Height	12", 15", 18", 21", 24", 27"	12", 15", 18", 21", 24", 27"
Dimension C - Nominal pipe size of inlet and outlet	1-1/2"	2"
Dimension D*	21.50"	26.63"

NOTES:

1. COMPOUND METER SUPPLIED AND SET BY THE CITY. 2" SINGLE REGISTER METER REQUIRES PRE-APPROVAL.
2. METER BOX SUPPLIED BY PERMITEE.
3. METER SETTER TO BE APPROVED BY THE CITY INSPECTOR PRIOR TO BACKFILL.
4. REFER TO CHAPTER 7 OF THE STANDARDS.
5. BRASS FITTINGS SHALL BE LEAD FREE.

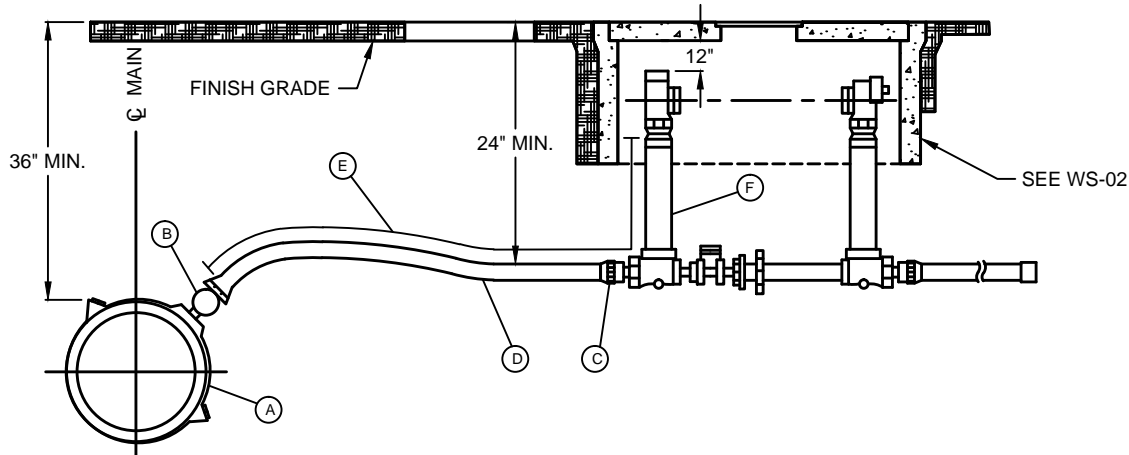
*CONTACT PUBLIC WORKS OPERATIONS FOR PREFERRED SPACING.

NOT TO SCALE



*City of
Tukwila*

METER	
1-1/2" AND 2" SETTER	
SHEET:	WS-02
REVISION #1:	02-2014
LAST REVISION:	08.04
APPROVAL:	R. TISCHMAK, CITY ENGINEER



- (A) PAINTED HIGH TENSILE D.I. SERVICE SADDLE WITH DOUBLE STRAP, AWWA I.P. THREAD TAP, ROMAC 202S OR EQUAL SIZE AS REQUIRED.
- (B) CORPORATION STOP, AWWA I.P. INLET BY MALE IRON PIPE THREAD OUTLET, MUELLER BALL NO. B-2969 OR EQUAL AS NEEDED.
- (C) COUPLING MALE IRON PIPE THREAD BY MUELLER 110 FITTING, MUELLER NO. H-15451 OR EQUAL.
- (D) COPPER TUBING, TYPE K OR HIGH MOLECULAR DENSITY POLYETHYLENE.
- (E) TRACING TAPE FOR POLYETHYLENE PIPE.
- (F) MUELLER B2423 OR APPROVED EQUAL.

NOTES:

- SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.
- METER WILL BE SUPPLIED AND INSTALLED BY THE CITY OF TUKWILA.
- SETTER SHALL BE POSITIONED TO CENTER RIGID SPREADER UNDER INSPECTION LID AND PROVIDE ADEQUATE CLEARANCE BETWEEN BYPASS AND BOX WALL FOR OPERATING AND LOCKING BYPASS VALVE.
- BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

SERVICE

1-1/2" & 2" DOMESTIC

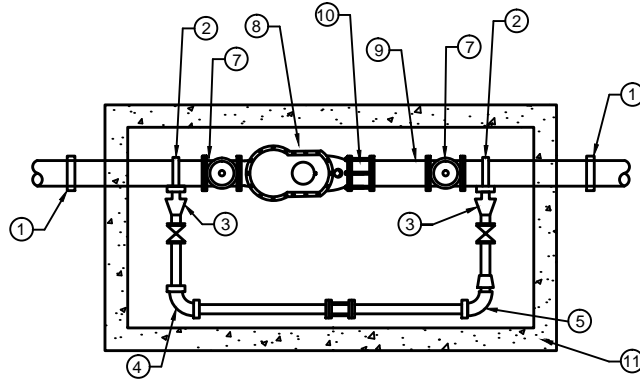
SHEET: WS-03

REVISION #1: 02-2014 LAST REVISION:

APPROVAL: R. TISCHMAK, CITY ENGINEER

MATERIAL LIST - COPPER BYPASS

- ① 2 - FLEX. CPLG. TO FIT, EQUAL TO ROCKWELL 441 (REDUCE AT TAP).
- ② 2 - SINGLE STRAP SERVICE CLAMPS EQUAL TO ROMAC 101 WITH IPS TAP. ROCKWELL 313.
- ③ 3 - STRAIGHT CPLG., COPPER TO OUTSIDE I.P. THREAD EQUAL TO MUELLER H-15428 110 COMP.
- ④ 1-1/4 BEND CPLG. COPPER TO COPPER, EQUAL TO MUELLER H-15526.
- ⑤ 1-1/4 BEND CPLG. COPPER TO OUTSIDE I.P. THREAD EQUAL TO MUELLER H-15530.
- ⑥ 2 - BALL VALVES WITH PADLOCK WINGS OR LOCK CAPS (MUELLER).
- ⑦ 2 - G.V. FL. EQUAL TO MUELLER A-2307-6.
- ⑧ 3" TO 6" COMPOUND METER SUPPLIED BY CITY.
- ⑨ 1 - C.I. ADPT., FL. X PE LENGTH TO FIT.
- ⑩ 1 - CPLG. ADPT., FL. EQUAL TO ROCKWELL 912.

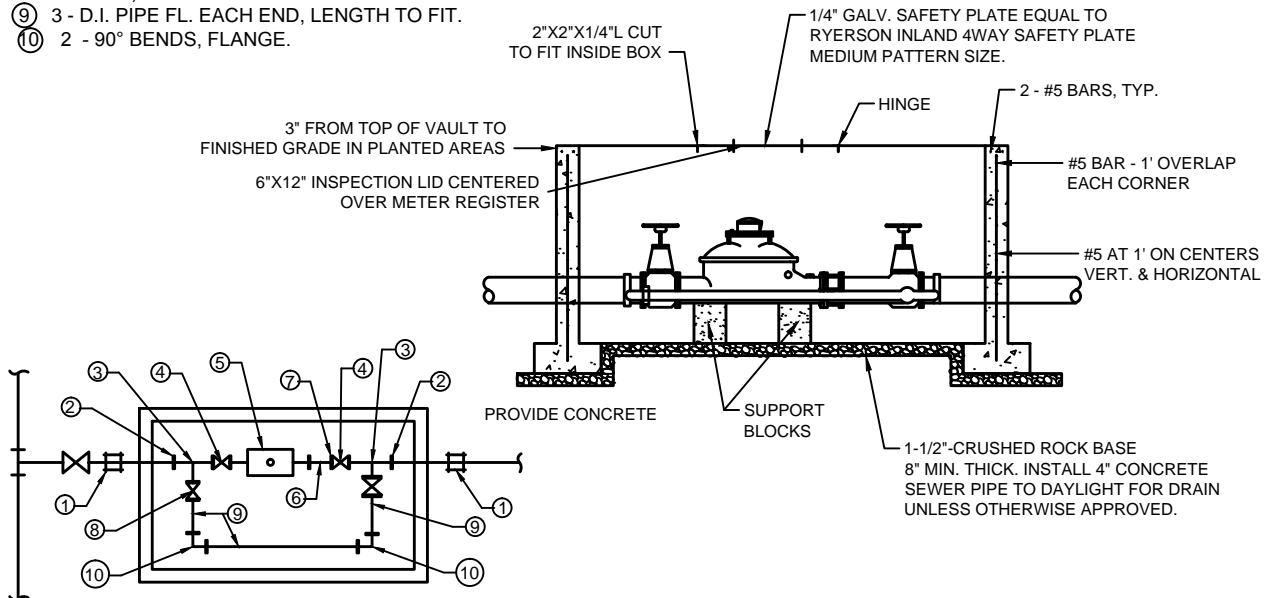


GENERAL NOTES:

- 1. METERS 3"-6" SUPPLIED BY CITY.
- 2. VAULT SHALL BE PRECAST CONCRETE VAULT.
- 3. ALL PIPE & FITTINGS 4" AND LARGER SHALL BE CEMENT LINED, CL52.
- 4. PIPING FROM MAIN TO VAULT SHALL BE 4" ON 3" METER INSTALLATION, TEE WITH VALVE ON EXISTING MAIN REQUIRED.
- 5. REFER TO SECTION 7.3.2.
- 6. BRASS FITTINGS 2" AND LESS SHALL BE LEAD FREE.

MATERIAL LIST - D.I. BYPASS

- ① 2 - FLEX CPLG. TO FIT.
- ② 2 - D.I. FL. X P.E., LENGTH AS REQUIRED.
- ③ 2 - TEE, FL.
- ④ 2 - G.V., FL. MUELLER A-2370-6 OR EQUAL.
- ⑤ 1 - 3" TO 6" METER, AS SPECIFIED.
- ⑥ 1 - ADPT. FL. X P.E. 12" LONG.
- ⑦ 1 - CPLG. ADPT., FL. EQUAL TO ROCKWELL.
- ⑧ 2 - G.V. FL. EQUAL TO MUELLER A-2370-6 (G.V. SATISFACTORY LOCKING DEVICE MUST BE FURNISHED).
- ⑨ 3 - D.I. PIPE FL. EACH END, LENGTH TO FIT.
- ⑩ 2 - 90° BENDS, FLANGE.



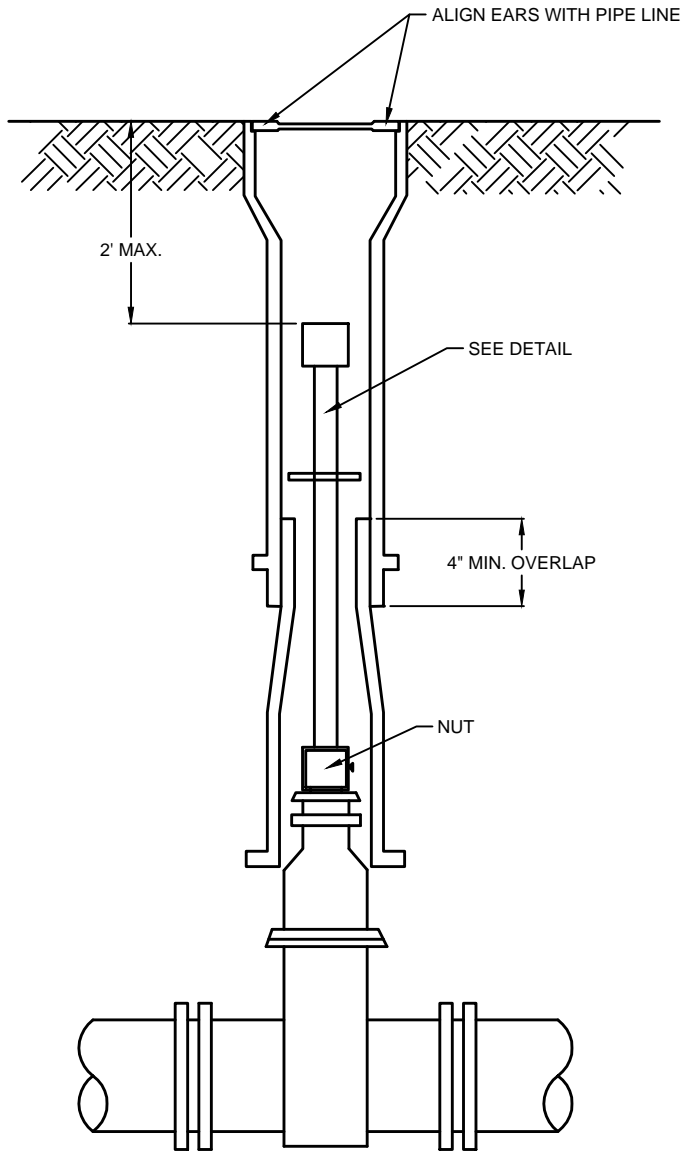
WITH DUCTILE IRON BY-PASS

NOT TO SCALE

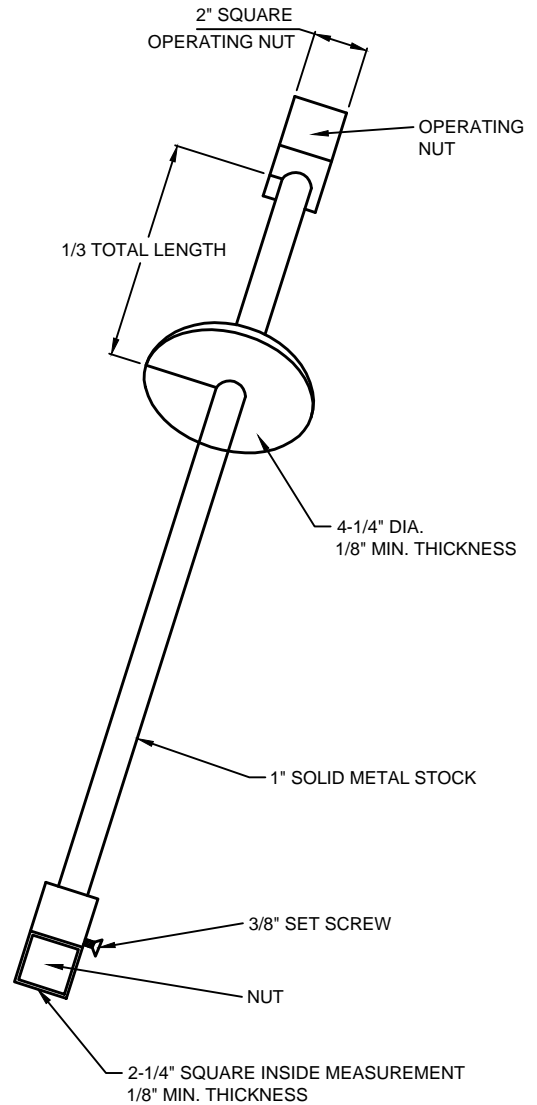


*City of
Tukwila*

METER	
3" TO 6"	
SHEET:	WS-04
REVISION #1:	02-2014
APPROVAL:	R. TISCHMAK, CITY ENGINEER
LAST REVISION:	



ASSEMBLY



DETAIL

NOTES:

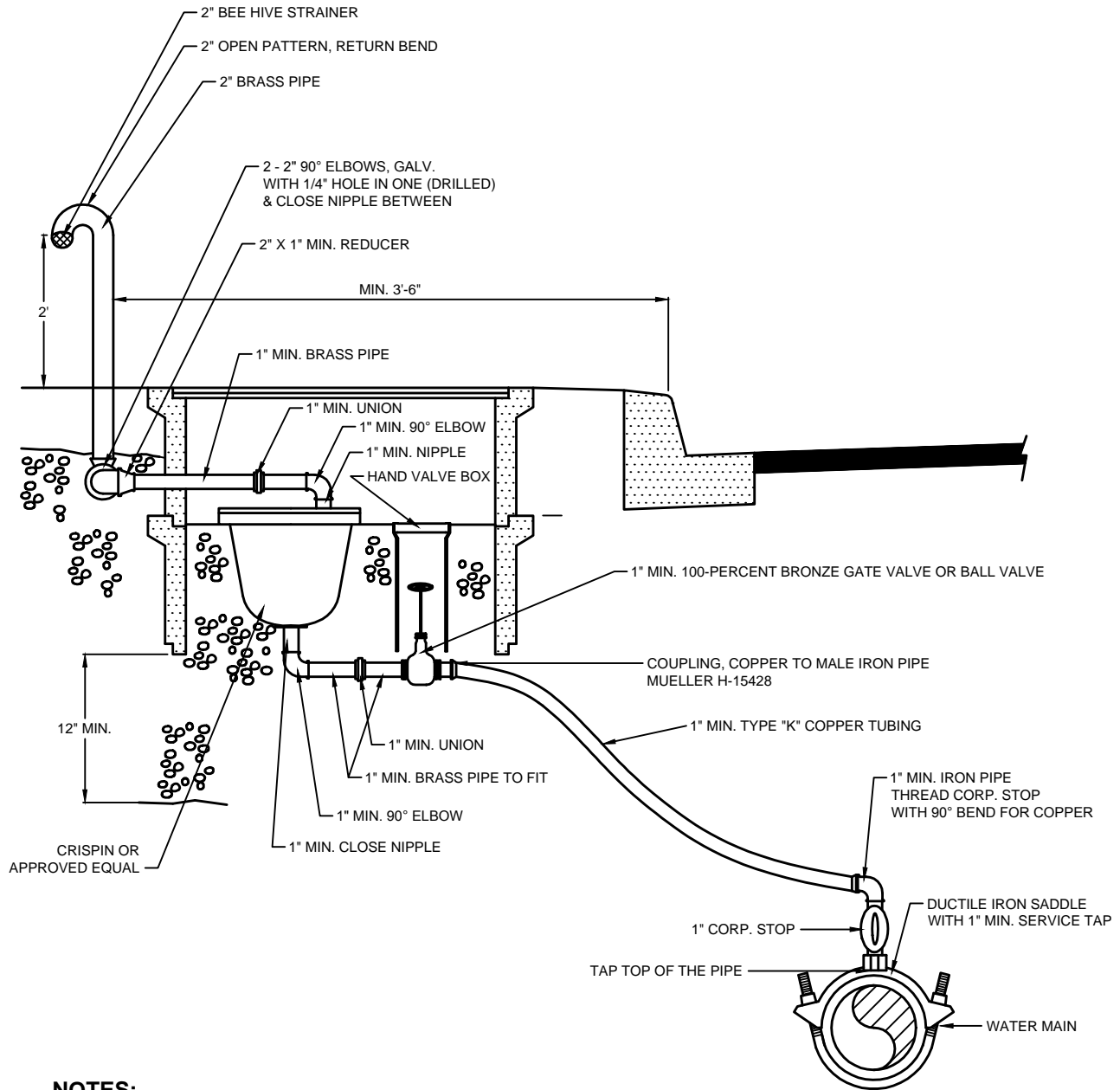
1. EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN 5 FEET BELOW FINISHED GRADE.
2. ONLY ONE EXTENSION, MINIMUM OF 3 FEET LONG, TO BE USED PER VALVE.
3. ALL EXTENSIONS ARE TO BE MADE OF STEEL AND PAINTED WITH TWO COATS OF METAL PAINT. NO FIELD-FABRICATED EXTENSIONS.
4. VALVE BOX COVER SHALL BE LABELED "WATER".

NOT TO SCALE



**City of
Tukwila**

WATER MAIN	
VALVE BOX (OPERATING NUT EXTENSION)	
SHEET:	WS-06
REVISION #1: 02-2014	LAST REVISION:
APPROVAL:	R. TISCHMAK, CITY ENGINEER



NOTES:

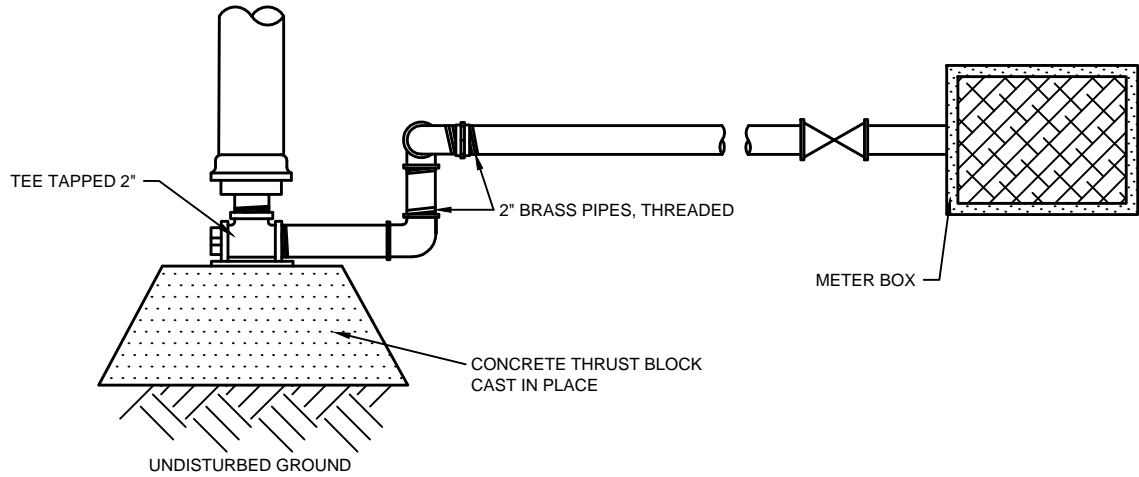
1. INSTALL AIR VALVE IN 17" X 28" CONCRETE METER BOX WITH 3/8" STEEL DIAMOND PLATE COVER, FOG-TITE METER SEAL CO. NO. 2 METER BOX OR EQUAL.
2. BED WITH WASHED GRAVEL, PASSING 1-1/2" AND RETAINED ON 1/4" MESH.
3. INSTALL 10' MIN. DISTANCE FROM ANY VEHICULAR ACCESS.
4. REFER TO CHAPTER 7 OF THE STANDARDS.
5. BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE

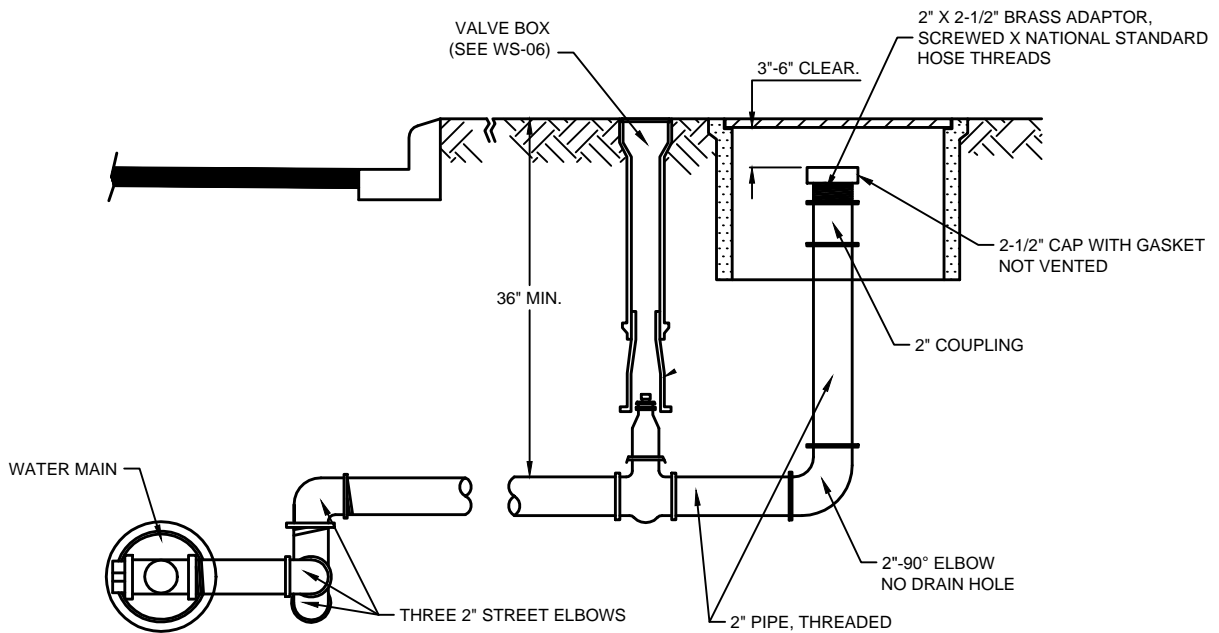


*City of
Tukwila*

WATER MAIN	
AIR AND VACUUM RELEASE (NON-TRAFFIC AREAS)	
SHEET:	WS-07
REVISION #1:	02-2014
APPROVAL:	R. TISCHMAK, CITY ENGINEER



PLAN VIEW



ELEVATION VIEW

NOTES:

1. ALL PIPE BEYOND MAIN SHALL BE PAINTED BRASS
2. INSTALL CAST METAL VALVE MARKER POST AND EXTENSION PIPE ADJACENT TO METER BOX. PAINT WITH TWO COATS OF NON-CORROSIVE PROTECTIVE PAINT, PER A.W.W.A. STANDARDS.
3. TWO PIECE CAST IRON VALVE BOX WITH STANDARD 24" BASE AND 18" TOP WITH 2" OVERLAP, RICH VALVE BOX OR EQUAL LIDS TO HAVE TABS.
4. REFER TO CHAPTER 7 OF THESE STANDARDS.
5. REFER TO WS-12A & WS-12B FOR BLOCKING, WS-06 FOR VALVE BOX.
6. BRASS FITTINGS SHALL BE LEAD FREE.

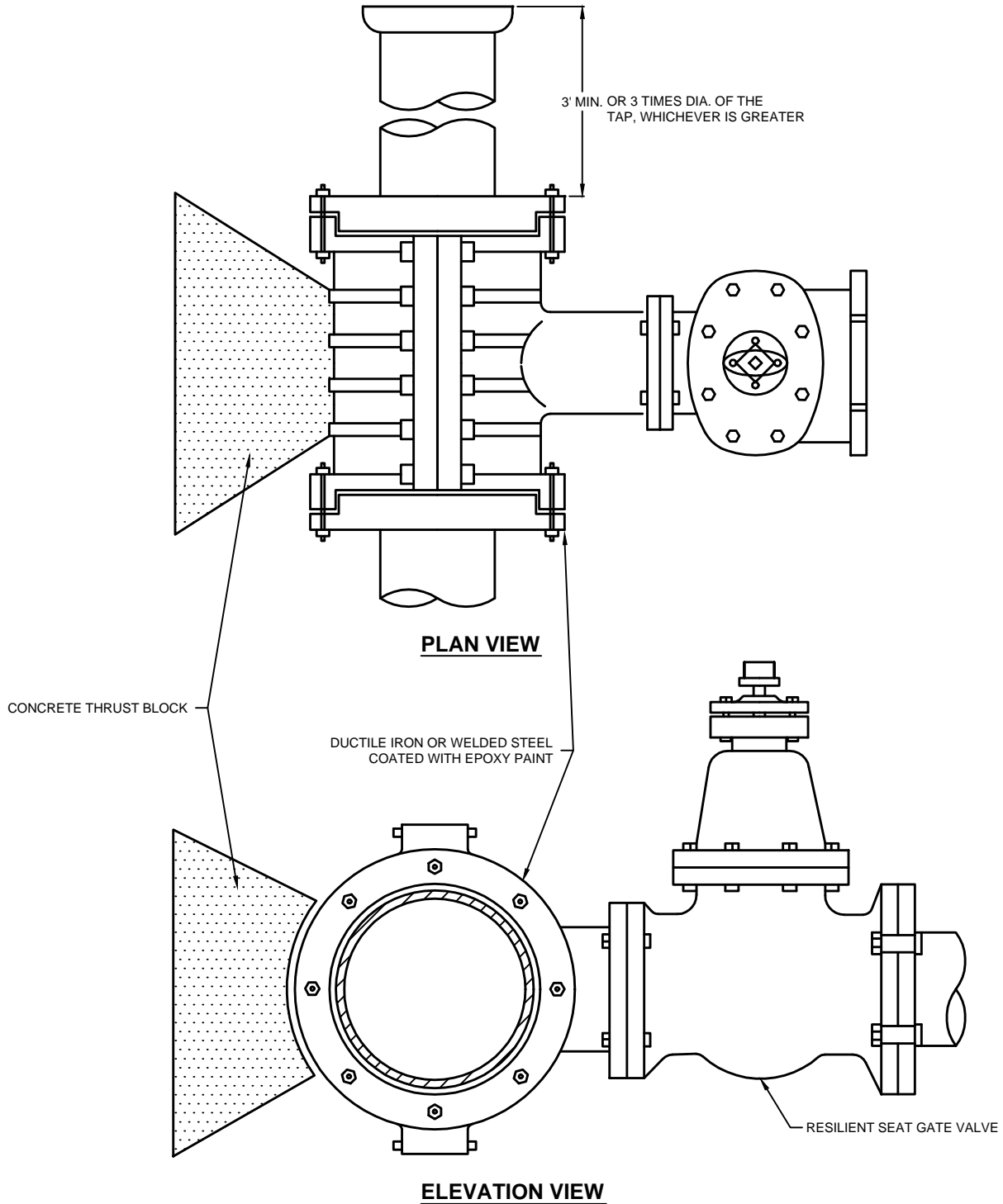
NOT TO SCALE



*City of
Tukwila*

WATER MAIN	
BLOW-OFF ASSEMBLY	
SHEET:	WS-09
REVISION #1:	02-2014
APPROVAL:	R. TISCHMAK, CITY ENGINEER

17967



NOTES:

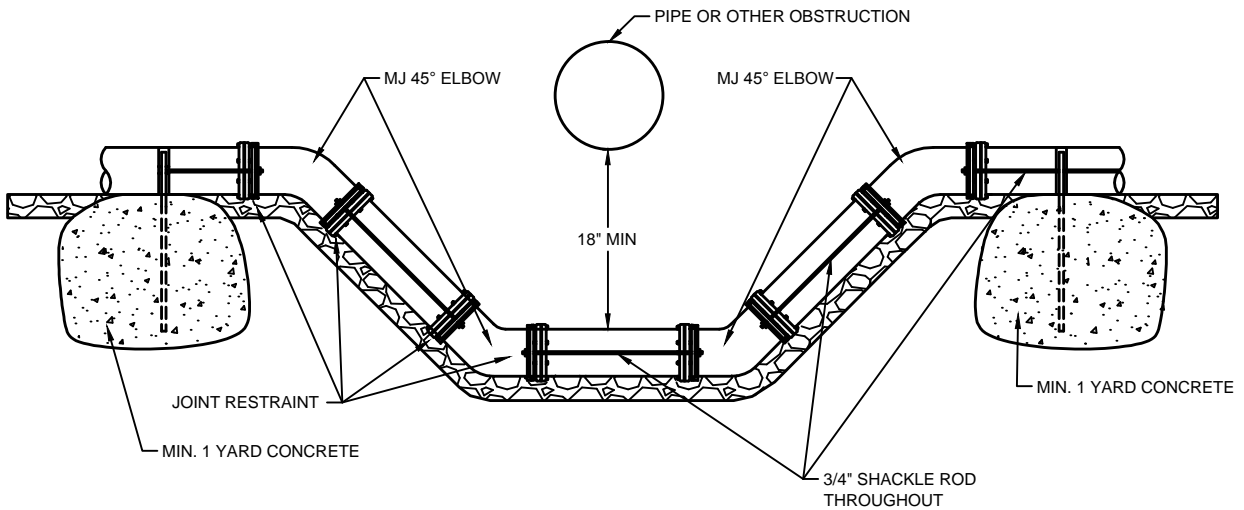
1. USE FOR TAPS ON CEMENT LINED DUCTILE PIPE.
2. PRE-TEST ASSEMBLY BEFORE DRILLING.
3. REFER TO CHAPTER 7 OF THESE STANDARDS.
4. REFER TO WS-13 & WS-14.

NOT TO SCALE

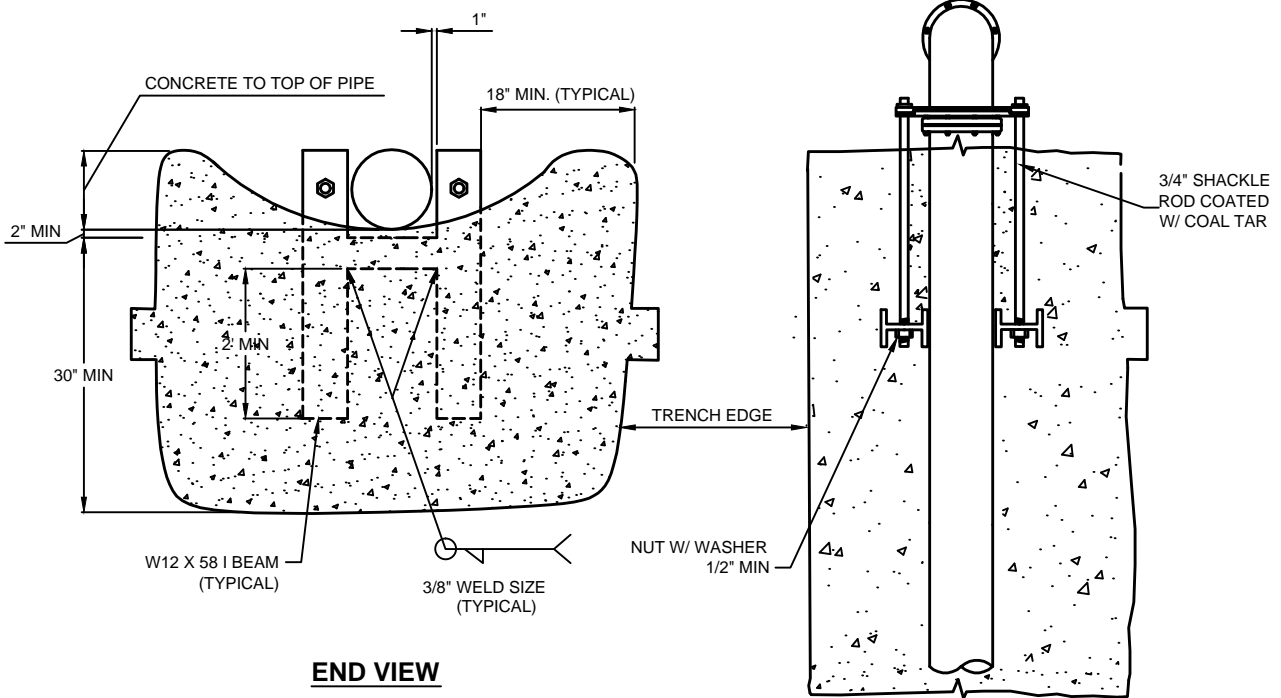


*City of
Tukwila*

WATER MAIN	
TAPPING TEE	
SHEET:	WS-10
REVISION #1: 02-2014	LAST REVISION: 07.08
APPROVAL:	R. TISCHMAK, CITY ENGINEER



ELEVATION VIEW



END VIEW

PLAN VIEW

NOTE:

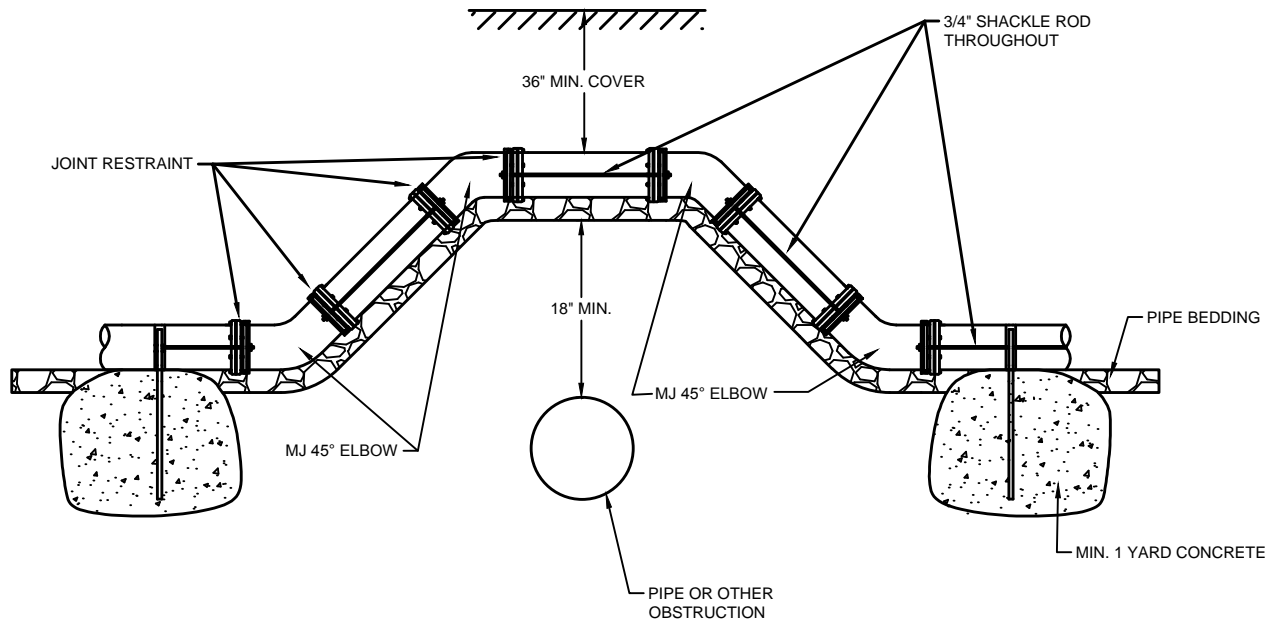
- 1. SHACKLE RODS SHALL BE ASPHALT-COATED STEEL OR CORTEN STEEL.

NOT TO SCALE



*City of
Tukwila*

BLOCKING	
8958A5B'K #() š69B8G	
SHEET:	WS-11A
REVISION #1:	02-2014
APPROVAL:	R. TISCHMAK, CITY ENGINEER



**ELEVATION VIEW
ALTERNATE**

NOT TO SCALE



*City of
Tukwila*

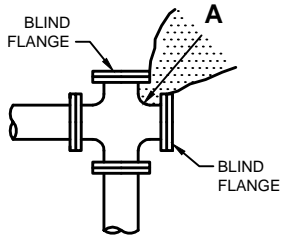
BLOCKING

8958A5B`K #() š69B8G`f5 @19FB5H9Ł

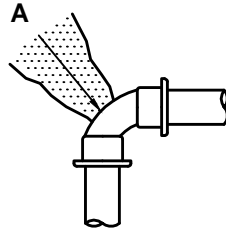
SHEET: **WS-11B**

REVISION #1: **02-2014** LAST REVISION:

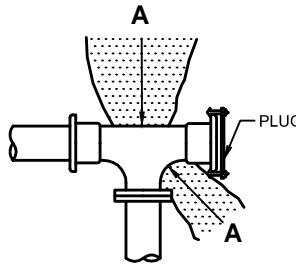
APPROVAL: **R. TISCHMAK, CITY ENGINEER**



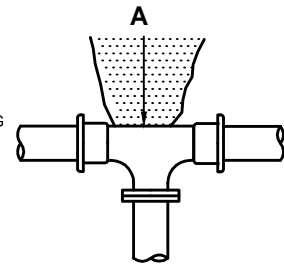
CAPPED CROSS



- 6 9 B8



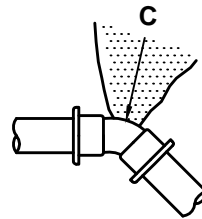
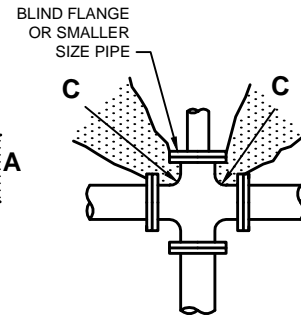
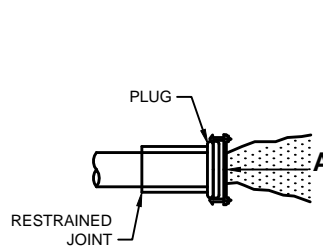
TEE W/ PLUG



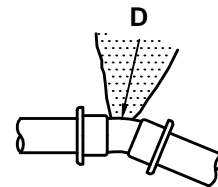
TEE W/O PLUG

THRUST BLOCKING SIZE

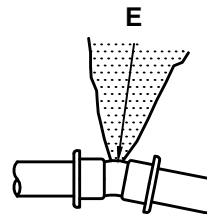
PIPE SIZE DIA	A (ft ²)	C (ft ²)	D (ft ²)	E (ft ²)
4"	4	2	1	1
6"	10	5	3	1
8"	18	10	5	2
10"	28	15	8	4
12"	40	22	11	6
14"	55	30	15	8
16"	71	39	20	10
18"	90	49	25	13
20"	111	60	31	15
22"	135	73	37	19
24"	160	87	44	22
28"	218	118	60	30
30"	251	136	69	35
36"	361	195	100	50
42"	491	266	135	68
48"	641	347	177	89



() 6 9 B8



&& 6 9 B8



6 9 B8

NOTES:

1. BEARING AREA OF CONCRETE THRUST-BLOCK BASED ON 250 PSI PRESSURE AND SAFE SOIL BEARING LOAD OF 1000 POUNDS PER SQUARE FOOT.
2. ADJUST BEARING AREA FOR OTHER PIPE SIZES, PRESSURES, AND SOIL CONDITIONS.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE AND HAVE A MINIMUM AREA OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING.
4. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATION PRESSURE UNDER ALL CONDITIONS OF SERVICE.
5. HEIGHT OF THRUST BLOCK MUST BE EQUAL TO OR LESS THAN 1/2 THE DEPTH FROM THE GROUND SURFACE TO THE BLOCK'S BASE.
6. USE GALVANIZED OR ASPHALT-COATED SHEEL, THREADED RODS AND PIPE CLAMPS.
7. REFER TO CHAPTER 7 OF THESE STANDARDS.

NOT TO SCALE



**City of
Tukwila**

BLOCKING (HORIZONTAL)

CONCRETE

SHEET: **WS-12A 1 OF 2**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

-THRUST BLOCKING SIZE
 -ASSUME 1000 SOIL PRESSURE
 -DESIGN PRESSURE 250 PSI

DIA	D ₉ SQ FT	D ₉ F ₉₅ (PSI)	<958 ft HL	A LOAD (LB)	A AREA (SF)	C LOAD (LD)	C AREA (SF)	D LOAD (LD)	D AREA (SF)	E LOAD (LD)	E AREA (SF)
4	0.08727	250	577.5	4,454.46	4	2,410.74	2	1,228.96	1	617.62	1
6	0.19635	250	577.5	10,022.54	10	5,424.16	5	2,765.17	3	1,389.65	1
8	0.34907	250	577.5	17,817.85	18	9,642.95	10	4,915.86	5	2,470.49	2
10	0.54542	250	577.5	27,840.39	28	15,067.11	15	7,681.03	8	3,860.15	4
12	0.78540	250	577.5	40,090.16	40	21,696.64	22	11,060.68	11	5,558.61	6
14	1.06902	250	577.5	54,567.17	55	29,531.54	30	15,054.82	15	7,565.89	8
16	1.39627	250	577.5	71,271.40	71	38,571.80	39	19,663.44	20	9,881.97	10
18	1.76715	250	577.5	90,202.87	90	48,817.44	49	24,886.54	25	12,506.87	13
20	2.18167	250	577.5	111,361.57	111	60,268.44	60	30,724.12	31	15,440.58	15
22	2.63982	250	577.5	134,747.49	135	72,924.82	73	37,176.19	37	18,683.10	19
24	3.14160	250	577.5	160,360.65	160	86,786.56	87	44,242.74	44	22,234.44	22
28	4.27607	250	577.5	218,268.67	218	118,126.15	118	60,219.28	60	30,263.54	30
30	4.90875	250	577.5	250,563.52	251	135,604.00	136	69,129.27	69	34,741.31	35
36	7.06860	250	577.5	360,811.47	361	195,269.76	195	99,546.16	100	50,027.48	50
42	9.62115	250	577.5	491,104.51	491	265,783.83	266	135,493.38	135	68,092.97	68
48	12.56640	250	577.5	641,442.62	641	347,146.23	347	176,970.94	177	88,937.75	89

NOT TO SCALE



*City of
Tukwila*

**BLOCKING
CONCRETE**

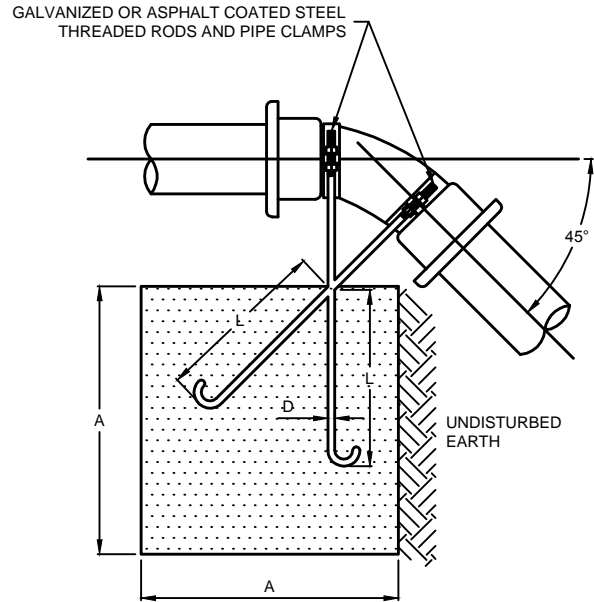
SHEET: **WS-12A 2 OF 2**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

VERTICAL BLOCKING
: CF %%% \$! &&%&!' \$š69B8 G

PIPE SIZE (INCHES)	V.B. (DEGREES)	CU. FT.	A (FEET)	D (INCHES)	L (FEET)
4	11 1/4	8	2.0	3/4	1.5
	22 1/2	11	2.2		2.0
	30	17	2.6		
6	11 1/4	11	2.2	3/4	2.0
	22 1/2	25	2.9		
	30	41	3.5		
8	11 1/4	16	2.5	3/4	2.0
	22 1/2	47	3.6		
	30	70	4.1	3/4	2.5
10-12	11 1/4	32	3.2	3/4	2.0
	22 1/2	88	4.5	7/8	3.0
	30	132	5.1		
16	11 1/4	70	4.1	7/8	3.0
	22 1/2	184	5.7	1 1/8	4.0
	30	275	6.5	1 1/4	
18-20	11 1/4	91	4.5	7/8	3.0
	22 1/2	225	6.1	1 1/4	4.0
	30	330	6.9	1 3/8	4.5
24	11 1/4	128	5.0	1	3.5
	22 1/2	320	6.8	1 3/8	4.5
	30	480	7.9	1 5/8	5.5



VERTICAL BLOCKING FOR 11 1/4°, 22 1/2°, 30°, 45°, AND 90° BENDS

J9FH75 @6 @7?-B; : CF () š69B8 G

4	45	30	3.1	3/4	2.0
6		68	4.1		
8		123	5.0		
12		232	6.1	3/4	2.5
16		478	7.8	1 1/8	4.0
20		560	8.2	1 1/4	
24		820	9.4	1 3/8	4.5

NOT TO SCALE



*City of
Tukwila*

BLOCKING (VERTICAL)

CONCRETE

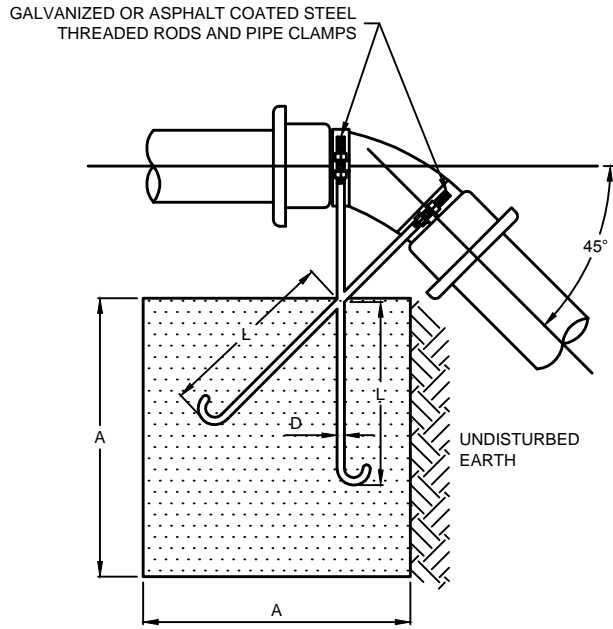
SHEET: **WS-12B**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

VERTICAL BLOCKING
: CF °%/% \$! &&%&S!' \$š69B8G

PIPE SIZE (INCHES)	V.B. (DEGREES)	CU. FT.	A (FEET)	D (INCHES)	L (FEET)
4	11 1/4	8	2.0	3/4	1.5
	22 1/2	11	2.2		2.0
	30	17	2.6		
6	11 1/4	11	2.2	3/4	2.0
	22 1/2	25	2.9		
	30	41	3.5		
8	11 1/4	16	2.5	3/4	2.0
	22 1/2	47	3.6		
	30	70	4.1	3/4	2.5
10-12	11 1/4	32	3.2	3/4	2.0
	22 1/2	88	4.5	7/8	3.0
	30	132	5.1		
16	11 1/4	70	4.1	7/8	3.0
	22 1/2	184	5.7	1 1/8	4.0
	30	275	6.5	1 1/4	
18-20	11 1/4	91	4.5	7/8	3.0
	22 1/2	225	6.1	1 1/4	4.0
	30	330	6.9	1 3/8	4.5
24	11 1/4	128	5.0	1	3.5
	22 1/2	320	6.8	1 3/8	4.5
	30	480	7.9	1 5/8	5.5



VERTICAL BLOCKING FOR 11 1/4°, 22 1/2°, 30°, 45°, AND 90° BENDS

J9FH75 @6 @7?-B; : CF'() š69B8G

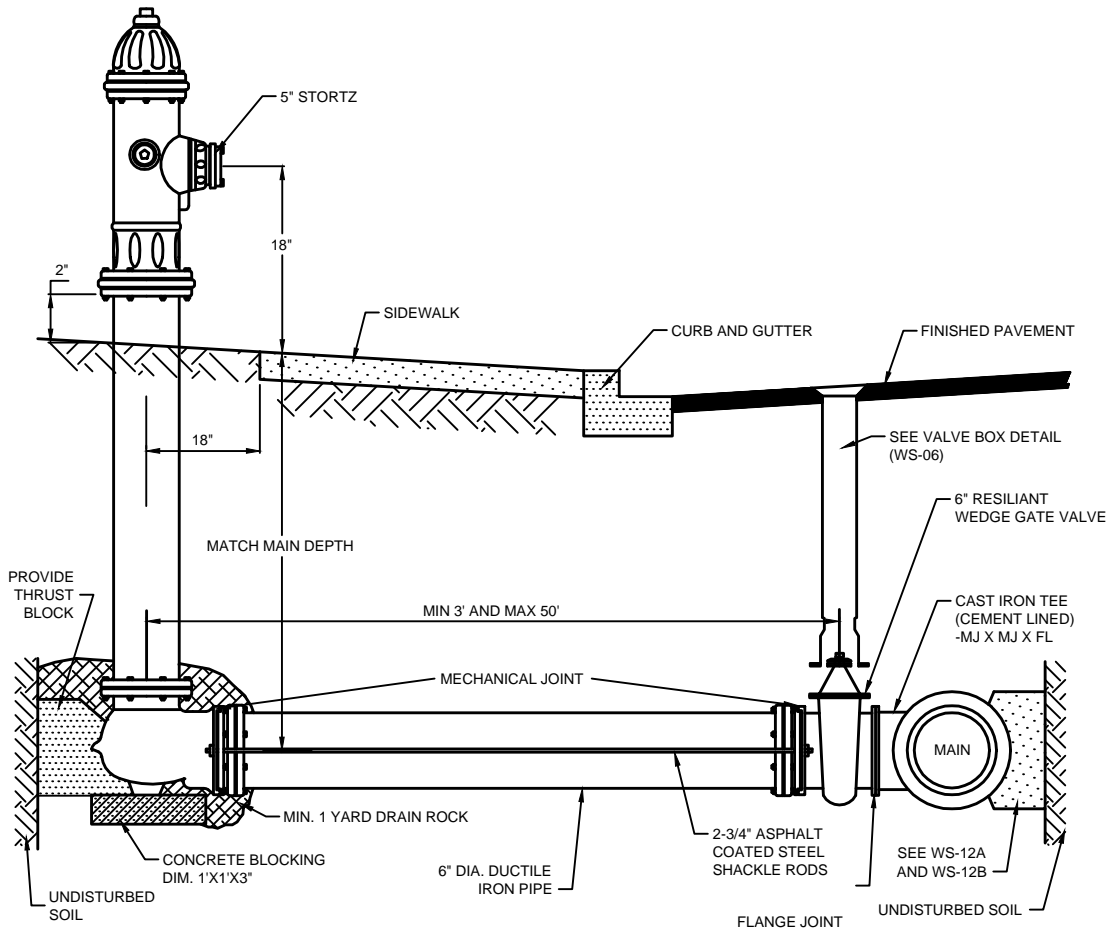
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6		68	4.1		
8		123	5.0		
12		232	6.1	3/4	2.5
16		478	7.8	1 1/8	4.0
20		560	8.2	1 1/4	
24		820	9.4	1 3/8	4.5

NOT TO SCALE



*City of
Tukwila*

BLOCKING (VERTICAL)	
CONCRETE	
SHEET:	WS-12B
REVISION #1:	02-2014
APPROVAL:	R. TISCHMAK, CITY ENGINEER



NOTES:

1. REFER TO CHAPTER 7 OF THESE STANDARDS.
2. HYDRANTS EQUAL TO MUELLER #A-423, CLOW MEDALLION #F-2545, M & H 929, OR EJIW # 5CD250 WATER MASTER.
3. HYDRANTS SHALL BE EQUIPPED WITH TWO 2-1/2" N.S.T. HOSE PORTS AND ONE 5" STORTZ PUMPER DISCHARGE PORT AND SHALL HAVE A 1-1/4" PENTAGON OPEN LIFT OPERATING NUT. HYDRANTS SHALL HAVE A 6" M.J. BOTTOM CONNECTION AND 5-1/4" MAIN VALVE OPENING, AND SHALL HAVE 18" ABOVE GRADE LEVEL TO THE CENTER OF THE PUMPER DISCHARGE PORT.
4. HYDRANTS SHALL CONFORM TO A.W.W.A. SPECIFICATIONS C 502-54; SHALL BE COMPRESSION TYPE AND SHALL HAVE A TWO PIECE BREAKING FLANGE WITH BREAKING THIMBLE AT THE GROUND LINE OR STEM; SHALL HAVE A SELF-OILING DRY BONNET WITH FACTORY FILLED RESERVOIR HOLDING APPROXIMATELY 8 OUNCES OF OIL. OIL RESERVOIR SHALL BE SO DESIGNED AS TO GIVE A COMPLETE LUBRICATION OF STEMS EACH TIME THE HYDRANT IS OPERATED. THE UPPER STEM SHALL HAVE A BRASS SLEEVE.
5. SHACKLE RODS SHALL BE ASPHALT-COATED STEEL OR CORTEN STEEL.
6. CITY HYDRANTS BONNET AND PORT CAPS SHALL BE FARWEST COMPASS BLUE # 4602. BARREL SHALL BE FARWEST CASE YELLOW SAFETY X-3472.
7. PRIVATE HYDRANTS SHALL BE PAINTED WITH TWO COATS OF FARWEST CASE YELLOW (# X-3472).
8. WHERE NO CURB AND GUTTER IS INSTALLED, FIRE HYDRANT SHALL BE LOCATED CLOSE TO THE PROPERTY LINE AND INSIDE THE RIGHT OF WAY OR EASEMENT. INSTALL BOLLARD GUARD POST PER WS-14.
9. HYDRANTS INSTALLED, RELOCATED OR OTHERWISE WORKED UPON AS A RESULT OF A PROJECT SHALL BE FRESHLY PAINTED.
10. HYDRANT SHALL NOT BE CLOSER THAN 4' TO ANY FIXED OBJECT, WITH THE EXCEPTION OF HYDRANT GUARD POSTS, PER TMC 14.24.03.

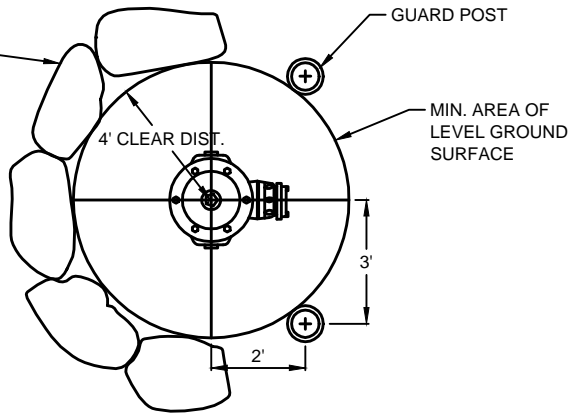
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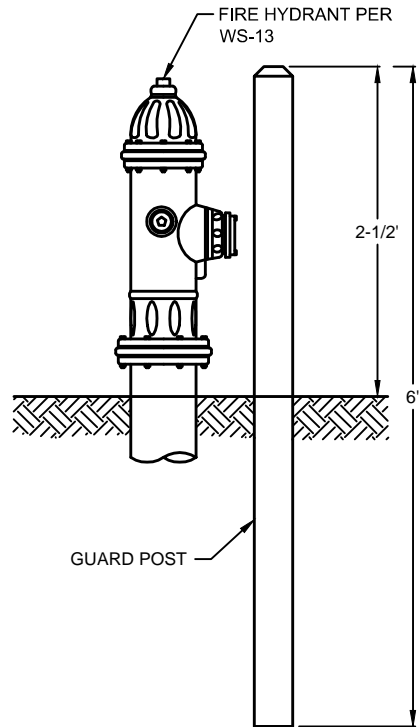
*City of
Tukwila*

FIRE HYDRANT	
ASSEMBLY AND SETTING	
SHEET: WS-13	
REVISION #1: 02-2014	LAST REVISION: 04.08
APPROVAL: R. TISCHMAK, CITY ENGINEER	

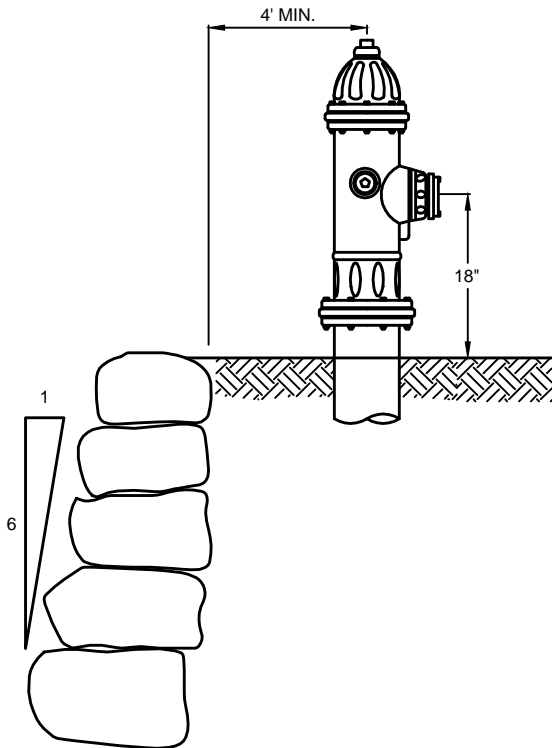
ROCK WALL,
PLANTINGS, OR
OTHER SURFACE
OBSTRUCTIONS



PLAN



**GUARD POST
ELEVATION**



NOTES:

1. GUARD POST SHALL BE EITHER CONCRETE FILLED STEEL PIPE (MIN. 4" DIA.) OR CONCRETE POST (MIN. 8" DIA.).
2. POSTS SHALL BE AT LEAST 3 FEET FROM THE CENTER OF THE HYDRANT AND SHALL NOT BE IN DIRECT LINE WITH ANY DISCHARGE PORTS.
3. POSTS SHALL BE 6 FEET LONG; 3-1/2 FEET SHALL BE BURIED.
4. PAINTED FINISH SHALL BE FARWEST CASE YELLOW #3472.

NOT TO SCALE



*City of
Tukwila*

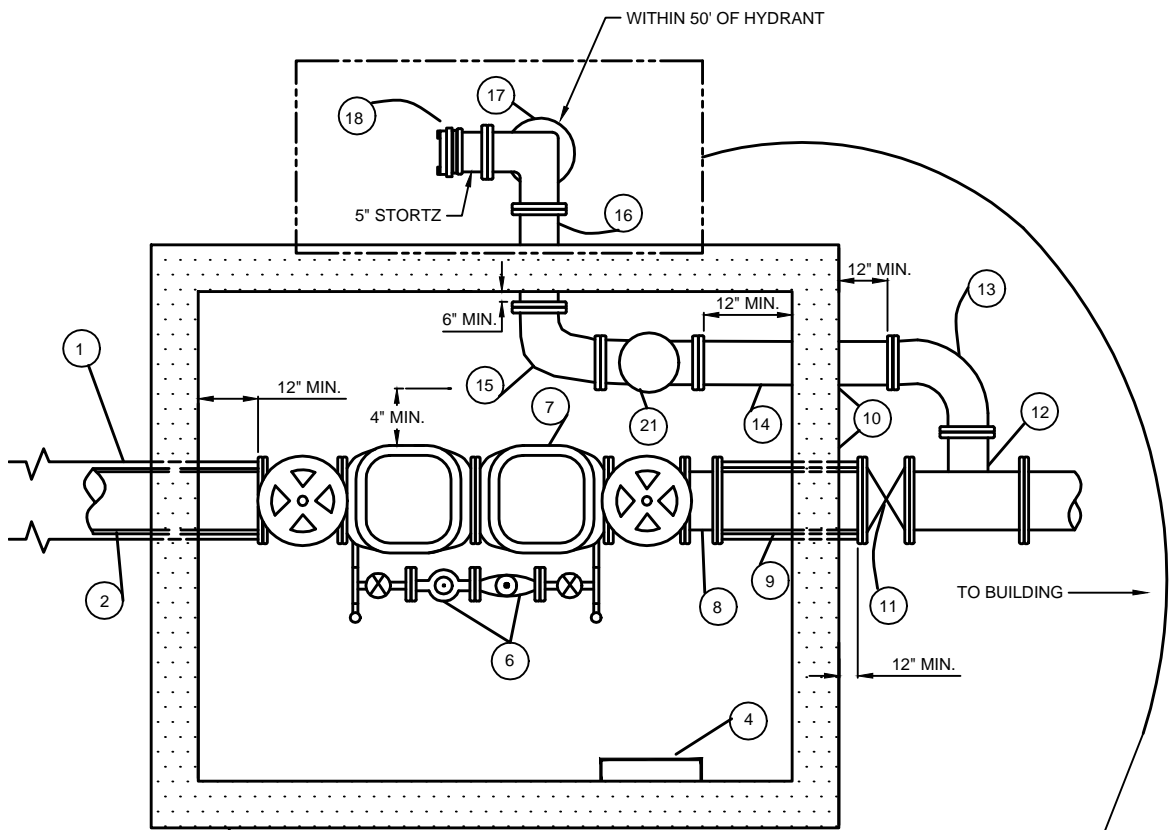
FIRE HYDRANT

GUARD POST

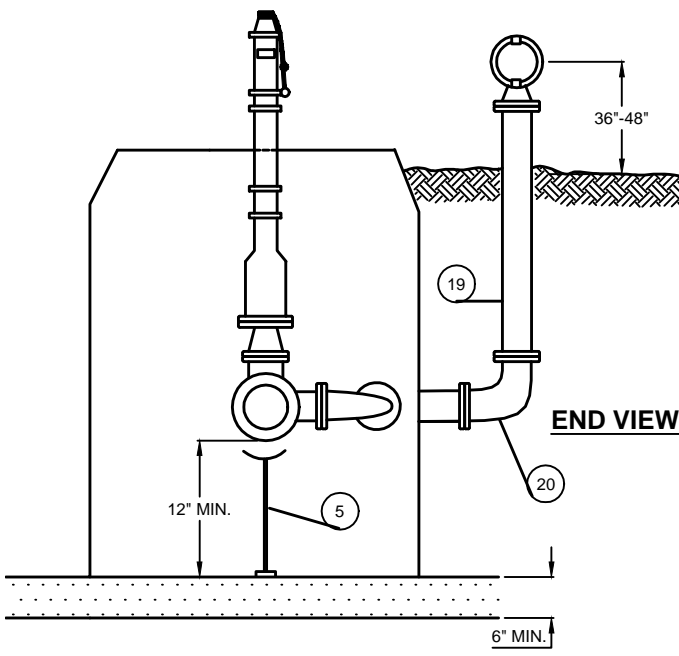
SHEET: **WS-14**

REVISION #1: **02-2014** LAST REVISION:

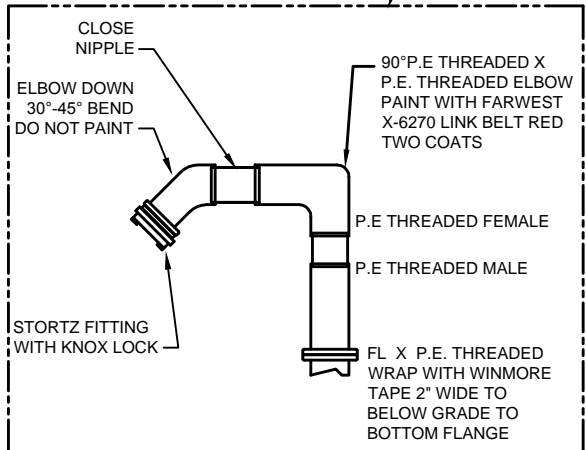
APPROVAL: **R. TISCHMAK, CITY ENGINEER**



PLAN VIEW



END VIEW



SIDE VIEW

NOTES:

- 1. DESIGN FOR 4" THRU 10" DDCV.
- ⑤ THE PIPE SUPPORT IS LOCATED INSIDE THE VAULT.

NOT TO SCALE



*City of
Tukwila*

**CROSS CONNECTION CONTROL
DETECTOR DOUBLE CHECK VALVE & VAULT**

SHEET:	WS-15 1 OF 2	
REVISION #1:	02-2014	LAST REVISION:
APPROVAL:	R. TISCHMAK, CITY ENGINEER	

MATERIAL LISTING:

1. 3/4" SHACKLE RODS WITH STAR BOLTS AND ASPHALT EMULSION COATING.
2. 4" MIN. D.I. CLASS 52 PIPE.
3. PRECAST CONCRETE VAULT WITH HINGED STEEL PLATE COVER, DIMENSION TO VARY WITH SIZE OF ASSEMBLY.
4. O.S.H.A. APPROVED LADDER IF OVER 30" DEEP.
5. PIPE SUPPORT STAND UNDER EACH CHECK VALVE.
6. COPPER OR BRONZE BYPASS WITH AN APPROVED DCVA AND 3/4" WATER METER.
7. APPROVED DCVA IN MAIN LINE WITH TWO RESILIENT SEATED SHUTOFF VALVES AND TEST COCKS.
8. 10", 8", 6" OR 4" COUPLING ADAPTER, FL.
9. 10", 8", 6" OR 4" FL*PE D.I. CLASS 52 PIPE LENGTH TO FIT.
10. GROUT INTERIOR AND EXTERIOR ALL AROUND PIPE USING NON-SHRINK GROUT.
11. 10", 8", 6" OR 4" GATE VALVE FL*MJ WITH POST INDICATOR VALVE.
12. FLANGE TEE ASSEMBLY SIZED ACCORDINGLY.
13. FLANGED 90° BEND.
14. 4" OR 6" D.I. CLASS 52 PIPE FL*FL.
15. 4" OR 6" 90° BEND FL.
16. 4" OR 6" D.I. CLASS 52 PIPE, FL*FL.
17. 6" 90° BEND, FL.
18. UL LISTED 5" STORTZ CONNECTION WITH 30° OR 45° ELBOW.
19. 6" D.I. CLASS 52 PIPE LENGTH AS REQUIRED FLANGE * THREADED P.E.
20. 6" 90° BEND FL.
21. SWING TYPE GRAVITY OPERATED CHECK VALVE WITH BALL DRIP VALVE TO BE INSTALLED HORIZONTALLY.

DETECTOR DOUBLE CHECK AND VAULT ASSEMBLY GENERAL NOTES:

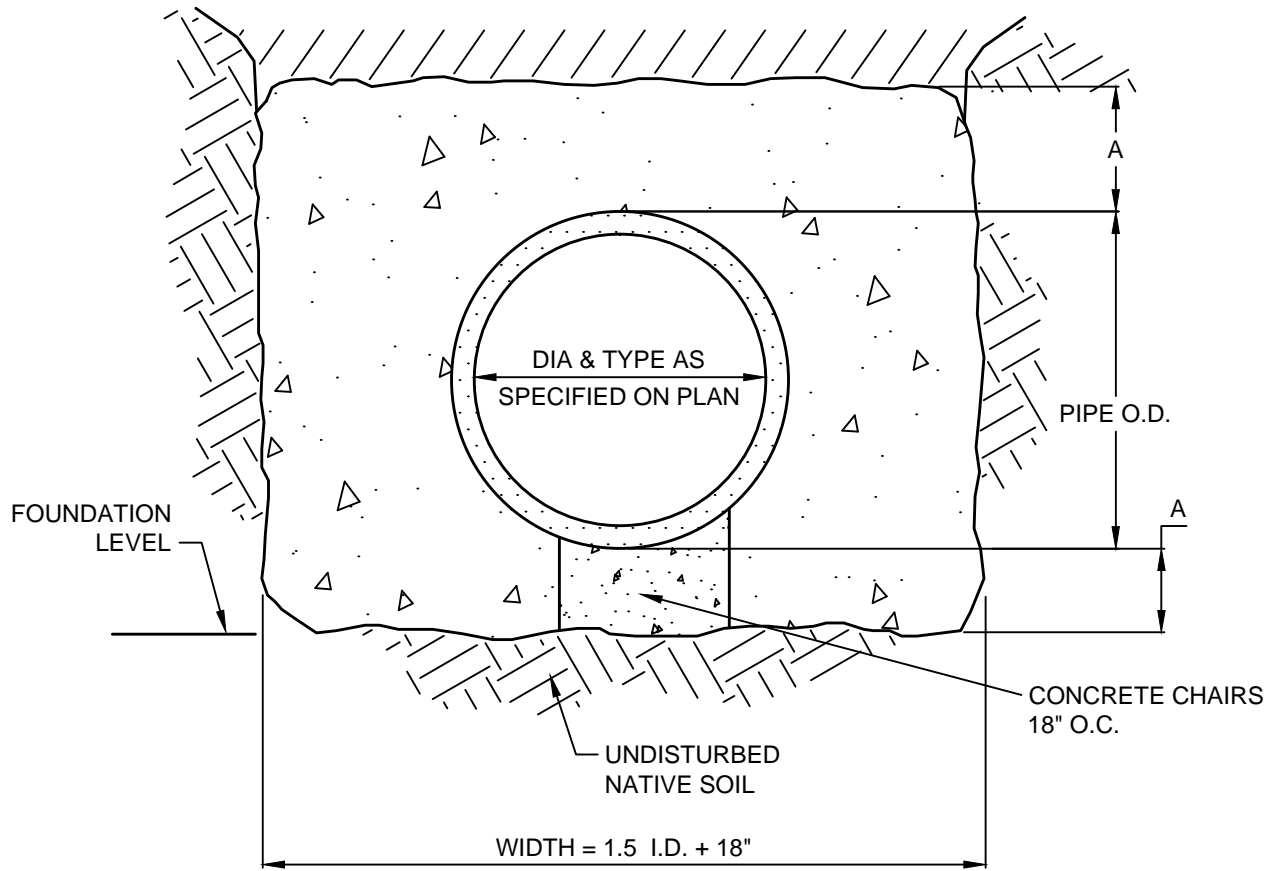
1. BACKFLOW PREVENTORS SHALL BE APPROVED BY DEPARTMENT OF HEALTH.
2. SIZE VAULT BASED ON SIZE OF APPARATUS AND MEETING MINIMUM CLEARANCES.
3. A SEPARATE DETAIL PLAN FOR VAULT INSTALLATION AND SPRINKLER LINE MUST BE SUBMITTED AND APPROVED BY THE FIRE MARSHALL PRIOR TO INSTALLATION.
4. MINIMUM APPARATUS SIZE SHALL BE 4".
5. VAULT SHALL BE SEALED TO PREVENT WATER LEAKAGE.
6. LADDERS SHALL BE REQUIRED WHEN DEPTH FROM TOP OF LID TO FLOOR OF VAULT EXCEEDS 30". INSTALLATION OF ALL LADDERS SHALL BE IN COMPLIANCE TO O.S.H.A.
7. LOCATE VAULT IN PLANTING AREA AND NOT IN PAVING AREA, UNLESS APPROVED BY THE ENGINEER.
8. FITTINGS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C110/A21.10 AND CEMENT LINED (SEE APWA & AWWA).
9. PIPE SHALL BE DUCTILE IRON MEETING ANSI A21.51, CL52 & CEMENT LINED.
10. TEMPORARY SUPPORT SHALL BE PROVIDED UNDER VALVES AT THE TIME OF INSTALLATION. AFTER COMPLETE INSTALLATION INSTALL PERMANENT PIPE SUPPORT STAND.
11. PROVIDE BALL DRIP VALVES ON F.D.C. CHECK VALVE ASSEMBLY OR AT BOTTOM OF F.D.C. RISER.
12. FIRE DEPARTMENT CONNECTION TO BE PROVIDED WITH ONE (1) 5" STORTZ CONNECTIONS AND TWO 30° OR 45° ELBOWS.
13. ALL UNDERGROUND PIPING TO BE INSPECTED, FLUSHED, AND PRESSURE TESTED IN THE PRESENCE OF AN INSPECTOR PRIOR TO COVER AND CONNECTION TO THE OVERHEAD SYSTEM.
14. UPON INSTALLATION, BACKFLOW PREVENTION ASSEMBLIES ARE TO BE TESTED BY A CERTIFIED TESTER AND ALL TEST-COCKS ARE TO BE PLUGGED AFTER THE TEST. THEREAFTER, ANNUAL TESTS SHALL BE PERFORMED AT OWNER'S EXPENSE, AND COPIES OF TEST RESULTS SHALL BE PROVIDED.
15. CONCRETE VAULT SHALL HAVE ONE 4' X 4' OR TWO 3' X 3' STEEL HINGED DOORS.
16. BACKFLOW PREVENTION VALVES AND POST OR WALL INDICATING VALVES SHALL BE PROVIDED WITH UL CENTRAL STATION TAMPER SUPERVISION.

NOT TO SCALE



*City of
Tukwila*

CROSS CONNECTION CONTROL**DETECTOR DOUBLE CHECK VALVE AND VAULT**SHEET: **WS-15 2 OF 2**REVISION #1: **02-2014** LAST REVISION: **08.04**APPROVAL: **R. TISCHMAK, CITY ENGINEER**



NOTES:

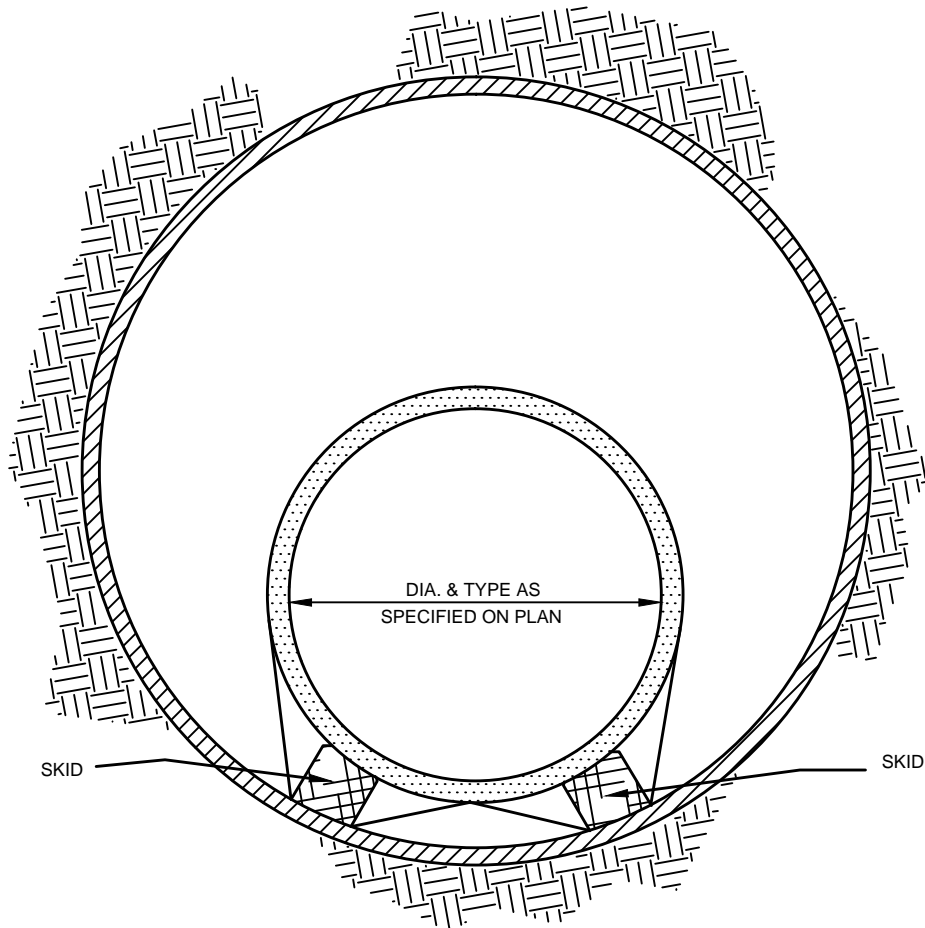
1. A = 1/4 I.D. (6" MIN. - 12" MAX.)
2. ENCASE IN CONTROLLED DENSITY FILL (CDF), PER WSDOT/APWA STANDARD SPECIFICATIONS SECTION 2-09.3(1)E.
3. CONCRETE STRENGTH 3000 psi.
4. COVERS SHALL BE LABELED WITH 2" RAISED LETTERS SAYING "SEWER" FOR SANITARY SEWER, "STORM" FOR STORM DRAIN IN THE RIGHT-OF-WAY, "DRAIN" FOR STORM DRAIN ON PRIVATE PROPERTY, "WATER" WHEN INSTALLED ON POTABLE WATER, OR "RECLAIMED" WHEN INSTALLED ON RECLAIMED WATER.

NOT TO SCALE



*City of
Tukwila*

ENCASEMENT	
CONTROLLED DENSITY FILL	
SHEET:	WS-16
REVISION #1: 02-2014	LAST REVISION: 04.08
APPROVAL:	R. TISCHMAK, CITY ENGINEER

**NOTES;**

1. STEEL CASING PIPE SHALL BE ASTM A-36 PIPE MANUFACTURED IN ACCORDANCE WITH AWWA C-201. FIELD JOINTS SHALL BE BUTT WELDED IN ACCORDANCE WITH AWWA C-206 UNLESS OTHERWISE SPECIFIED ON PLANS OR DIRECTED BY ENGINEER.
2. PLACE CASING BY BORING OR BY JACKING.
3. SKIDS SHALL SUPPORT THE FULL LENGTH OF EACH PIECE OF PIPE, EXCEPT FOR JOINT AREA. SKIDS SHALL BE SECURELY STRAPPED TO THE CARRIER PIPE. THE NUMBER, SIZE AND PLACEMENT OF SKIDS SHALL BE SUFFICIENT TO SUPPORT THE CARRIER PIPE, INCLUDING JOINT SECTIONS, ABOVE THE STEEL CASING.
4. FILL CASING VOID WITH SAND. GROUT CASING ENDS WITH CONCRETE OR CONTROLLED DENSITY FILL AT LEAST 12" THICK.
5. COVERS SHALL BE LABELED WITH 2" RAISED LETTERS SAYING "SEWER" FOR SANITARY SEWER, "STORM" FOR STORM DRAIN IN THE RIGHT-OF-WAY, "DRAIN" FOR STORM DRAIN ON PRIVATE PROPERTY, "WATER" WHEN INSTALLED ON POTABLE WATER, OR "RECLAIMED" WHEN INSTALLED ON RECLAIMED WATER.

NOT TO SCALE



*City of
Tukwila*

ENCASEMENT

STEEL

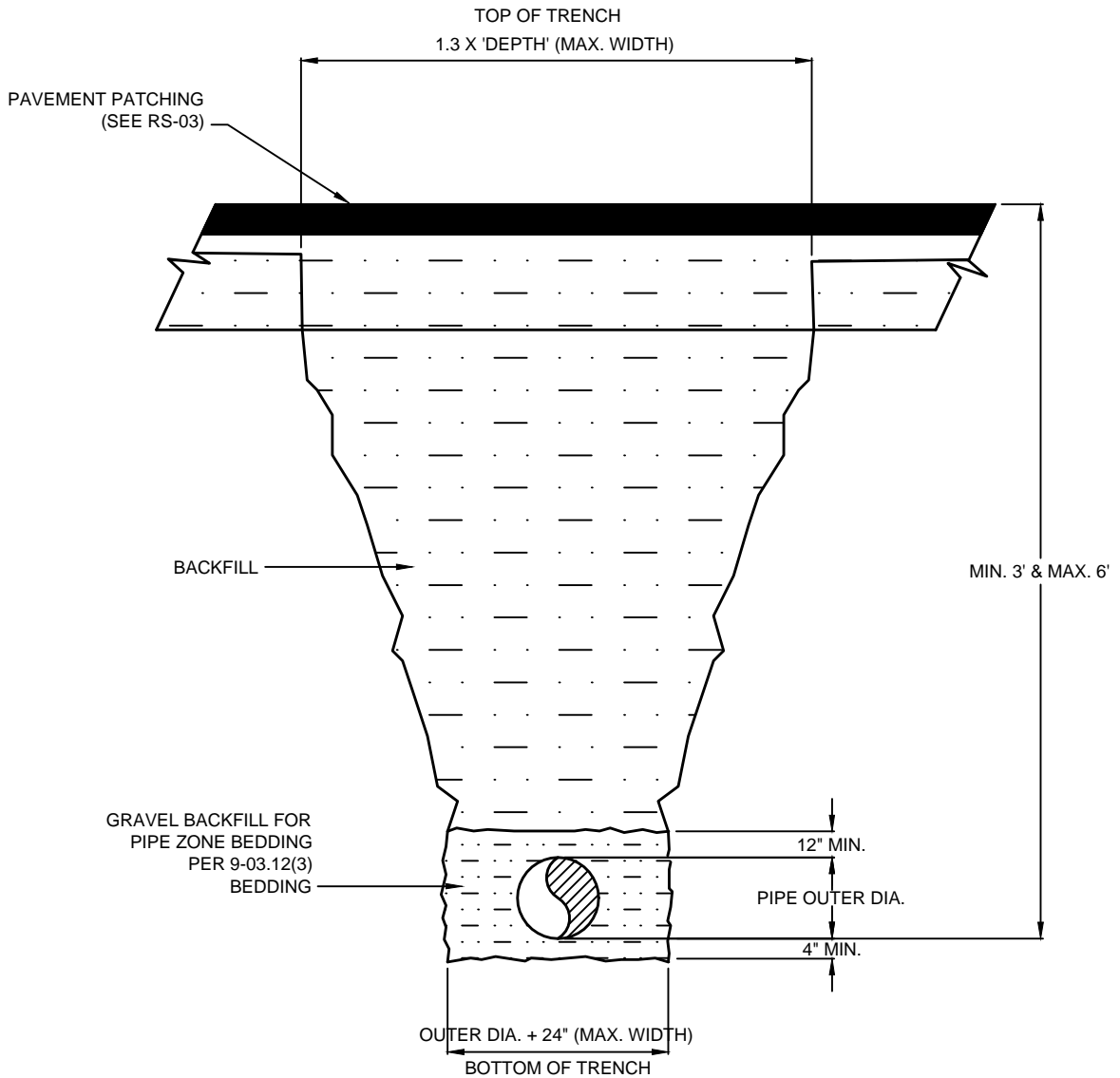
SHEET:

WS-17

REVISION #1: 02-2014

LAST REVISION:

APPROVAL: R. TISCHMAK, CITY ENGINEER



NOTE:

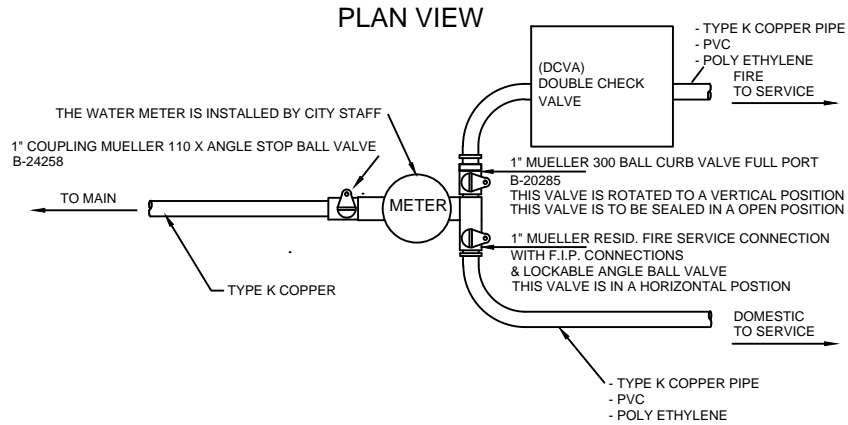
1. ALL BACKFILL SHALL BE 5/8" CRUSHED ROCK COMPACTED TO 90% MODIFIED PROCTOR OPTIMUM DENSITY.
2. REFER TO RS-03 FOR PAVEMENT PATCHING.
3. PAVED AREAS: BACKFILL WITH CRUSHED ROCK.
4. UNPAVED AREAS: BACKFILL WITH NATIVE MATERIAL OR CRUSHED ROCK.

NOT TO SCALE

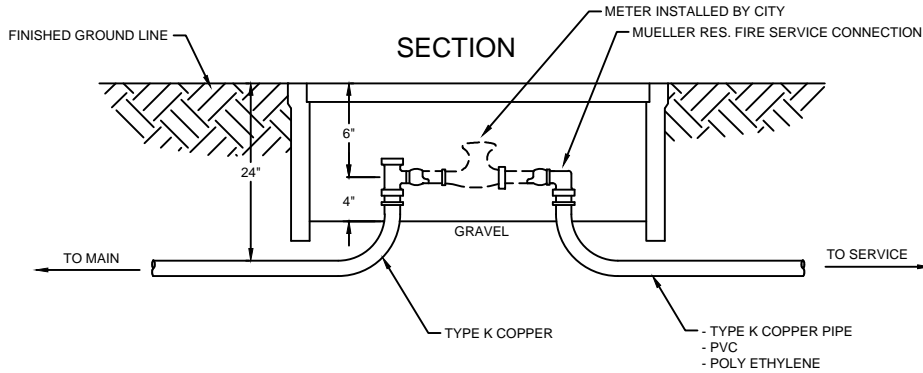


*City of
Tukwila*

TRENCH	
BEDDING AND BACKFILL	
SHEET:	WS-18
REVISION #1: 02-2014	LAST REVISION: 04.08
APPROVAL: R. TISCHMAK, CITY ENGINEER	



FITIINGS USED ON THE PIPES LEADING TO THE HOUSE FROM THE MUELLAR TEE SHALL BE MUELLER 110 TYPE FITTINGS OR EQUAL.



1" FIRE SERVICE PARTS LIST:

- 1-B-24258 - 1" COUPLING MUELLER 110 X ANGLE STOP - BALL
- 1-B-25028 - 1" CORP STOP - BALL
- 1 - TAILPIECE WITH FEMALE IRON PIPE THREADS

NOTES:

1. NO METER BOXES IN SIDEWALKS AND DRIVEWAYS WHERE POSSIBLE.
2. USE CLEAN 5/8" MINUS CRUSHED ROCK TO BACKFILL AROUND CORP STOP AND SERVICE LINE.
3. THE FIRE SPRINKER SYSTEM SHALL BE DESIGNED PER APPENDIX R AND NFPA 13D
4. THE DOUBLE CHECK VALVE SHALL BE INSTALLED WITHIN 5' OF THE WATER METER.
5. THE DOUBLE CHECK VALVE SHALL BE INSTALLED TO PROTECT FROM FREEZING.
6. ALL BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



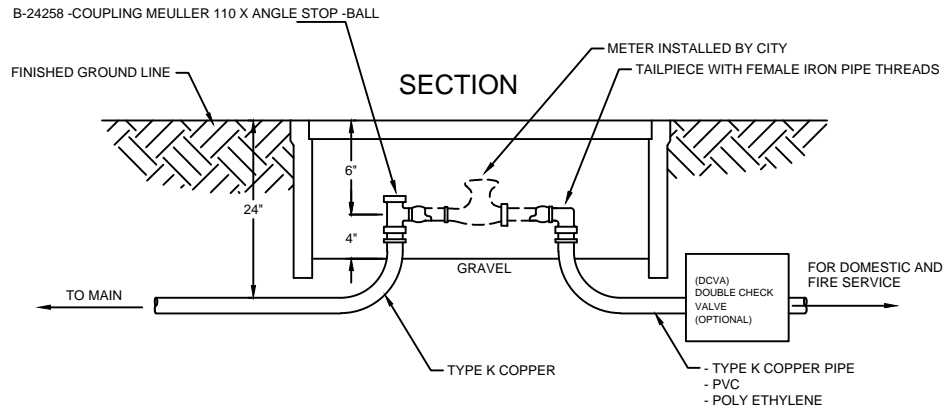
*City of
Tukwila*

1" FIRE / DOMESTIC SERVICE

SHEET: **WS-19**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**



1" FIRE SERVICE PARTS LIST:

- 1-B-24258 - 1" COUPLING MUELLER 110 X ANGLE STOP - BALL
- 1-B-25028 - 1" CORP STOP - BALL
- 1 - TAILPIECE WITH FEMALE IRON PIPE THREADS

NOTES:

1. NO METER BOXES IN SIDEWALKS AND DRIVEWAYS WHERE POSSIBLE.
2. USE CLEAN 5/8" MINUS CRUSHED ROCK TO BACKFILL AROUND CORP STOP AND SERVICE LINE.
3. THE FIRE SPRINKLER SYSTEM SHALL BE DESIGNED PER APPENDIX R AND NFPA 13D
4. REFER TO CHAPTER 7 OF THE STANDARDS.
5. ALL BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

FLOW-THROUGH SYSTEM

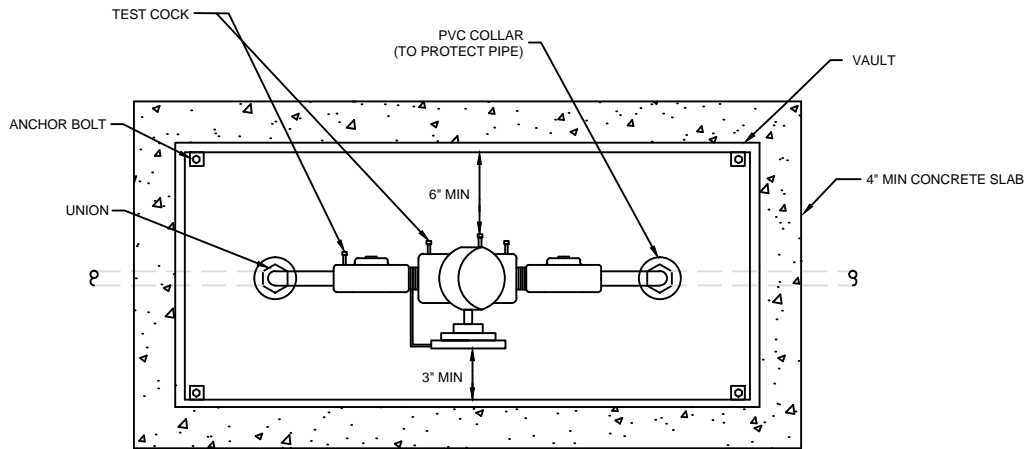
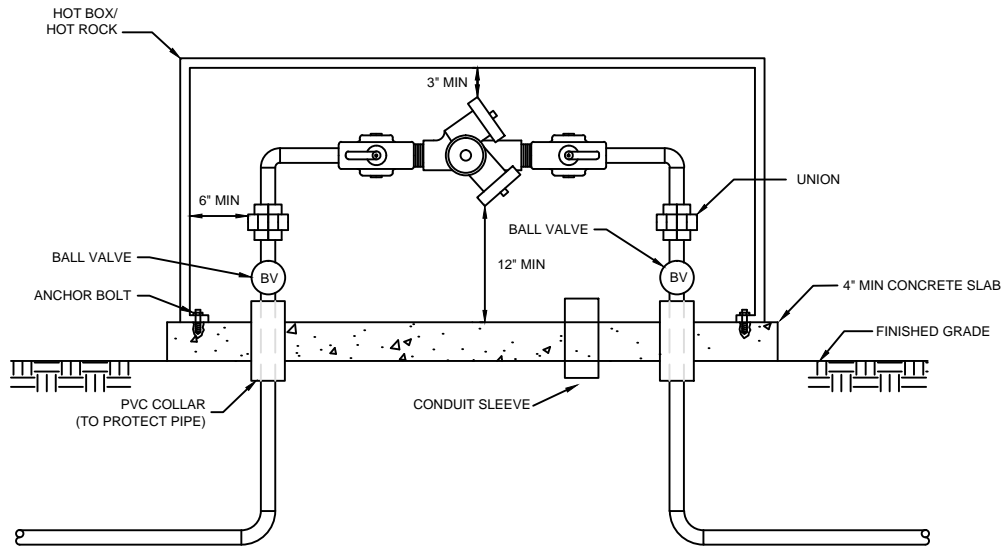
1" FIRE / DOMESTIC FIRE SERVICE

SHEET: **WS-20**

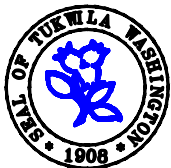
REVISION #1: **02-2014**

LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**



NOT TO SCALE



*City of
Tukwila*

**2" AND SMALLER REDUCED PRESSURE
PRINCIPAL ASSEMBLY INSTALLATION**

SHEET: **WS-21A**

REVISION #1: **02-2014**

LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

1. THE RPPA SHALL BE INSTALLED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING. IT SHALL BE TESTED AFTER INSTALLATION, BY A WASHINGTON STATE CERTIFIED BACK-FLOW ASSEMBLY TESTER, TO INSURE ITS SATISFACTORY OPERATION BEFORE OCCUPANCY AND ANNUALLY THEREAFTER. A COPY OF THE TEST RESULTS SHALL BE GIVEN TO THE PUBLIC WORKS INSPECTOR.
2. AN RPPA SHALL NOT BE INSTALLED IN A PIT BELOW GROUND LEVEL.
3. THE FREEZE PROTECTION ENCLOSURE FOR THE RPPA MUST INCLUDE A DAYLIGHT DRAIN. THE DRAIN MUST BE ABLE TO BE BORE SIGHTED. IT MUST BE INSTALLED ABOVE GROUND LEVEL. THE DRAIN MUST ALSO BE ABLE TO HANDLE THE VOLUME OF WATER THAT POTENTIALLY COULD BE DISCHARGED FROM THE RELIEF PORT.
4. THE FREEZE PROTECTION ENCLOSURE SHALL BE SUPPORTED BY A MIN. FOUR (4) INCH CONCRETE SLAB WITH FOUR (4) ANCHOR BOLTS ATTACHING THE COVERING TO THE SLAB.
5. RPPA MUST BE PROTECTED FOR FREEZING.
6. AN RPPA INSTALLED MORE THAN FIVE (5) FEET ABOVE FLOOR LEVEL MUST HAVE A PLATFORM UNDER IT FOR THE TESTER OR MAINTENANCE PERSON TO STAND ON. THE PLATFORM MUST BE OSHA APPROVED AND MEET ALL APPLICABLE SAFETY STANDARDS AND CODES.
7. WHEN THE RPPA IS LOCATED INSIDE A BUILDING IT SHALL BE INSTALLED IN A LOCATION WHERE BOTH THE OCCASIONAL SPITTING FROM THE RELIEF PORT AND THE POSSIBLE CONSTANT DISCHARGE DURING A FOULED CHECK VALVE SITUATION WILL NOT BE OBJECTIONABLE. AN APPROVED AIR GAP FUNNEL ASSEMBLY, EITHER PROVIDED BY THE MANUFACTURER OR FABRICATED FOR SPECIFIC INSTALLATION, MAY BE INSTALLED TO HANDLE THE OCCASIONAL SPITTING OF THE RELIEF VALVE DUE TO PRESSURE FLUCTUATIONS. A LINE FROM THIS FUNNEL ASSEMBLY MAY THEN BE RUN TO AN ADEQUATELY SIZED FLOOR DRAIN OF EQUAL OR GREATER SIZE. IT MUST BE EMPHASIZED THAT THE AIR GAP FUNNEL ASSEMBLY WILL HANDLE ONLY THE OCCASIONAL SPITTING AND WILL NOT CONTROL FLOW IN A CONTINUOUS RELIEF SITUATION.
8. A PVC COLLAR SHALL BE INSTALLED BETWEEN THE PIPE AND CONCRETE SLAB.
9. A UNION SHALL BE INSTALLED ON THE RISERS TO AID IN REMOVAL OF THE ASSEMBLY.
10. BALL VALVES WILL BE INSTALLED ON THE RISERS TO AID IN THE TESTING AND MAINTENANCE OF THE ASSEMBLY.
11. ALL BRASS FITTINGS SHALL BE LEAD FREE.

NOT TO SCALE



*City of
Tukwila*

2" AND SMALLER REDUCED PRESSURE

PRINCIPAL ASSEMBLY INSTALLATION

SHEET: **WS-21B**

REVISION #1: **02-2014** LAST REVISION:

APPROVAL: **R. TISCHMAK, CITY ENGINEER**

**KING COUNTY WATER RECLAMATION
EVALUATION CHECKLIST**



King County

Water Reclamation Evaluation Checklist For Systems with 1,000 or more Connections

The County and State recognize that changing conditions could initiate a need to respond in new ways to future water quality standards, wastewater discharge requirements, take advantage of advances in treatment technologies and/or allow our region to be positioned to respond to changes associated with climate change and population growth.

In 2003, Chapter 90.46 of the Revised Code of Washington (RCW) was amended to require public water systems serving 1,000 or more connections to evaluate opportunities for reclaimed water when completing their water system plans. Please use this checklist to meet King County consistency requirements in responding to this legislation.

Water System Name: CITY OF TUKWILA
Date: November 12, 2013
PWS ID# 89500F
Contact: Pat Brodin

Please use this checklist, including the inventory template, to ensure that your water system plan includes sufficient information about opportunities for reclaimed water and your system's efforts to develop those opportunities. If a question is not applicable or the information is unavailable, then answer, "unknown" or "n/a." King County will consider the checklist completed if each answer is filled in with the best available information, even if the utility states that it is not aware of any reclaimed water opportunities within its service area.

1. Identifying Potential Future Demand for Reclaimed Water: King County maintains a database and map of potential reclaimed water users for evaluating future projects. Please use the template below, or similar table, to provide information to assist King County in further researching these potential uses.

• **Large Utility Water Users** (choose one):

- Attached is an inventory of twenty large (above 20,000 gallons/month on average), non single-family residential, water users served by our utility that have a potential for reclaimed water use, or
- Attached is an inventory of our utility's top twenty water users, or
- The information requested is unknown or not available.

Additional Comments: _____

• **Large Self Suppliers** (choose one):

- Attached is an inventory of large, self-supplied water users within our water utility's service boundaries - especially those near wastewater treatment plants, mainlines, outfalls, and pump stations or similar reclaimed water facilities), or
- The information requested is unknown or not available.

Additional Comments: THERE ARE NONE IN THE CITY OF TUKWILA

• **Other** (choose one):

- Attached is an inventory of other water users (such as those that are clustered near one another and could be served by a single system) that may be likely candidates for reclaimed water use, or
- The information requested is unknown or not available.

Additional Comments: SEE ATTACHED LIST OF TOP WATER USERS.

2. **Environmental Commitment:** Are you a city/town, or providing water service to a city/town, that has made commitments within resource management plans, salmon recovery plans, or other environmental initiatives for which there is a potential opportunity for using reclaimed water to assist in meeting commitments? (choose one)

Yes, here are plans that have potential for reclaimed water use in our service area to meet the above commitments:

The information requested is unknown, not available.

Additional Comments: THERE ARE NONE IN TUKWILA

3. **Identifying Areas of Potential Use of Reclaimed Water for Environmental Benefit:**

Below are *examples* of uses of reclaimed water *that comply with State, Federal and other reclaimed water environmental, health and safety standards*. All of these uses are currently in effect somewhere in Washington State. To the best of your knowledge, are any of these potential uses for reclaimed water applicable to your area?

River Augmentation (choose one):

Yes, our water rights are limited by instream flows. For more information, King County may contact:
N/A

The information requested is unknown, or not available.

Additional Comments: THE CITY IS NOT REQUIRED AUGMENT RIVER FLOWS

Groundwater Recharge (choose one):

Yes, we withdraw water from an aquifer that is in a groundwater management area, or from a declining aquifer, where water levels may need to be replenished or to maintain aquifer storage. For more information, King County may contact:

The information requested is unknown, or not available.

Additional Comments: THE CITY IS NOT REQUIRED TO RECHARGE GROUNDWATER

Water Rights Mitigation (choose one):

Yes, our area is pursuing, or planning to pursue, new or additional water rights, and there may be an opportunity to use reclaimed water for mitigation of those new water rights. For more information, King County may contact:

The information requested is unknown, or not available.

Additional Comments: THE CITY IS NOT PURSING NEW WATER RIGHTS

Potential Areas of Environmental Need (choose one):

Yes, parts of our service area include potential environmental enhancement locations, such as wetlands enhancement, aquifer recharge, stream flow augmentation, that might be candidates for reclaimed water use. For more information, King County may contact:

The information requested is unknown, or not available.

Additional Comments: N/A

4. **Local Reclaimed Water Legislation:** If water reclamation is mandated for this water system through local government agreement, contract, local regulations, ordinances, or other mechanisms, please provide a copy of the governing mechanism (choose one).

Yes, local legislation exists in our area in support of reclaimed water use. The following relevant legislation is attached (please list titles of documents):

No water reclamation legislation exists, or is known to exist, at a local level in our service area.

5. **Coordination with Local Wastewater Utility:** Include a brief description of your interactions with any wastewater or reclaimed water utility (King County or other) adjacent to your service area to evaluate any potential opportunities to develop reclaimed water (choose one).

Describe if applicable:
THE CITY IS WORKING WITH KRISTINA WESTBROOK @ KING COUNTY TO FIND ADDITIONAL CUSTOMERS FOR RECLAIMED WATER. #

None. Additional Comments: _____

**Template for
Inventory of Water Users and Identification of Potential Reclaimed Water Users**

Site Owner or Site Name	Site Address (for general mapping purposes)	Estimated Annual Water Use	Water uses not requiring potable water ¹	Is this a Potential Reclaimed Water Customer?
CITY TUKWILA			SEWER AND ROAD USE	IS A USER
STAR FIRE SPORTS CENTER			IRRIGATION OF TURF FIELDS	IS A USER
FIARWAY CENTER	12420-14240 INTERURBAN AVE SOUTH		IRRIGATION	YES
BRAVO ENVIRONMENT	6437 144TH		SEWER CLEANING	YES

¹ See Washington State Reclamation and Reuse Standards, September 1997, Section 1, Articles 1-5 for allowable uses of reclaimed water.
<http://www.ecy.wa.gov/PROGRAMS/WQ/reclaim/standards.html>

Account	Name	Address	5-Year Average Demand	Model Node
08-0790	SHASTA	1227 Andover East	44.8	Shasta
07-0002	WESTFIELD	2800 Southcenter Mall	34.8	268
12-0380	BOEING	9747 East Marginal Way S	34.7	521
12-0385	BOEING	9747 East Marginal Way S	24.5	521
07-0001	WESTFIELD	2800 Southcenter Mall	25.7	264
08-0214	CHA S/C	16500 Southcenter Parkway	25.4	438
12-0255	BOEING	7755 East Marginal Way S	23.9	1053
15-0585	EMBASSY	15420 East Valley Hwy	24.5	241
12-0360	BOEING	9407 East Marginal Way S	22.1	1056
12-0309	JORGENSEN	8531 East Marginal Way S	21.8	436